ICT Regulation Toolkit

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The ICT Regulation Toolkit is a joint production of infoDev and the International Telecommunications Union (ITU).

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1 Overview
Regulating the Telecommunications Sector

The ICT Regulation Toolkit, produced by the Information for Development Program (infoDev) and the International Telecommunication Union (ITU), is a practical, web-based tool intended for ICT policymakers and regulators around the world. Module 1 provides an overview of the Toolkit while Modules 2-7 cover a number of specific topics including competition and pricing; authorization; universal access; radio spectrum management; legal and institutional frameworks; and new technologies. The Toolkit also contains extensive practice notes and reference materials. Under each Module abstract below are links to the full text of the module, the executive summary, and a clickable table of contents. Translated versions are included where available.

1.1 CONTEXT

This chapter examines the evolving context of ICT Regulation and consists of the following six sections.

1.1.1 NEW VOCABULARY, NEW ECONOMY, NEW REGULATION

Our vocabulary is evolving as existing words assume new meanings – app, burn, rip, text, game, cookie – or appear in new combinations, such as smart phone, cyber crime, file sharing, instant message, search engine and navigation bar. Some vocabulary is entirely new, including blog, podcast, googling, Web 2.0 and Wikipedia. The range of acronyms continues to expand – MP3, P2P, SMS, BPO, DRM, NGN, VoIP, VoBB, WiMAX, NGA, IP and LTE. This evolving vocabulary can even evoke the experience of an era, such as the “dotcom bubble.” The field of ICTs reflects the growing and highly significant contribution of the Internet and other burgeoning technologies to a new landscape of economic and social activities and relations. The landscape is populated by innovative ways of performing existing and new activities. In terms of the evolving vocabulary, we have entered the “Information Society” and the “New Economy.”

The infrastructure and services of electronic communications (previously known as telecommunications) are central components of ICTs and the associated networked landscape. The key characteristic of these components is that they are regulated by government administrative agencies. Consequently, there is a direct link between the performance and development of the New Economy/Information Society and the regulation of ICTs. Furthermore, government regulation of ICTs extends into many adjacent areas, such as content, copyright, privacy, culture, mergers, and market entry and exit, which extends the impact of regulation in the New Economy/Information Society.

Importantly, as the Toolkit demonstrates, the substance of ICT regulation has continued to evolve with the emerging technologies. The liberalization of ICT markets has stimulated cumulative interacting innovations in products, services and technologies with a general convergence or blurring of distinctions between platforms, products and services in an IP or Net-centric world. These developments necessitate some form of regulatory response either to support or impede them. The evolutionary nature of regulation is evident in the moving target of European Union (EU) regulation. There have been successive “packages” updating the framework from 1987 to 1998 and, most recently, to 2002. Increasing numbers of countries are adopting this framework as they accede to the European Union or become candidate members. The EU regulatory approach is also reaching outside of Europe and influencing the frameworks that other countries are adopting. Consultations and recommendations on a new framework with new subjects took place in 2006 with a continued shift to less sector-specific and more regulation in the European Union. Significantly, these EU regulatory packages have been forcefully linked to broader policy objectives concerning inclusiveness, innovation, job creation, growth, energy and environmental issues in the New Economy or Information Society. The EU is not alone in this process; most ITU members have also implemented ICT strategies. For example, Rwanda Information Technology Authority, National Information and Communications Infrastructure Plans, see . Also see Info-communications Development Authority of Singapore, Infrastructure Programs at.

1.1.2 ICTS AND THE TRANSFORMATIONAL OPPORTUNITY AND RISKS

ICTs offer major transformational opportunities. They can contribute to enhanced productivity, competitiveness, growth, wealth creation, poverty reduction and can spur the knowledge-based economy. ICTs provide the means by which knowledge is developed, stored, aggregated, manipulated and diffused. ICTs also enable participation in the global economy.

In 2006, a report published by the U.S. National Academy of Sciences began by stating: "*The New Economy refers to a fundamental transformation in the United States economy as businesses and individuals capitalize on new technologies, new opportunities, and national investments in computing, information, and communications technologies. Use of this term reflects a growing conviction that widespread use of these technologies has made possible a sustained rise in the growth trajectory of the U.S. economy …. While the telecom sector accounts, by various measures, for about one percent of the U.S. economy, it is estimated to be responsible for generating about ten percent of the nation's economic growth.*"[*] The New Economy, the Information Society and associated transformations and opportunities reach out and engage all countries.

These opportunities are well known and are not just a developed country phenomenon. ICTs, particularly access to broadband Internet, are vital for developing nations as well. The ITU's *Build on Broadband* project is dedicated to promoting equitable, affordable broadband access to the Internet for all people, regardless of where they live or their financial circumstances.[*] In a speech on July 9, 2009, ITU Secretary-General Dr Hamadoun I. Touré stated: "*[I]n the 21st century, affordable broadband access to the Internet is becoming as vital to social and economic development as networks like transport, water and power. Broadband access – and the next generation broadband network infrastructure which underpins it – is a key enabler for economic and social growth… Broadband changes everything. It enables not just great new enabling applications, such as VoIP and IPTV, but also the delivery of essential services – from e-health to e-education to e-commerce to e-government. And broadband is helping us make great progress towards meeting the Millennium Development Goals – and improving the quality of life for countless people around the world.*"[*]

A new program focused on bringing ICTs to the developing world was introduced by the World Bank in 2008. This program, called New Economy Skills for Africa Program-Information and Communication Technologies (NESAP-ICT), supports the growth of Information Technology (IT) and IT Enabled Services (ITES) industry in Sub-Sahara African countries.[*] The NESAP-ICT program noted that ICTs transform the economy and peoples' lives and provided various examples, including:

- **New jobs**: In India, the expansion of the IT-ITES industry over the last 15 years has added more than 10 million direct and indirect jobs. In South Africa, the industry has employed 100,000 workers directly and indirectly by 2009. In the Philippines, a projected 900,000 people will be employed directly or indirectly by IT-ITES by 2010;
- **Economic growth**: In 2009, the Indian IT-ITES industry contributed an estimated US$ 70 billion to the GDP or six percent share of total GDP. In the Philippines, the industry's contribution in 2010 is expected to reach US$ 13 billion, or about eight percent of GDP.
- **Increased productivity**: The rapid spread of e-applications and digital tools to such diverse areas as manufacturing, transportation, logistics, finance, banking, governance, health, education and even in traditional sectors like agriculture is transforming the economies of developing countries. IT investments have been found to raise worker productivity three to five times that of non-IT capital. U.S. studies have shown that the IT-ITES industry was responsible for two-thirds of total factor productivity growth between 1995 and 2002 and for nearly all of the growth in labor productivity in that period.

Clearly, ICTs can have an impact on everyday lives and on general economic activity, but the opportunities only materialize fully to the extent that the regulatory framework, as implemented, supports and fosters both investment in and widespread diffusion of ICTs. Absent these conditions, the full promise of ICTs is unrealized. ICTs offer the prospects of rapid advancements, but if appropriate conditions are not in place, the outcome can be a rapid slide down the digital divide. And although the digital divide is narrowing, particularly due to the rise of Internet-enabled mobile phones and applications, a new broadband divide is growing that governments need to address.[*]

There are some stunning successes, particularly with regard to mobile services. In 2002, the total number of mobile subscribers in the world surpassed that of fixed customers. Between 2004 and 2009, mobile phone subscriptions worldwide grew from nearly 1.8 billion to an estimated 4.6 billon, translating into a growth in mobile penetration from less than 28 percent to 67 percent.[**]

The Asia-Pacific region is the largest mobile market in the world, and by 2013, Asia is expected to have almost three billion mobile subscribers. In 2008, China alone had 634 million mobile subscribers, which far exceeded the combined number of mobile subscribers in Japan and the United States at 110 million and 270.5 million subscribers, respectively.[*] Sub-Saharan Africa had a mobile penetration of rate of 32 subscribers per 100 people in 2008, this translated into over 246 million mobile customers.[*]

Mobile phone handsets are now turning into smart-phones equipped with digital cameras, Internet-enabled video, pre-installed social networking applications such as Facebook and music juke box payment terminals. "Billboard" magazine publishes a list of top 20 ring tones, a market that generates billions of dollars in revenue. These new functionalities are transformational. For example, as digital cameras, mobile devices provide benefits such as instant news gathering or create harmful effects like facilitating industrial espionage. Their Internet-enabled video, access to social networks and music capability brings them into the realm of media, copyright and Internet governance. As a component of the banking system, the mobile network can provide services where the financial network is weak, but there is also the risk of banking fraud and identity theft. These widely used electronic consumer devices now straddle several regulatory jurisdictions, raise new legal issues, and present new challenges to existing regulatory frameworks. From a government standpoint, the challenge becomes how to sustain investment and promote widespread diffusion of technologies, while protecting the legitimate interests of all players, particularly consumers.

ICTs have significantly impacted business operations where a large number of new, non-OECD countries have successfully entered the market. This is particularly the case for software and ITES. Market entry is partly explained by the "death of distance" or the dramatic fall in the costs of international connectivity. The latest manifestation is the proliferation of broadband access networks. Broadband can carry huge quantities of data, at very high speeds. Although postal and courier services can deliver large quantities of data (*e.g.*, a truckload of CDs), they fail the speed test. To transfer the digital information contained in an average two-hour movie downloaded from Apple's iTunes takes about three days using a 56Kbps dial-up modem; two hours using a 1.5 Mbps connection; two minutes using a 100 Mbps connection; and 15 seconds using a 1000 Mbps (1 Gbps).[*]

In the broadband world, large volumes of data can be moved almost instantaneously to widely dispersed locations at low cost. Through the application of ICTs, many services once considered non-tradable are now tradable, such as back-office functions including the management of employee benefits or dental records. "Out-sourcing" and/or "business process off-shoring" (BPO) have seen massive increases, amounting to a total addressable market estimated at US$ 300 billion, of which US$ 100 billion will be off-shored by 2010.[*] In the BPO market, India is a tremendous success story. It has become the dominant player in the BPO market. Growth in India's BPO exports were 44.5 percent in 2005 and employment in the sector increased from 42,000 jobs in 2002 to an estimated 470,000 in 2006. The state of Andhra Pradesh increased its ITES exports from US$ 37 million in 2001 to US$ 714 million in 2005. Other countries like the Philippines, Brazil, Romania and Ireland have also been particularly successful in attracting investment and creating employment from BPO-related activities. But these successes have come about due to a commitment from the government to foster and support these activities by implementing necessary policies and developing the supporting regulatory framework. In the case of India, government policies and reforms, including telecommunications reforms implemented in 1999, established the foundations for these new activities.

The use of ICTs in e-government services is also transforming citizens' interactions with the public sector by improving efficiency, effectiveness and accountability of governments. In India, for example, a comparison of manual and e-government services found that computerized services substantially increased cost-savings and access to services.[*] The survey showed that e-services lowered travel costs, made delivery of services more predictable, decreased waiting times, reduced corruption and generally improved overall quality of service.

Although ubiquitous and open networks produce great gains for society as a whole, they also increase our vulnerability. Maximizing the connectivity and openness of networks requires regulators to create new laws in several areas, including privacy and data protection; protection of children online; and prevention of cyber crimes such as identity theft.[*] Regulators must also ensure that law enforcement techniques evolve with technology in order to continue protecting society against those who would take advantage of these vulnerabilities. This requires adequate provisions for emergency services and lawful interception (*i.e.*, "wiretapping"). [*] GSR 2009 Discussion Paper, Rory Macmillan, Connectivity, Openness and Vulnerability: Challenges Facing Regulators at

Reference Documents

- **GSR 2009: Connectivity, Openness and Vulnerability: Challenges Facing Regulators**
- **IC4D 2009: How Do Manual and E-Government Services Compare? Experiences from India**

1.1.3 TRANSITION TO NEXT GENERATION NETWORKS

The ITU defines a **Next-Generation Network** (NGN) as a "*packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.*"[*]

In short, NGNs are fully converged IP networks in which a single service provider offers every different type of communications services – fixed and mobile voice, video and Internet – using various technologies, such as DTH, digital cable, DSL, LTE, DVB-H and IPTV. Consumers benefit from new services and lower prices, as well as greater convenience through multifunction devices and through “triple” or “quadruple” play bundles that combine all communications services into one package.

NGNs, mainly based on fiber optics, continue to be deployed around the world with countries taking different regulatory and market approaches to promote deployment. The Asia-Pacific region is ahead of other regions in developing NGN infrastructure and access, which tend to be financed by the operator with strong governmental support and a strong preference for FTTH.[*] For example, the Japanese government directly subsidizes current providers, which has resulted in a 35 percent increase in deployment of fiber-to-the-home (FTTH) from 2007-2008 and an 83 percent increase in 3G mobile deployment between 2004 and 2007. Other Asia-Pacific countries, like New Zealand and Singapore, are seeking to implement a wholesale only network. Meanwhile, Australia has created a state-sponsored NGN company.

The European approach has been to promote competition through open access requirements.[*] This has resulted in relatively small and limited deployments rather than nationwide build-outs of FTTH. The French government, for instance, established a new framework for the regulation of NGNs in 2008, requiring operators with significant market power (SMP) to provide wholesale access to ducts in a transparent, non-discriminatory and cost-oriented manner. SMP obligations also require symmetrical regulation of the sharing of the last part of the fiber loop. French law further requires each operator rolling out fiber within a building to give other operators access to its fiber network. Other countries have favored direct state intervention.

In Latin America, there is a need for innovations in both infrastructure and business models to make deployments in rural regions with low ARPU users. Operators are considering how they can provide services to the consumer segment, offer seamless access to these services and also introduce new offerings in a quick and cost effective way. Not surprisingly, these service providers have begun the transition to NGN core networks. Regarding NGN access developments, wireless NGN access technologies seem more promising in this region. Some operators have initiated FTTx projects for NGN access networks. At this stage, however, the high costs and uncertain returns limit such projects to high population, high-income areas. Therefore, other types of technologies, such as WiMax, are gaining popularity. [*] World Bank, Tim Kelly, Victor Mulas, Siddhartha Raja, Christine Zhen-Wei Qiang and Mark Williams, What Role Should Governments Play in Broadband Development? at .

1.1.4 INNOVATIVE TECHNOLOGIES AND SERVICES

All ICT organizations have legacy assets, some more than others. The evolving regulatory frameworks have facilitated or even encouraged the introduction of new technologies and services. Ideally, ICT organizations would like to manage the transition to new technologies in a way that allows them to optimize their returns on legacy assets. The reason is that new technologies disrupt (or make obsolete) pre-existing business plans and thereby the value of legacy assets. In economic terms, this is an example of a “Wave of Creative Destruction” in which **disruptive technologies** can bring wider choices and lower prices for the consumer.

Innovative technologies and NGNs may offer substantial opportunities for incumbents with limited legacy assets, as is the case in many developing economies. But for those with significant legacy assets, innovative technologies and services could be very disruptive if the incumbents do not remain competitive and continue to innovate. Chief executive officers in many developed economies may be forced to choose between competing with their own businesses and having another company doing it. The threat of innovation may also cause some strong incumbents to adopt delaying tactics. The extent to which they can adopt such tactics depends largely on the effectiveness of implementing pro-competitive regulatory frameworks. However, innovative technologies and NGNs can benefit incumbent service providers through the lower costs of using more efficient technology. They also allow providers to compete in new service areas to offset declines in tradition lines of business.

Incumbents are also facing disruptive elements in cases where, frustrated by existing suppliers, local governments and municipalities are constructing their own networks, sometimes using the “open access” model and the “bottom up” development of applications. For example in Ottawa, Canada, local residents are able to purchase their fiber connections directly from the municipal government, which has built and continues to subsidize fiber network. Such “open access” models are also gaining currency in international networks.[*] These are the technological advances that gave rise to the ICT Regulation Toolkit.

The process of managed transition is becoming more difficult in the current ICT environment for at least two reasons. First, the rate of change in technology is increasing (see **Module 5**, Radio Spectrum Management and **Module 7**, New Technologies and Impacts on Regulation). Secondly, the organizations introducing the new technologies are not necessarily members of the traditional ICT/telecommunications community, but innovators that may not play by the same rules. Established organizations as well as new entrants are arming themselves with different business models like "triple/quad play," "always on," "flat charges," "all you can eat," or even "free." These business models differ from the more traditional models where a limited range of services or a single service are offered at prices based on distance and time. In some instances, the provision of voice services is ancillary to the main line of business of the new entrant. For example, the voice version of Yahoo! Instant Message service is not the core business of the company.

Voice over Internet Protocol (VoIP) is an example of an innovative and disruptive technology. VoIP demonstrates that the basic premise of traditional voice telephony – the network and voice services must be owned and operated by the same firm – is no longer relevant. VoIP is disrupting the pre-existing business plans of traditional telephone service providers and is being introduced by firms outside the traditional community.[*] For instance, Google launched its Google Voice service in March 2009. Rather than own or operate any part of the underlying network, Google simply offers an application that gives users one phone number for all of their phones, provides free long distance within the United States and has low international calling rates.

Another innovative and disrupting technology is Internet Protocol television (IPTV). By providing video services, such as live television channels and video-on-demand (VOD), as well as interactive services, over an IP platform, IPTV allows traditional telephone service providers to compete with terrestrial over-the-air broadcasters, cable television operators and satellite television providers.

ICTs have transformed many other activities, notably the media and the creative industries. Traditional broadcast media offer limited "mass fare" to mass audiences, due to the economics of the sector and radio spectrum restrictions. Cable and satellite platforms have expanded choice for television and radio by offering services such as video-on-demand. However, new technologies expand choice immensely and are able to cater to targeted audiences. The combination of broadband (wired or wireless), the digitalization of media content, and the falling costs of producing digital content herald an age of abundance. The falling costs of producing media has placed digital content production, including documentaries, entertainment, news, music, blogs, in the hands of many and has created a bottom-up trend.

The introduction of broadband and the switch to digital from analogue broadcasting will increase delivery capacity enormously in comparison to traditional broadcasting. New content producers have a means of distributing their creations instantly and globally. Content can be customized to the personal tastes of an individual rather than be defined for a mass audience. Many observers are focusing on the "long tail"[*] of digital content in which a large number of unique services, content or applications are sold in relatively small quantities. Although there are still services and items that large numbers of people will wish to purchase, many small providers and developers can become successful by selling their products to niche markets. With broadband, this "long tail" of niche media content has found a highly receptive audience, for example, through the popularity of the video-sharing site "YouTube." Apple's iPhone App Store provides another example of how small developers are finding great success by targeting the "long tail." After a developer completes a relatively simple process for developing and getting approval for a new application, iPhone subscribers are able to search through and download these specialized applications at fees set by the developer. By the end of 2009, there were more than 125,000 developers in Apple's iPhone Developer Program and subscribers had downloaded over two billion of their applications.[*] This continued abundance of choices in existing and new digital content, produced and distributed at rapidly falling costs on converged platforms, presents new disruptive challenges to both existing players or "majors" (content producers and distributors) and regulators.

The rapid increase in content choices for consumers and the speed of delivery through broadband Internet are also transforming social and cultural landscapes. For example, broadband helps to reduce carbon emissions through environmentally-friendly business practices such as remote management of equipment, telecommuting and live video-conferencing and can result in a reduction of carbon emissions five times greater than the emissions that the ICT industry produces.[*] The growth of innovative technologies, NGNs and convergence promises to become a disruptive force for the way individuals interact with one another in society. [*] Dev, Broadband as a Platform for Economic, Social and Cultural Development: Lessons from Asia at .

Practice Notes

- Public (Municipal) Initiatives
- The municipal wireless broadband networks in Knysna and Tshwane in South Africa

Reference Documents

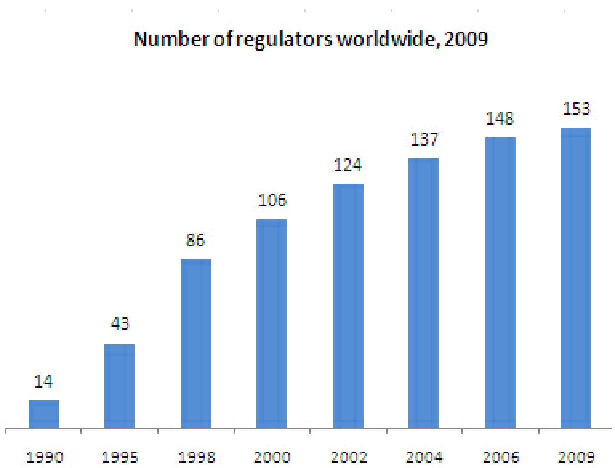
- Next Generation Networks and Universal Access: The Challenges Ahead

- Open Access Models
- Open Access Report

1.1.5 HOW DID WE GET HERE?

The ICT past was populated by Ministries of Post, Telegraph and Telecommunications (MPTTs), which set the policies; determined the technical standards; designed and certified equipment; controlled the radio spectrum; allocated numbers; managed assets; made investment decisions; set prices; operated businesses; granted privileges; and regulated these largely state-owned communications administrations.

In the 1980s and 1990s, the communications landscape in some countries started to change in large part due to changing technological development and business opportunities interacting with each other. In this period, there were also institutional developments. Telegraph lost its importance, while post and telecommunications generally became structurally separated regulators. As of the end of 2009, 153 countries and administrative regions had created a national regulatory authority for their ICT and telecommunication sectors. Ninety-three percent of African countries have a separate sector regulator, which is the highest percentage in the world.* Of the countries in the Americas, 89 percent have a separate sector regulator, followed by 80 percent in Europe, 66 percent in the Arab States and 62 percent in Asia-Pacific countries. Figure 1 below shows the growth in the number of ICT and telecommunications sector regulators since 1990.**Figure 1. Growth in the number of regulators worldwide**



Source: ITU

In addition to changes to the regulators' functions and jurisdictions, there has been a substantial trend towards liberalization in which state-owned operators were partially or wholly transferred to the private sector. Most significantly, the telecommunications sectors were liberalized as new entrants were licensed in mobile, fixed and Internet markets. Postal services have also been liberalized, but this has usually been after telecommunications. By opening markets, the burden of investment was shared among multiple operators, which mitigated the potentially dangerous risks of misguided decisions by a single operator. For example, as noted in Module 2, the 2009 ITU World Telecommunication Regulatory Database lists that 171 countries around the world have opened their mobile cellular markets to competition by 2009.

Series of clusters of innovation were stimulated by liberalization. The Internet and other platforms have dramatically expanded the global market for electronic communications and applications so that the prefix "e" for "electronic" is now extremely commonplace in all jurisdictions. During this process the traditional telecommunications sector has been transformed in a radical manner to ICTs, which has become both more significant as an economic sector, as well as a major contributor to the competitiveness of firms, cities, regions and countries. Major institutional developments accompanied this transformation. Sector-specific, independent institutions were established to perform regulatory functions in the context of new ICT policy frameworks. Regulations continue to be amended and updated in response to market and technological changes. Some countries have moved from sector-specific *ex ante* regulation in certain markets to *ex post* regulation. Increasing numbers of countries have followed this path of change so that now the old MPTT model is a rarity.

More recently, governments have adapted to converging technologies, such as IPTV and mobile TV, by merging the telecommunications regulator with the broadcasting and content regulator. In Korea, for example, the Ministry of Communications and Information regulated the telecommunications sector while the Korean Broadcasting Commission regulated broadcasting and content until 2008 when the government established a converged regulator called the Korea Communications Commission.** See Korea Communications Commission Annual Report 2008 at .

1.1.6 REGULATORY SEQUENCING

Once the decision to liberalize the market has been taken, the next step is to provide an appropriate regulatory framework and institution(s) to implement the decision. However, there is no simple sequencing for the drafting and adoption of the framework since several issues must be addressed simultaneously. Interconnection, universal access and service, regulatory processes, means of dispute resolution, market definition methodologies, licensing/authorization procedures and tariff-setting principles all need to be resolved in a fairly compressed period. Furthermore, most of these issues interact with, relate to, or rely on the other components of the body of regulations. The body can then be amended in light of market and technological developments.

The absence of a simple sequence also means there is no obvious order of topics addressed in this module or in the Toolkit as whole. Instead, the module starts with issues related to the regulatory agency, the characteristics that enhance its legitimacy, the functions performed by the regulator and others, as well as the supporting legal environment. The module then presents regulatory issues related to authorization and competition, interconnection, universal access, radio spectrum, and finally, the impact of new technologies.

1.2 THE REGULATOR

This chapter examines the role, rationale, and requirements of the ICT regulator and consists of the following five sections

1.2.1 RATIONALE FOR AN EFFECTIVE AND INDEPENDENT REGULATOR

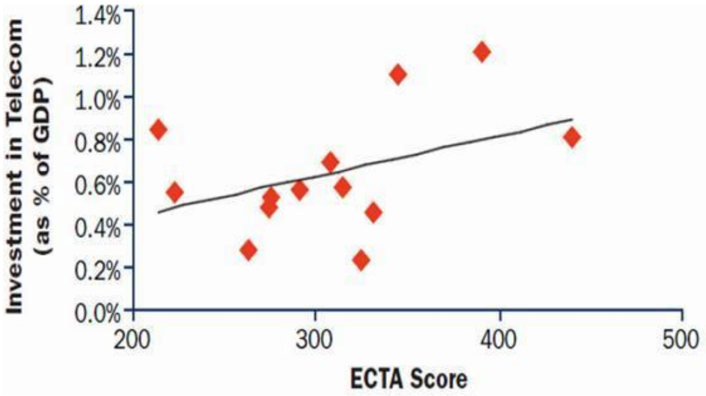
Effective regulators are normally associated with being independent to some degree. The rationale for establishing independent, often sector-specific, regulatory institutions is based on ensuring non-discriminatory treatment of all players in the liberalized market. At the outset of the transformation process the pre-existing monopoly structure allows for discriminatory behavior. The emphasis on non-discrimination arose from four sources which, in part, reflect different constituencies in the market. These four broad imperatives are to ensure that:

- Cooperation is enabled in a competitive environment to ensure that a level playing field exists between unequal entities in the marketplace;
- All equipment suppliers are treated equally where the market is dominated by a single buyer with strong pre-existing relationships with suppliers;
- All new entrants and investors in the telecommunications service sector are treated equally by the dominant competitor, who will be a supplier of inputs (*e.g.*, interconnection) to the businesses of the new entrants; and
- All customers have a “voice” and their complaints and interests receive an adequate response.

Addressing non-discrimination involves building confidence in and the legitimacy of an “independent” regulatory institution. The central issue is establishing a functioning, enabling environment consisting of the regulator(s) and regulations that will attract sufficient and sustainable investment to satisfy existing demand, expand supply and introduce new services. Independence stimulates investor confidence and reduces regulatory risk.

The UN Task Force on Financing ICT supports the introduction of independent regulators, linking such independence to growth in the market. The Task Force has observed that: *“The introduction and strengthening of independent, neutral sector regulation has helped to reinforce investor confidence and market performance, while enhancing consumer benefits.”*[*]

Reinforcing investor confidence through an independent and effective regulator will attract private investment in the ICT sector. As detailed in the succeeding sections, independence, transparency of the regulatory process and regulatory policies that encourage competition are factors that influence the level of investment in ICTs.[*] An effective regulator results in less regulatory risk and increases the likelihood of investment in the sector. Figure 1 shows the relationship between effective regulations and investment. The higher score from the European Competitive Telecommunications Association (ECTA), the more effective the regulations are. As the figure below demonstrates, investments in telecommunications rise as the regulatory environment improves.



◂ **Figure 1. Relationship between Effective Regulation and Investment in Telecommunications**

Source: Impact of Effective Regulation on Investment: an Investor's Perspective, Zain Group citing the European Competitive Telecommunications Association (ECTA) which annually publishes a regulatory scorecard on the link between effective regulation and investment

Reference Documents

- GSR 2009 Discussion Paper, Impact of Effective Regulation on Investment: an Investor's Perspective
- Training Regulators in Africa

1.2.2 WHAT IS "INDEPENDENCE" AND HOW IS IT FOSTERED?

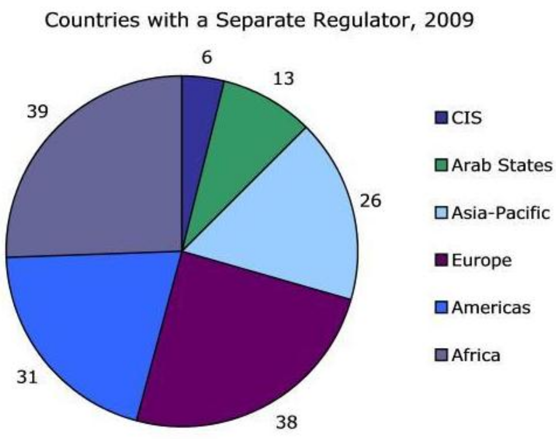
Absolute independence of regulatory bodies is neither possible nor desirable. A regulator should not set and implement its own agenda. "Independent" regulators are expected to be subject to government oversight and a system of checks and balances.

Effective regulation that supports sustainable investment requires some independence from political influences, especially on a day-to-day or decision-by-decision basis. The regulatory body must be an impartial, transparent, objective and non-partisan enforcer of government-determined policies by means set out in controlling statutes of the regulator, free of transitory political influences. The regulator should also be independent from the industry that supplies ICT services.

The regulator should implement the policy of the government and only make decisions that are within its legal authority. However, regulators need insulation from political intervention, so that the regulatory process is not politicized, its decisions are not discredited and the policy of the government is implemented. As discussed in **Module 6**, Legal and Institutional Framework, a balance is needed to ensure that the regulator is both independent and responsive to the broad policies of the government. Several formal safeguards have been employed to achieve such a balance, such as:

- Providing the regulator with a distinct statutory authority, free of ministerial control;
- Prescribing well-defined professional criteria for appointments;
- Involving both the executive and the legislative branches of government in the appointment process;
- Appointing regulators (the Director General or Board/Commission members) for a fixed period and prohibiting their removal (subject to formal review), except for clearly defined due cause;
- Where a collegiate (Board/Commission) structure has been chosen, staggering the terms of members so that they can be replaced only gradually by each successive government;
- Providing the agency with a reliable and adequate source of funding. Optimally, charges for specific services or levies on the sector can be used to fund the regulator to insulate it from political interference through the budget process;
- Exempting the regulator from civil service salary limits to attract and retain the best qualified staff and to ensure adequate good governance incentives; and
- Prohibiting the executive from overturning the agency's decisions, except through carefully designed channels such as new legislation or appeals to the courts based on existing law.

There are currently far more regulatory authorities independent from ministerial control around the world than dependent regulators. 153 countries have established regulatory authorities that are separate from the ministries. As shown in Figure 1, Section 1.5, there has been a steady rise in the number of separate regulators over the last 20 years. 125 of these countries with separate regulators have also ensured that the regulator is autonomous – or independent – in the decision-making processes. The separate regulator in the remaining 28 countries must get approval from the relevant ministry or other official body prior to issuing decisions.*



◂ **Figure 1. Number of Countries with Separate Regulators around the World**

Source: ITU [*] ITU, ICT EYE, Regional Reports (2009).

Practice Notes

- Independence of the Polish Regulator

1.2.3 ACCOUNTABILITY, TRANSPARENCY, AND PREDICTABILITY

In addition to independence, an effective regulator should demonstrate other characteristics, including accountability, transparency and predictability. These traits should be enhanced by a clear division of responsibilities between the ICT regulator, ministries and other regulatory agencies, such as the competition authority or radio spectrum management body where relevant.

The independence of the regulator must be balanced with accountability. The regulator's authority provides it with significant power to redistribute income among different constituents in the economy. Therefore, safeguards are required to ensure that the regulator does not become corrupt or inefficient. Citizens and regulated firms must know who is responsible for a decision and the reasoning behind the decision. Interested parties must be able to provide relevant input to a decision through consultation processes. They must be able to obtain redress easily and quickly when the regulator has acted arbitrarily or incompetently. These types of safeguards produce a balance between independence and accountability. Several formal safeguards have been employed to achieve this balance, such as:

- Publishing the statutes of the regulator that clearly specify the duties, responsibilities, rights and obligations of the regulator, as well as differentiating between primary and secondary regulatory goals where there are multiple goals;
- Ensuring that the decisions of the regulator are subject to review by the courts or some other non-political entity although some "threshold" should be established to deter frivolous challenges that simply delay the implementation of decisions;
- Requiring the regulator to publish annual reports on its activities and requiring a formal review of its performance by independent auditors or oversight committees of the legislature;
- Establishing rules for the removal of regulators if they show evidence of misconduct or incompetence;
- Allowing all interested parties to make submissions to the regulator on matters under review; and
- Mandating that the regulator publishes its reasoned decisions.

Transparency in interconnection, authorization and licensing practices, and universal service obligations is a specific requirement of the World Trade Organization (WTO) and a general requirement of the EU regulatory package. Transparency entails the regulator making available all relevant information in a timely fashion. Transparency enhances the confidence of interested parties in the effectiveness and independence of the regulator and strengthens the legitimacy of the regulator. Consequently, all regulatory rules and policies, the principles for making future regulations and all regulatory decisions and agreements should be a matter of public record. ICT regulation is an important policy issue, and all citizens need information about the policy to evaluate the performance of government.

Transparency is an important contributor to good governance in general. Importantly, transparency reduces the probability that interested parties, especially those adversely affected by a regulatory decision, will believe that decisions are biased, arbitrary or discriminatory. The reasoning behind regulatory decisions, including the principles and evidence that guided them, will be apparent when they are clearly presented in the public record. Discriminatory or corrupt decisions will become evident and more difficult to substantiate once transparent processes are in place.

A successful market that attracts investors requires a predictable regulatory process. Independent regulators are predictable if they adhere to the rule of law. The most important features of the rule of law are respect for precedent and the principle of *stare decisis*, particularly in common law jurisdictions. Respect for precedent means that regulators do not reverse policy decisions unless there is evidence that those decisions have led to significant problems or that new circumstances warrant a change in the rules. The principles of *stare decisis* require that cases with the same underlying facts be decided in the same way every time. This is of particular relevance in the resolution of disputes. Adherence to these principles enhances confidence in and the credibility of the regulator and reduces regulatory risk, which reverberates positively with investors.

Practice Notes

- **Interconnection Principles Contained in the WTO Regulation Reference Paper**
- **Using the Web to Increasing Licensing Transparency**

Reference Documents

- **World Trade Organization - Reference Paper**

1.2.4 WHAT IS THE ROLE OF REGULATORS?

Often there are sector-specific regulators, general regulators (such as competition authorities), and special agencies or ministries charged with specific tasks (such as spectrum management), that all share common duties. As noted by the UN Task Force on Financing ICT, this Toolkit and other sources, the most important duties of the regulator(s)[*] include:

- Implementing the authorization framework that provides opportunities for new companies and investors to establish ICT businesses. Simple authorization procedures tend to maximize new entry (see **Module 3**, Authorization of Telecommunication/ICT Services).
- Regulating competition (including tariffs) involving the effective enforcement of fair and equitable competitive market principles, restraining the power of dominant suppliers and leveling the playing field for new entrants (see **Module 2**, Competition and Price Regulation).
- Interconnecting networks and facilities. Normally transparent rules are established for interconnecting all types of traditional and new communications networks and associated cost-based payments (see **Module 2**, Competition and Price Regulation).
- Implementing universal service/access mechanisms to ensure the widespread (and affordable) diffusion of ICT (see **Module 4**, Universal Access and Service).
- Managing the radio spectrum effectively to facilitate new entrants and new technologies, which is particularly relevant to new broadband wireless opportunities such as Wi-Fi and wimax (see **Module 5**, Radio Spectrum Management).
- Establishing sufficient safeguards to ensure that consumers, particularly children, are protected against bad business practices, cyber crimes and violations of data privacy (see **Module 6. Legal and Institutional Framework).**
- Minimizing the burden and costs of regulation and contract enforcement (see **Module 7**, New Technologies and Impacts on Regulation).

All of the above continue to evolve and to present new challenges in the context of market and technological developments, especially the growing availability of broadband and the increasing prevalence of convergence. For example, many countries have adopted consumer protection regulations specifically designed for ICT customers, which are enforced by the ICT regulator and/or a designated consumer protection agency. The Australian Communications and Media Authority (ACMA) has instituted measures to protects consumers' interests in the Internet Age by investigating complaints about online content and gambling services; encouraging the development of codes of practice for ISPs; and educating the public about Internet safety and privacy risks, particularly for children.[*]

To better adapt to the new converged landscape, governments have also been developing coherent national broadband strategies as a vital component of overall deployment and access to broadband services. For instance, those OECD countries leading in broadband penetration rates have typically established national broadband policies. These countries include Korea (Rep.), Denmark, the Netherlands, Sweden, Finland, and the United Kingdom.[*] As a step towards improving its ranking for broadband penetration among OECD countries, the United States is currently developing a National Broadband Plan to be presented to the U.S. Congress in February 2010. Rather than engage in broad regulatory intervention, the government's role in the provision of broadband should be based on sound economic principles limited to ensuring that markets function effectively and access is reasonably available to all.

The role of the regulator in broadcasting is similar to some of the functions of the ICT regulator such as allocating and managing the radio spectrum, licensing service providers and ensuring universal access. But broadcasting regulators have additional duties regarding the social and cultural impact of the sector. They are also charged with overseeing content and ensuring diversity, protecting minors, the right of reply, etc. Furthermore, if there is a Public Service Broadcaster (PSB), the regulator performs some form of oversight of it and private channels.

The proliferation of broadband and the digitalization of content are bringing about a profound and rapid transformation of the media/content landscape, which may change regulatory functions. Russia, for instance, has issued several Internet Protocol Television (IPTV) licenses. It is quite common for a radio "chat show" to take a call from someone living overseas and listening to the program on the Internet. Both the Russian TV and the chat show channels are licensed but many service providers are not. The aggregate audience for the unlicensed self-produced and "long tail" content exceeds that of traditional broadcasters in some countries. For example, in July 2009 alone, YouTube's audience exceeded 120 million people in the United States – or approximately one-third of U.S. population. The explosion in content provision is a huge challenge to content regulation (how does the regulator screen everything?), which is made even more difficult because a large proportion of the content may originate in other jurisdictions. As "mass markets" retreat, it will be necessary to reconsider the regulation of national broadcasting institutions and thereby the functions of the regulator.

Where PSBs, cable and satellite channels remain in a strong position, the regulator(s) will have a role to play in the application of competition policy, including merger control. This competition policy issue centers on the relationship between dominant/non-dominant access providers and dominant/non-dominant content providers.

In light of the recent global economic crisis, regulators can also play a key role in increasing confidence, reducing risk and encouraging investment in the ICT sector overall. In particular, regulators are able to play a role in investment by 1) lending financial support through "stimulus packages" and public private partnerships and 2) lowering the costs of doing business by deferring license fees and taxes, as well as implementing rules that enhance efficiency. [*]

[*] GSR 2009 Discussion Paper, Mandla Msimang, Effective Regulation: The "Stimulus Plan" for the ICT Sector at .

Practice Notes

- **Case Study Converged Regulator: Ofcom [6.1.1]**
- **Case Study Multi-Sector Regulator: Latvian Public Utilities Commission (PUC) [6.1.1]**
- **Case Study Single Sector Regulator - Instituto das Comunicações de Portugal (ICP-ANACOM) [6.1.1]**
- **Case Study Single Sector Regulator: Botswana Telecommunications Authority (BTA) [6.1.1]**
- **Facilitating Cooperation between Regulatory Agencies – Memorandums of Understanding and Cooperation Protocols**

Reference Documents

- **GSR 2009 Discussion Paper, Consumer Protection: Meeting the Expectations of the Connected**
- **GSR 2009 Discussion Paper, Effective Regulation: The "Stimulus Plan" for the ICT Sector**
- **Netherlands: Agreements between the Commission of the Independent Post and Telecommunications Authority (OPTA) and the Director General of the Netherlands Competition Authority (the NMa) on the method of cooperation in matters of mutual interest, 2004**
- **Nigeria: Memorandum of Understanding between the Consumer Protection Council and the Nigerian Communications Commission**

1.2.5 CONVERGENCE AND REGULATORS

Platforms fulfilling different functions have traditionally been regulated differently for many reasons. For example, as illustrated in **Module 6**, telecommunications has been regulated in a different manner than broadcasting. In the context of convergence, where a single platform is capable of delivering all forms of electronic communications, should separate regulatory bodies merge or remain distinct institutions? Or should there be one regulator for platforms and another for content?

There remain many multi-utility regulators, which include telecommunications, although the number of "converged" regulators has grown over recent years,. In Malaysia, the issue of a converged regulator was addressed at an early date when the Communications and Multimedia Act 1998 established the Malaysian Communications and Multimedia Commission (MCMC) as the sole regulator of telecommunications, broadcasting, and computing industries. In 2008, the Korean government created the Korea Communications Commission (KCC) by consolidating the separate telecommunications regulator and broadcasting regulator, which were the Ministry of Information and Communications (MIC) and Korean Broadcasting Commission (KBC), respectively. The KCC merged telecommunications, spectrum allocation and broadcasting, including content, under a single regulatory authority in order to adapt to the rise of converged technologies, particularly Internet Protocol Television (IPTV). The introduction of IPTV in Korea had been delayed for several years due to disputes between the MIC and KBC over jurisdiction. Within a few months of the KCC's creation, however, the converged regulator finalized the rules enabling operators to provide IPTV. By the end of 2009, Korea had over one million IPTV subscribers.[*]

Establishing converged regulators in the EU has been more challenging. Although EU Member States are implementing a "future-proof" single regulatory framework for electronic communications, only four out of 27 Member States (as of 31 December 2009) have what could be regarded as "converged" regulatory bodies.[*] These are Finland, Italy, Slovenia, and the United Kingdom.

It is not just the EU that lacks converged regulators since most OECD Members have not yet implemented laws to consolidate regulators. Only seven of the 30 OECD Members have single bodies dealing with all four regulatory forms of telecommunications; broadcasting carriage; broadcasting spectrum allocation; and content. These countries are Australia, Finland, Iceland, Japan, Korea (Rep.), the United Kingdom and the United States.[*] For each of the EU Member States listed above, at least one of the four regulatory functions lies outside the "converged" regulator.

Converged regulators – with responsibilities for media and content as well as ICT services – face a daunting challenge by taking on extensive, and often complicated, workloads. However, in a converged environment, traditional telecommunications regulators may struggle to resolve certain issues, such as consolidation between media content and telecommunications service providers.[*] Further, the absence of a converged regulator allows for the possibility of unequal regulatory treatment of different platforms delivering overlapping content or unequal regulatory treatment of different content delivered over any platform. Here there is the issue of technology-neutral regulation, meaning that the regulatory treatment of a particular service, regarding authorization, spectrum, interconnection, universal service, and numbering, is the same irrespective of the technology used to deliver it. Convergence poses challenges to both the structure of regulatory bodies and the instruments they use.

[*] GSR 2009 Discussion Paper, Rory Macmillan, Connectivity, Openness and Vulnerability: Challenges Facing Regulators at

Practice Notes

- **Case Study Converged Regulator: Ofcom [6.1.1]**

1.3 AUTHORIZATION AND COMPETITION

This chapter outlines ICT regulation in the areas of authorization and competition and consists of the following two sections.

1.3.1 AUTHORIZATION

Authorization is addressed in **Module 3**, Authorization of Telecommunication/ICT Services. It is a general term applied to all the legal instruments (such as licenses or concession agreements) used to facilitate entry to the electronic communications markets for services (including content) and networks. These legal instruments set out the rights and obligations of the authorized party as well as of the government in the case of concession agreements. The authorization process is the means of introducing and encouraging competition in the sector.

Granting an authorization can confer certain privileges on the grantee, especially where there are a limited number of authorizations. Consequently, the authorization process is best performed outside the political process. In circumstances where only a small number of operators are to be authorized, transparent competitive processes are considered best practice. While the use of radio spectrum is most frequently associated with limited market entry, there is a growing presence of "unlicensed spectrum" or "license-exempt" market entry. The rise of Wi-Fi is due, in large part, to the availability of unlicensed spectrum.

Unlicensed spectrum rules allow anyone to operate devices on a designated spectrum band without obtaining a specific authorization, provided that 1) they do not cause harmful interference to others operating in the same or adjacent bands; 2) they operate within range limits; and 3) they operate within certain technical parameters including maximum power outputs. For example, the Federal Communications Commission in the United States opened unused portions of the television broadcasting spectrum, called the "TV white spaces", for the operation of unlicensed devices, subject to certain limitations. To protect incumbent services against harmful interference, the rules for the TV white spaces require unlicensed devices, which may be for fixed or mobile use, to include geolocation capability, spectrum-sensing technology and the ability to access a database of the incumbent services in order to detect at what frequencies incumbents such as TV broadcasters are using at that location.[*]

When competition was first introduced, the original licenses were hefty documents containing specific details regarding the technology to be used and behavior of a particular licensee. These documents represent the high point of *ex ante* regulation. Gradually the legacy of this practice is being superseded by issuing light-touch, general authorizations that apply across all sectors or in a particular sub-sector or "class." In some instances, no authorization or formal approval is required. Market entry is unlimited and any regulation that takes place is *ex post* in the context of competition policy. General authorizations are well-suited to activities characterized by rapid technological change and dynamism. Nevertheless, the legacy of the original licensing practices lingers in many jurisdictions.

Many of the original service-specific and detailed licenses were issued around the time that the MPTTs and PTTs were being restructured and some assets were being privatized. At the time there was a very limited body of regulation, which led to the license being used as the primary regulatory instrument. Regulators have since implemented and updated a substantial body of regulations, which has eliminated the need to issue particular, detailed and specific authorizations. Instead, regulators can simply refer to the relevant regulations where necessary.

The early authorization methods also had an impact on the fees charged, the legacy of which is still present. Fees are frequently composed of different elements but generally entail an initial component and recurring charges. Many initial fees were established at auctions where particular privileges were for sale, often linked to a scarce national resource. By this means, governments were able to have early access to the future income streams of operators rather than waiting for their tax contributions over the life of the authorization. In the end it is usually the customer who pays the fees of the operator. One way of optimizing consumer welfare and promoting competition is to charge fees that enable the regulator to recover the costs of regulation. This also minimizes the costs of regulation. Though this is regarded as best practice numerous other methods have been adopted that tend to distort the functioning of the market.

Convergence introduces a new set of issues for the authorization agenda. Authorization has tended to follow a process that allows applicants to provide specific services with specific technologies. In a converged environment, such distinctions become irrelevant. Although service-specific authorizations remain, multi-service authorizations and unified (or global) authorizations are becoming more prevalent. The unified authorizations are technology- and service- neutral and allow licensees to provide all types of services under a single authorization, using any type of communications infrastructure and technology capable of delivering the desired service. Like unified frameworks, multi-service authorizations are also technology-neutral and permit licensees to offer a broad set of services under one authorization. Like the service-specific framework, however, the multi-service authorization still prohibits the licensee from providing certain categories of service, such as television broadcasting.[*] Further, multi-service authorizations often remain separated into class and individual license categories, which is also similar to the service-specific framework.

In creating a regulatory environment that promotes convergence and NGNs, four inter-related authorization/licensing trends have emerged. These are neutrality, simplification, flexibility and reduction of the administrative burden. Authorizations are increasingly becoming service-neutral and technologically neutral by allowing licensees to offer a wide range of services over the technological infrastructure of the licensee's choice. Frameworks are becoming more simplified through the introduction of unified licenses in which many different service-specific licenses are combined under a single authorization. Unified licenses are appearing in some jurisdictions, such as Kenya, and work in tandem with technology and service neutrality to allow the licensee to use any platform to deliver nearly any service. The shift to a flexible authorization framework helps to attract investment in ICTs, for example, by allowing licensees to provide 3G services over the spectrum bands assigned to them in their 2G authorizations. Finally, regulators can attract investment and encourage competition in the ICT sector by reducing administrative burdens, which is particularly helpful for allowing new entrants to enter the market. Figure 1 below shows the process by which a service-specific licensing regime may be reformed into a unified licensing framework.

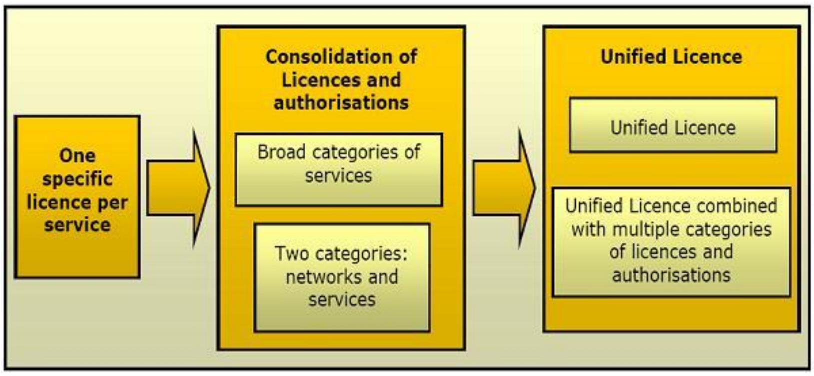


Figure 1. Process for Simplification of the Licensing Regime

Clearly, there will be restrictions on the number of licenses issued where resources like the radio spectrum are limited. Consequently, special obligations will continue to be placed on authorizations for scarce resources, as well as for dominant operators or operators with significant market power. However, these obligations should not preclude various arrangements that would facilitate, for example, fixed mobile integration. Existing restrictions on, or unequal treatment of, authorized operators offering similar services may impede convergence. Regulators should reexamine certain policies that discriminate against providers and services, such as rules that allow cable TV operators to enter the voice and data markets, but exclude telecommunications operators from the video market. * GSR 2009 Discussion Paper, Mindel De La Torre, Report from ITU-D Study Group 1, Question 10-2/1 Regulation for Licensing and Authorization of Converging Services at

Reference Documents

- **GSR 2009 Discussion Paper, Report from ITU-D Study Group 1, Question 10-2/1 Regulation for Licensing and Authorization of Converging Services**

1.3.2 COMPETITION

Once the authorization process is underway the role of the regulator is to ensure non-discriminatory treatment of all players in the liberalized market. The UN Task Force on Financing ICT has advocated equitable treatment of market players as an essential means towards liberalization by stating: "*The explosion of ICT sector investment in most developing countries correlates closely with an improved environment for private investment to take place and the transformation of formerly closed, monopoly ICT markets to allow competitive entry. Where Governments have actively pursued an open, equitable market environment, investors have generally welcomed the opportunity to compete.*" *

However, at the outset of the liberalization process, the market is unbalanced with the incumbent clearly the dominant, vertically integrated player. It is likely that the tariff structure of the incumbent is unbalanced, where prices charged do not reflect the underlying costs of service provision so that some cross-subsidies are in operation. Market distortions can wrongly discourage or encourage new entrants. For instance, on the one hand, cross-subsidies can artificially decrease the incumbent's costs and allow the incumbent to under cut the newcomer's prices, which leads to under-investment by new entrants. On the other hand, excessively priced international calls, for example, can lead to over-investment by newcomers.

There are numerous ways in which the incumbent can further distort competition (see **Module 2** and **Module 6**) unless the regulatory authorities take action. These include:

- Failure to deal with the requests of competitors for network interconnection in a timely or serious manner (typical responses are: "it is not technically possible," "it will take a very long time," and "it will be very expensive");
- Charging its retail arm lower fees than those paid by competitors;
- Reducing retail tariffs to a level where new entrants cannot survive;
- Making the sale of one product (to customers or competitors) conditional upon the purchase of a second product;
- Offering discounts to customers who take a combination of products/services;
- Entering agreements with distributors that preclude them from offering the products/services of competitors; and
- Providing low-quality products/services to competitors.

These activities are known as price/margin squeeze, predatory pricing, tying, bundling and exclusive arrangements. Although some of these practices, particularly tying, bundling and exclusive deals, often produce pro-competitive and proconsumer benefits, these activities may be proscribed in individual authorizations or may be prohibited under the application of *ex post* competition law. In some cases, the competition agency is responsible for the application of competition law. In other cases, the sector-specific regulator has the authority or assumes the powers of the competition agency.

Generally, the focus of ICT regulation is on "essential facilities." New entrants are certain to require some inputs from the incumbent. Some of these inputs cannot be replicated economically or technologically by new entrants and no substitute can be found for them. These are "essential facilities" for new entrants and the "last mile" and interconnection disputes flow from this characteristic. Many of the above activities are prohibited by law or addressed in detailed *ex ante* licenses. There is a large body of analyses, case law and remedies concerning anti-competitive behavior provided in the Toolkit that reflects various jurisdictions.

Regulators also need to promote the interests of consumers since the incumbent can set tariffs above costs where it holds a dominant position (*e.g.*, line rental, local calls, and to some extent national calls) since new entrants initially target the international segment. Baskets, sub-basket and associated price caps have been constructed and linked to rates of inflation [*] (*i.e.*, Retail Price Index(RPI)/Consumer Price Index (CPI) minus some "X factor") to take account of expected efficiency gains. The impact of these price caps is largely felt by new entrants who can rarely set prices above those of the incumbent. Increasingly sophisticated costing models, such as forward-looking or incremental, with significant information requirements have been developed to improve tariff-setting efficiency. Regulatory tariff setting is much less common in competitive mobile markets, especially where three or more operators have been authorized.

The growing availability of the Internet and broadband are changing the tariff landscape with customers frequently paying for access and not usage. For a flat fee, customers can obtain a broad range of services such as Caller ID, conference calling, and call forwarding, plus unlimited national calls and/or free calls to on-net customers, as well as reduced prices for international calls. These practices are both a challenge to the previous principles of tariff setting and to the business models of incumbents.

Poorer consumers, such as those in South and Southeast Asia, have taken advantage of competition in the broadband market through the rise of prepaid mobile broadband access.[*] Originally emerging in the budget voice telephony market, prepaid cards are now expanding to mobile broadband access and compete with the "always on" broadband access model. The prepaid mobile broadband market allows poorer consumers, whose incomes are often irregular, to purchase broadband access according to their needs or ability to afford broadband. A necessary condition of this development is the removal or reduction of barriers to entry in the mobile broadband market and protection of competition.

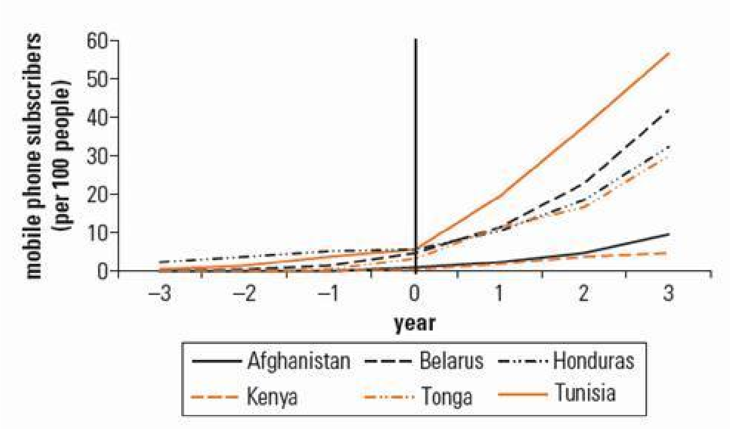
Ultimately, competition leads to the erosion of the dominant positions of incumbents. In these circumstances emphasis shifts from *ex ante* sector specific to *ex post* competition law-based regulation. Simple market share thresholds (*e.g.*, 35 percent) in broadly defined markets have typically been used as a means of identifying a dominant position. However, competition policy has developed and become more sophisticated. In today's *ex post* regulation, the first step is the "definition of the relevant market."[*] Where the identified market is considered sufficiently competitive, sector-specific regulation has been lifted. For definitional purposes, markets can be analyzed according to product, geographic location, type of customer, retail, wholesale and time. Market definitions that are too narrow or too broad will fail to accurately identify dominant positions. Certain products in the market display clear signs of dominance, such as call termination on networks and thereby interconnection. For definitional purposes, markets must be analyzed from the point of view of buyers and sellers, particularly in regard to whether a product is a substitute for the one under analysis. Additionally, the presence or absence of barriers to entry (such as essential facilities) is central to defining markets. Once again, there is a substantial body of analyses, methodologies, and *ex post* competition case law reflecting the experience in different jurisdictions in the Toolkit.

The success of competition and private investment is demonstrated in mobile penetration rates in various countries around the world before and after the introduction of competition in the mobile market, as illustrated in the following Figure 1.[*]

Figure 1: Mobile Telephony Penetration Before and After the Introduction of Competition

Source: ITU, World Telecommunication/ICT Indicators Database

As the above figure shows, the number of mobile subscribers



Note: Year 0 in the figure indicates the year of entry of a second mobile operator.

was relatively stagnant until the entrance of a second mobile operator, at which point the number of mobile phone subscribers typically skyrocketed. In Tunisia, for example, fewer than five percent of the population had mobile phones prior to the introduction of competition in 2001. By 2005, the mobile penetration rate jumped to more than 57 out of 100 people and reached a penetration rate of 84.6 per cent by end of 2008.*

*** ITU World Telecommunication/ICT Indicators database at .**

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* ITU World Telecommunication/ICT Indicators database at .

1.4 INTERCONNECTION

Networks interconnect to exchange traffic and supply inputs in situations where the operators both compete and cooperate. As explained above, such inputs are "essential facilities." As the OECD observed: "*the regulation of the terms and conditions under which competing firms have access to essential inputs provided by rivals has become the single biggest issue facing regulators of public utility industries. This issue is both theoretically complex and inherently controversial. Since the development of competition and the success of liberalization often depend on the access terms and conditions chosen, there is also a strong public policy interest in getting these terms and conditions "right". At the same time, new entrant firms and incumbents often have a substantial financial stake in the outcome and therefore a strong interest in negotiating aggressively.*"*

The legacy of the initial liberalization of markets and required interconnection lingers in current interconnection practices. Interconnection charges are often characterized by the same features as retail voice tariffs with a dependency on time of day, length of call, and distance covered. These characteristics are coming under increasing pressure from disruptive technologies. For example capacity-based charging* has been implemented by ISPs in some instances while most large Internet backbone providers use "sender keeps all" (or "bill and keep") for interconnection with equivalent "peers."

In order for a new entrant to compete with the incumbent on a wide range of services, it needs access to different, separately priced facilities on a network, often on a shared basis. To ensure access, many regulators have required incumbents to "unbundle" their facilities, particularly the local loop, which allows the competitor to lease the incumbent's local line to the customer on a wholesale basis. Although unbundling can help ensure competition, in developing countries where fixed penetration is limited, such unbundling may discourage network roll out. The availability of wireless access and the authorization of multiple services via cable TV and other platforms are diminishing the "essential" nature of some facilities and thereby the need for *ex ante* regulation.

Many agree that interconnection charges should be based on the necessary cost incurred by the receiving party of the additional traffic it has to carry – that is, the requesting party pays the providing party the relevant costs caused by the request. However, there is much less agreement on the underlying theoretical models. Fundamental disputes surround the issues of sunk, variable, shared, common, replacement, historic, depreciation, incremental and forward-looking costs, and differing pricing models* that are found in the Toolkit. Benchmarks may be more appropriate in developing markets where the informational requirements of these various approaches are too onerous for operators and regulators.

Disputes over local loop unbundling have declined as mobile voice services and IP-based services have risen in importance. Two areas in which interconnection policies continue to develop and mature are issues relating to mobile termination rates (MTRs) and interconnection between traditional and IP-based services, particularly Voice over Internet Protocol (VoIP.)

Interconnection charges on calls from fixed to mobile operators continue as a legacy from introducing competition in the voice services market. The mobile sector was originally perceived as an "elite" rather than a "mass" market and, at the time, the technology was new and fairly costly. Furthermore, incumbents were frequently members of the first wave of authorized mobile service providers. In these circumstances, there was a tendency for the incumbent operator to set high fixed-to-mobile interconnection (or termination) charges as a means of transferring funds internally to its start-up subsidiary. When additional authorizations were issued, the new entrants willingly accepted these high charges and such payments became an important element of mobile business plans. There has been a tendency for regulators to focus on the charges paid by mobile operators to fixed operators for call termination rather than the reverse. This tendency has persisted even when the total number of mobile customers has surpassed the number on the fixed network. The decline in the interconnection charges of mobile operators has not kept pace with the dramatic fall in the capital expenditure of mobile operators to less than USD $100 per subscriber.

Now regulators are paying much closer attention to mobile interconnection and termination charges [*] rather than allowing operators to set fees themselves. This is especially the case when operators switch to "calling party pays" billing[*] and for international roaming charges as more customers complain[*]. Regulators sometimes pursue market-based solutions to bring down interconnection charges. They can promote competition by encouraging new (*e.g.*, "virtual") mobile operators or by allowing customers greater opportunities to choose between mobile operators (by for instance number portability) and generally increasing transparency. Indirectly, more intense competition will reduce mobile termination charges. Regulators have continued to play a role in determining the interconnection charges of fixed operators.

There is a myriad of ways for a country to handle mobile termination charges, including:

- Full regulation of mobile termination rates (*e.g.*, Austria, Portugal and Cuba);
- No regulation of MTRs by allowing operators to negotiate freely (*e.g.*, Brazil);
- Only regulate mobile termination charges for fixed-to-mobile calls (e.g. Jamaica);
- Require mobile network operators to apply a single regulated termination charge regardless of where the call originates; and
- Apply asymmetric regulation where only the MTRs of mobile operators with SMP are regulated (*e.g.*, Colombia). [*]

With so many possibilities, the decision on which type of MTR regulations to implement should be based on a complete analysis of each country's particular needs. However, MTRs tend to be high where there is no regulation. For example, the MTRs in Brazil, a country without rate regulation, are among the highest in the world. Several factors should influence the decision, including the amount of price competition in the mobile market; potential costs and delays associated with reliance upon negotiation; the regulator's available resources; and consumer complaints regarding prices.

New interconnection regulations are also arising with the transition from analogue to digital, voice to data, narrowband to broadband, circuit-switched to packet-switched and the growing role in this context of wireless has radical consequences for existing interconnection regimes. In a converged environment, interconnection may frequently entail interconnection between different services and devices, as well as a wider range of platforms. A major challenge facing regulators is the management of tensions between the traditional, closed-network model in which the network operator owns and runs the public-switched telephone network (PSTN), and the new IP-based network model, which is open and decentralized. Since the IP-based model separates services from the platform, the network operator loses significant control over which applications and content users may run over the network.[*]

While VoIP originally involved two customers connected to the Internet (by different devices) making voice calls or other forms of communications over the Internet without connecting through the PSTN or incurring any additional charges over their monthly payments to their ISPs, VoIP has become interconnected.

"Interconnection" in these IP-based business models is fundamentally different from interconnection as it has been widely practiced. Instead, interconnection refers to peer-to-peer (P2P) network operator relationships, which are.much more harmonious than the traditional interconnection relationship, which has been characterized as confrontational (incumbent versus new entrant, big versus small), especially in the early phases. Peers are by definition of equivalent scale. Generally, P2P agreements are not subject to regulatory supervision.

A hierarchy of "peers" has developed with an ascending ladder of "aggregators" or transit providers. Within a peer group, traffic is exchanged on a sender-keeps-all basis and there is consequently no need for interconnection models. Peers exchange traffic but do not charge each other, because this is a largely symmetrical relationship. Traffic between different peer groups is exchanged on commercially negotiated rates for a given capacity and maximum peak load for "transit" services. Where there is sufficient choice and competition between rungs on the ladder or peer groups, market solutions will prevail for commercially negotiated rates. "Fair" cost-based charges emerge from a well-functioning market and in those instances where a dominant peer group emerges, any abuse of such a position would be the subject of *ex post* regulation via the application of competition law. For many operators in developing countries, the advantages of P2P may be slow to materialize where the choice of "transit" providers is restricted and international access capacity is limited. Further, while many developed economies have established cooperative or joint application of competition law (thereby extending jurisdiction beyond a national boundary), there is much less experience of such relations in developing countries. Consequently, action to improve regional connectivity may be necessary, accompanied by appropriate regional regulatory initiatives.

It is widely held that the costs of IP-based networks are substantially below those of public switched telephone networks (PSTN), so that any form of cost-based interconnection (or capacity charging) will be cheaper than those prevailing for traditional operators,[*] thereby implying a generalized downward pressure on fees. All these P2P "interconnection" charges are already factored into the monthly charges to final customers rather than individual tariffs billed to customers of the traditional model.

While "traditional" interconnection is on the wane, its legacy will linger. VoIP is permitted in a substantial and growing number of jurisdictions, such as the Philippines, South Africa, and Ecuador.[*] It is also possible to use VoIP services to call PSTN customers with a "breakout" from a local Internet point of presence to the final destination. In these circumstances a "traditional" domestic interconnection fee will be charged to the originating customer even if the call is international. It is also possible to reverse the breakout, with similar consequences, and to provide two-way breakouts. All of these possibilities are disruptive for PSTN business models. The leaders in VoIP services (Skype, Google Talk, Yahoo! IM with voice, VoIP Buster) are not traditional telecommunications operators and their core revenue sources are not necessarily from the provision of voice services.

Many developing country operators are already under pressure from operators in developed countries. The latter, both privatized incumbents and new entrants, seek lower international termination charges, which challenge the finances of their developing country correspondents. VoIP and its impact on international termination fees further intensifies these downward pressures.[*]

[*] Mike Jensen, Open Access Lowering the Costs of International Bandwidth in Africa (2006) at

Practice Notes

- **Interconnection Principles Contained in the WTO Regulation Reference Paper**

Reference Documents

- **GSR 2009 Discussion Paper, Coexistence of Traditional and IP Interconnection**
- **GSR 2009 Discussion Paper, Mobile Termination: To Regulate or Not?**
- **GSR 2009 Discussion Paper, Voice over Internet Protocol (VoIP): Enemy or Ally**

1.5 UNIVERSAL ACCESS

Widespread access to and diffusion of ICTs are highly desirable for social and economic reasons. Ensuring the full participation of all in the Information Society is a major policy goal, the implementation of which brings all the benefits and transformational opportunities of ICTs. For example, countries participating in WSIS set the ambitious goal of connecting all villages of the world to ICTs by 2015, including establishing community access points, and connecting universities, schools, libraries, post offices, health centers, and local governments. The EU has adopted the term "e-inclusion" to refer to full access and participation[*] and is particularly conscious of the promises of new digital opportunities and the new risks of digital exclusion.

As the ITU observes, two different terms are used to describe levels of inclusion. Universal Service (US) means that every household in a country has the opportunity for telephone service. Universal Access (UA) means that everyone in a community can gain access to a publicly available telephone, although not necessarily in their homes. Normally, both include free access to emergency services, the availability of directory services and special provision for customers with disabilities. Since many countries have reached universal access for telephony and now strive to achieve universal service, they are now focusing on reaching universal access for broadband. Therefore, the generic term UAS (or UA/S) is becoming more common as policies target both UA and US.

The term "Universal" encompasses several elements including availability, affordability, and accessibility (see Module 4). The focus of UAS policies is delivering service to those segments of society that are least able to attract the commercial provision of service. Policies targeted at US address non-commercially viable households and those targeted at UA address non-commercially viable communities. High cost-of-service provision and/or low incomes are the primary reasons that such customers are unattractive to operators.

However, the provision of UAS should not be viewed as a burden since extending access brings about the economic benefits of "network externalities" (increasing the customer base brings benefits to all customers), "call externalities" (new customers may not make many calls but they generate revenues when they receive calls), and externalities derived from substituting electronic communications for other forms of participation or access to important public services. Generally, operators do not take these externalities into account when making purely commercial decisions. The possibility of materializing such externalities provides a rationale for policy interventions.

The WSIS target is one for universal access, which is appropriate for developing countries at this time. But as markets and technology unfold, the bar will continue to be set higher. This implies a periodic reconsideration of what types of service should be included in any definition of UAS (ranging from single line voice-grade, incrementally all the way to two-way broadband services) and at what cost to the consumer. Flowing from these issues are the mechanisms for both delivering and financing the desired level of service.

Global experience with extending access and UAS policies has expanded considerably since the publication of the *info*Dev Telecommunications Regulation Handbook. Separately or in combination, the following approaches have been implemented:

- Market based reforms
- Mandatory service obligations
- Leveraging new technologies, *e.g.*, mobile services
- Leveraging new business practices, *e.g.*, pre-paid cards
- Cross subsidies
- Access deficit charges
- Universal Funds
- Public-private partnerships

Of these, the most successful have been the market-based reforms associated with the liberalization of the mobile sector, supported by a stable regulatory environment and the subsequent exponential growth in customers in developing countries. These initiatives have allowed market forces to contribute fully and thereby close the "market gap." Regulators have used a variety of methods to achieve UAS through market forces, including regulatory reforms that create incentives for the private sector to extend universal access, establishing interconnection frameworks, flexible spectrum rules and other technology-neutral policies to encourage the entry and use of new and innovative technologies and provide a wider range of participants to achieve UAS goals.[*] The remaining "access gap" can be categorized as:

- Communities that only require a targeted capital injection where future revenues will support operational expenditure, often referred to as the "sustainability frontier" and
- Communities that require ongoing support for both capital and recurring expenditures.

The practice of ensuring universality by using cross subsidies between the different services of an operator (from international to local and/or access) to ensure affordability has been severely strained by the introduction of competition. Access deficit charges have also been found to be sub-optimal in competitive environments. In many jurisdictions, Universal Service Obligations (USO) are in place. The informational demands on regulators are considerable where a designated operator (frequently the incumbent) is reimbursed for the losses incurred or reported in the provision of UAS.

As the Toolkit illustrates, Universal Access/Service Funds (UAS Funds) have been established to provide financial incentives to operators to close the access gap. They require mechanisms to garner finance and disburse the incentives in a cost-effective manner to achieve the ends of the UAS policy objective. Frequently, the sector is the source of finance for the UAS Fund in the form of levies and in other cases the fund is financed from the general budget. While UAS Funds (also called Universal Service Funds or USFs) are an important tool, they should not be solely relied on to achieve universality. Other mechanisms to be considered and adopted include direct state aid and public financing such as loan guarantees and public-private partnerships, as well as liberalizing the licensing and spectrum frameworks.

Where UAS Funds are used, they have proved effective when disbursement is coupled with competitive bidding or auctions for these financial incentives, requiring operators to compete for the minimum subsidies needed to fulfill the UAS target.[*] Since subsidizing ICT projects carries certain risks such as market distortion, dependence on funding, fraud and abuse, favoritism and wasted resources, regulators have introduced "smart subsidies." Smart subsidies provide a one-time award geared towards obtaining results in areas where investors have been reluctant to invest, but will ultimately become commercially viable. Thus, the subsidy acts as more of a kick start to investment rather than as a crutch. The Dominican Republic provides an example of where a smart subsidy, known as an output-based aid (OBA) subsidy, has been used. The regulator conducted transparent, minimum subsidy auctions in which the winners receive the subsidies in phases over the course of the project rather than all at once.[*] Thus, winners receive 20 percent upon signing the contract, 40 percent upon completion of the required installations and the remaining 40 percent in six month installments over a five-year period.

In some instances, subsidies have been provided directly to customers or to particular institutions, such as libraries, schools, and public tele-centers. Early, large-scale UAS projects were frequently undertaken on a top-down, supply-driven approach where a single provider, often the incumbent, was selected to provide a standard set of services, using a narrow set of technologies over a wide geographical area. The introduction of NGN-related technologies, such as Broadband Wireless Access (BWA) and Wi-Fi, has substantially reduced economies of scale in both the infrastructure and service segments. This has opened up the field to a wider range of small or local providers to expand universal access from a bottom-up, demand-driven approach.

The phenomenal spread of the Internet has had an impact on notions of universal service. In the 2002 Universal Service Directive, the EU included the concept of "Functional Internet Access"[*] in the definition of universal service and is currently constructing a "future proof" regulatory environment. For example, in September 2009, the EU announced that it will inject EUR 1.02 billion into the European Agricultural Fund for Rural Development (EAFRD), part of which will be used to support investment in high-speed broadband to help ensure 100 percent coverage to EU citizens by 2010.[*] As part of the EU's stimulus plan to secure investments in broadband deployment, Member States must ensure that provision of state aid is 1) granted out of state resources; 2) confers an economic advantage to businesses; 3) selectively targeting recipients and is not distorting or threatening to distort competition; and 4) affects intra-Community trade.

In a converged economic space of electronic communications, new forces have been set in motion. VoIP business models are leading to the erosion of revenues from voice services for operators, while the intensification of competition is hastening the transition to NGNs. While NGNs provide the opportunity for a much wider range of revenue-generating services, the platforms will be deployed on a commercial basis. It is quite possible that this deployment will follow the geographic and income-related distribution of computers in businesses and households. This implies that those locations currently underserved or benefiting from a UAS Fund will not be among the first to be connected. Furthermore, given the shift in cost towards the user, when the cost of a computer is included, the concept of "affordability" must be re-examined. Clearly there will be an enhanced role for shared access and community-based initiatives.

There is growing interest in and experience of community-based projects to provide Internet services based on the "municipal open access model." A study by *info*Dev found numerous examples of community-based projects, including the Myagdi, Kaski, and Parbat districts in north-west Nepal; the municipality of Pirai in the Rio de Janeiro state of Brazil; and the city governments of Philadelphia (USA) and Knysna (South Africa).[*]

The debate over the role of broadband in universal service is underway around the world, such as Chile[*] and India. In 2006, India was one of the first countries to include broadband in the UAS Fund, which allows fund to support broadband connectivity and mobile services in rural and remote areas of the country.[*] Convergence, facilitated by NGNs, raises the potential externalities by increasing the potential benefits to households of services if they had access to them. Convergence may possibly increase the sector base on which levies can be made for a UAS Fund while also raising specific regulatory issues related to universal service regarding voice quality, emergency services, and services for the disabled.[*] Overall, policy makers should keep in mind that UAS requirements have expanded to include broadband due to the rise of NGNs and convergence. While market forces are dynamic, UAS policies should build on competition to encourage deployment to all. These issues are addressed in Module 4 of the Toolkit.

Reference Documents

- **GSR 2009 Background Paper, Bringing Broadband To Rural Areas: A Step-by-Step Approach, the Experience of the Dominican Republic**
- **GSR 2009 Background Paper, Trends in Universal Access and Service Policies**

1.6 RADIO SPECTRUM

The importance of spectrum to the electronic communications sector is evidenced by the soaring number of mobile service subscribers, the huge numbers of viewers and listeners to television and radio and the relatively new and mushrooming phenomenon of Wi-Fi and WiMAX radio access – all of which place demands on the radio spectrum. The transition to digital broadcasting adds a new dimension to the radio spectrum agenda.

In the modern era, spectrum has been subject to detailed regulation for national security and emergency services purposes, as well as to manage spectrum as a scarce resource and minimize the risks of harmful interference between spectrum users. The notion of spectrum scarcity has increasingly led administrations to more efficiently manage spectrum through various mechanisms, such as spectrum trading, reallocation of spectrum to more valuable uses and in-band sharing. In-band sharing is a flexible spectrum management policy in which several licensees are permitted to offer different applications and/or technologies over the same spectrum bands, provided they do not cause harmful interference to any other lawful users. Since spectrum management involves cross-border agreements and harmonization, the spectrum agenda necessarily entails international coordination, where the ITU plays a particular role.

The central issues for spectrum management are allocation (where choices are made between competing uses) and price. Spectrum can be used for many applications where more than one application can work on any given frequency; where some applications can work on a range of different frequencies; and where different applications require varying amounts of spectrum.

Under traditional radio spectrum management, decisions have been made regarding allocations of radio spectrum among competing applications or services for the range of frequencies available. These decisions have often taken place in a two-staged manner. First, frequencies are allocated to particular applications (often according to international agreements), then within those applications certain operators are assigned particular frequencies (often on a first-come, first-served basis) and are charged fees. There is a relationship between fees that can be charged for spectrum usage and revenues that can be earned from services of operators. These choices and prices should provide the maximum net benefit. Issues arise where new technologies offer higher value opportunities for frequencies already allocated to operators or applications. Allocating resources among competing uses is traditionally the realm of economics and markets, but decisions have been made to a large extent administratively, in order to take account of public-interest policies.

Spectrum-related technology is moving much faster than spectrum-related regulation in the context of demand for spectrum growing at an accelerated rate. Once regarded as a particularly scarce resource (another rationale for detailed regulation) the switch from analogue to digital broadcasting will produce a “spectrum dividend.”[*] Equally, new compression techniques and the use of very short range spectrum are enhancing the availability of spectrum. It is clear that radio spectrum is becoming more valuable with the development of convergence and the expanding range of services that can be delivered via radio spectrum. Consequently there is a requirement to use radio spectrum efficiently.

Currently, there are certain inefficiencies in the radio spectrum arena. These are caused by the inertia and legacies of licensees and certain spectrum management practices that can limit spectrum availability and impede innovation. Very often the public sector is a major holder of radio spectrum. For instance, in the United Kingdom the public sector accounts for nearly half the spectrum below 15 GHz,with the UK Ministry of Defence the largest user. Often, public sector holders of radio spectrum do not use it in the most efficient ways, and in some cases “warehouse” the spectrum, which led to Ofcom issuing a decision in 2008 requiring the public sector to more efficiently use spectrum.[*] The decision also permits government agencies to sell their unused spectrum to the private sector.

Markets and price mechanisms are generally associated with efficient allocation of scarce resources and may be used to cover the administrative costs of spectrum management; maximizing the economic benefit of the spectrum resource for the public; and ensuring that those operators that benefit pay for the use of spectrum. Often in the second stage, frequencies are assigned to particular operators by market means, and auctions are very common in the issuance of mobile licenses. Some of these licenses have subsequently been traded in mergers and acquisitions. Increasingly, financial incentives are being introduced to encourage users to economize the spectrum they occupy. Measures are also being introduced to allow for the reuse of assigned spectrum that is not fully utilized.

As **Module 5** of the Toolkit explains, four radio spectrum management models have been developed and implemented:

- The traditional “command-and-control” model, which is regarded by some as best suited to fulfilling public interest policies. The model can also provide for the harmonization of spectrum use leading to the development of economies of scale and falling costs for equipment manufacturers and customers
- A “market-based property rights” model involving exclusive usage rights and spectrum trading and pricing. The market-based model should stimulate further technological change in spectrum-based applications and usage, which may not lead to the same degree of harmonization and falling costs of production of equipment.
- The “commons” or “unlicensed” model where, on a shared basis, spectrum is available to all users who comply with certain pre-determined technical limits (e.g., total transmission power/output limits) and equipment certification requirements of mitigation techniques to guard against interference. This “open” model is

generally flexible regarding usage rights of "white spaces", lowers access barriers to radio spectrum usage, and effectively decentralizes radio spectrum allocation to users. As a consequence, the commons approach allows quicker new market entry. In combination, decentralization, rapid market entry, and flexibility can encourage technological developments for spectrum-efficient applications like Wi-Fi. The drawback of the commons model is that it can stimulate overuse of spectrum rather than the efficient use of alternative resources.

- More recently, an "easement" model has been developed and implemented, which relies on intelligent or smart technologies. These technologies allow for spectrum sharing. They enable unlicensed users of devices to operate in the same frequencies on a secondary basis as licensed users who hold exclusive rights to use spectrum. The model draws on both the market-based and commons approaches. It is clear that the easement model can only function where the spectrum in question is not used intensively.

There is always a tension between harmonizing spectrum uses, thereby generating economies of scale and lower costs, and permitting wider uses of any particular band of frequencies and thereby stimulating innovation. The past has largely been characterized by harmonization, while the future is more likely to encourage innovation. Equally, there is a tension in the command-and-control model with the requirements for technological and service neutrality associated with the converged environment.

The ICT sector has witnessed the evolution of spectrum management policy from pure command and control to include increasing contributions from the other three models. It is clear that no single model can be applied in all circumstances. It is also clear that many operators would prefer greater flexibility in using the spectrum they already hold. As discussed in the Toolkit, the challenge for regulators is to achieve a balance between these models that best suits their circumstances. Wireless is clearly the most popular technology in developing countries, and therefore, spectrum management is very high on the regulatory agenda.

[*] Ofcom, Spectrum Framework Review for the Public Sector (2008) at .

1.7 NEW TECHNOLOGIES AND THEIR IMPACT ON REGULATION

As emphasized throughout the Toolkit, new technologies have a major impact on ICT regulation. One word is missing from the new vocabulary described at the start of this Module – Globalization. ICTs have been a major driving force and enabler of globalization and its associated connectedness. Globalization brings with it a whole set of international and cross-border regulatory issues, and a requirement for multilateral regulatory forums. For example, IT-enabled services, international financial services, and e-commerce entail the transfer of data across borders, and these activities raise the issue *inter alia* of privacy. The sheer volume of data transfer is itself a challenge, but the OECD[*] notes two additional risks related to:

- Secondary uses of personal data; and
- Information security breaches.

It has always been difficult for individuals to monitor how organizations use their personal data in a secondary manner and the problem is made more difficult due to the ease and frequency with which organizations currently process data. The second risk is evidenced by the growing number of high profile data security breaches that are publicly reported. Privacy is not the only issue; according to OECD, "*A wide variety of scams operate in the online environment, ranging from fraudulent lottery schemes, travel and credit-related ploys, modem and web page hijacking, and identity theft (ID theft) to name but a few… the Internet has given criminals access to a worldwide base of consumer targets as well as more opportunities to elude enforcement as they need not be in the same country, or even in the same hemisphere, as their victims.*"[*] Ensuring e-security is a major task. However, "security" is applied both to the individual and the state, and requires a balance between the two sets of interests.

Lack of trust in the Internet, and therefore the need to address the above issues, is often cited as one of the most important obstacles to the use of the Internet and e-commerce. Internet governance is a major topic in its own right. In order to involve all stakeholders and ensure comprehensive cybersecurity protections, national governments are often in the best position to implement new security policies. These policies should touch on many different areas including highlighting the importance of ICTs to the nation; identifying and analyzing the risks from cyber crime and attacks; establishing objectives such as prevention, detection and prosecution of cyber crimes; and setting a plan to achieve these objectives that details the stakeholders' roles and responsibilities for data protection and cybersecurity.[*]

Regulation in an IP environment raises serious questions concerning the current regulatory environment. It impinges on all of the previously discussed topics: competition, spectrum management, interconnection, UAS, authorization, price regulation, and also numbering, together with all associated regulatory and legal practices and instruments. For example, spam has become a particularly unwelcome and costly consequence of the spread of the Internet where national and international agencies are taking actions to limit it. For emergency services, IP telephony poses a particular problem in many countries. In Europe, for instance, access to emergency service numbers is an obligation of Publicly Available Telephone Service (PATS). Both the U.K. and Irish regulators have conducted consultations on ensuring that VoIP users can contact police, fire and ambulance services. Challenges that VoIP users face in accessing emergency services include location correspondence since VoIP numbers are often non-geographic and quality of service since power failures often make VoIP phones useless.[*]

One of the major consequences of the evolving technology is that it at last makes a reality of the long-promised "convergence" (the EU issued its first Green Paper on convergence in 1997). Convergence is facilitated by the transition from analogue to digital, voice to data, narrowband to broadband, circuit switched to packet switched, one way to interactive, scarcity to abundance, and the accompanying digitalization of all content. Convergence allows both previously separate industries and entirely new sectors to compete in the same newly expanded market space. For example, numerous markets around the world are offering IPTV and mobile television. However, countries are taking different approaches towards classifying IPTV. Some countries regulate all IPTV-related services as broadcasting while other countries prefer to focus on competitive market entry and do not classify IPTV at all. Still other countries have adopted a middle ground in which some IPTV services are classified as broadcasting while other services, such as video-on-demand, are not regulated as a broadcasting service. See **Module 7** for more detail on how IPTV is impacting regulation.

In this new converged market space, technology allows, and customers can expect, the seamless provision from multiple sources on a single device of all of electronic communications for one supplier competing with many other suppliers – a working definition of "convergence." This one-stop-shop could be the business of a single entity or of multiple entities working in collaboration. In the new market space, the core business of a traditional player may be peripheral to that of a new player and yet the traditional player may not be able to withstand the competition from the new entrant. This transition has radical consequences for existing business models, platforms, content, and devices, together with the regulatory environments that support investment in and consumption of them.

A broadband platform can deliver telecommunications services, information services, broadcasting services and much more. Frequently, regulation has taken a "line of business and technology" approach and has often limited cross-market entry. Normally, there have been separate regulators for the different lines of business and often an additional regulatory body dealing with radio spectrum. Often the objectives of the government vary according to the "line of business," notably between broadcasting and telecommunications. The regulation of broadcasting has focused on the social and cultural impact of the sector, while in telecommunications the concern has been the transition from monopoly to competition. Convergence calls this state of affairs into question since the content of these lines of business are indistinguishable digital messages. While the objectives of the government may not have changed with respect to a "line of business," they will become more difficult to implement in the new market space.

Both broadcasting and telecommunications have been regulated with the goal of achieving a form of universal access and service. Broadcasting has also been charged with nation building, preserving language and culture, promoting values and standards, protecting minors, etc. The regulation of publishing has some of the characteristics of broadcasting, especially with regard to values, minors, slander, and defamation. The Internet is largely unregulated but there are some controls on content. As yet, there is little regulatory experience on "web casting" even though live audio-visual streaming of content can be a very close substitute for television broadcasting. Increasingly these platforms are providing overlapping or the same service, applications, and content.

A distinction has been made between "linear" and "non-linear" services. TV broadcasts are regarded as linear services where content is "pushed." On-demand services are regarded as non-linear where content is "pulled." The EU has defined non-linear services as any audiovisual media service where the user decides upon the moment in time when a specific program is transmitted.[*] Generally, non-linear services are regulated by e-commerce regulations rather than broadcasting legislation. Consequently, the two types of content are subject to different forms of regulation regarding obligations, the treatment of advertising, and what is termed "positive" content regulation, such as requirements to support independent content production.

The key questions in a converged environment capable of delivering both linear and non-linear service are how and by which institution should these platforms and the content they carry be regulated? Is there any case for continuing to regulate according to the technology of a platform where all platforms deliver the same services, applications, and content? Should platforms that are near-perfect substitutes for each other be regulated in the same way?

The questions are especially important because investment in platforms will only generate positive returns where customers are willing to pay for the service, applications and the content they provide – that is, content drives platform investment. Market distortions, impacting investment and consumption decisions, can result from the unequal regulatory treatment of different platforms delivering overlapping content or unequal regulatory treatment of different content where all platforms deliver the same services, applications, and content.

Clearly a level playing field would be most advantageous – that is, an integration of existing regulatory frameworks into a single framework that is coherent across the entire electronic communications market space. But in leveling the field, should the regulatory field be raised to the highest common factor (possibly broadcasting) or dropped to the lowest common denominator (possibly Internet)?

Convergence will present new challenges for competition authorities since it is expected to generate pressures for "consolidation." We have already witnessed numerous mergers and acquisitions among players in the new market space. In some instances, acquirers have emerged from non-traditional sectors. There are forces in play that stimulate vertical consolidation. These forces flow from the enhanced economies of scope and scale between platforms and content made available by convergence. Where size is a key factor for business sustainability, there are also forces at work to bring about horizontal consolidation.

There has been a trend towards *ex post* regulation using competition law and away from sector-specific *ex ante* regulation as ICT markets have become more competitive. One of the pillars of ICT regulation has been "access" and interconnection that predominantly concerns access to customers. In a converged environment there are additional access issues because there are additional "gateways" both technical and economic. The gateway may be a set top box (conditional access) or a digital rights management (DRM) system. Service providers need access to content and content providers need access to customers, both of which may establish some form of economic gateway. In the new value chain, control over a gateway can ensure considerable returns to its owner. Competition policy must continue to address dominant positions that may emerge in the converged environment, hence the need for the application of competition policy.

Similarly, competition authorities in different jurisdictions have already struggled with and come to different conclusions regarding the treatment of exclusive rights – especially for significant national and now global media events – termed "general access to major events," such as the Olympic Games. Regulating these events in a global converged market space requires international cooperation and innovative thinking. There are many examples where cross-media ownership is not permitted, where the "reach" of same-owner TV channels is limited, where there are limitations on foreign ownership and the provision of bundled services is strictly regulated on competition grounds. Such practices risk becoming redundant or unenforceable in a converged Web 2.0 environment. The latter represents the "second generation" web-based services based on sharing and on-line collaboration, such as blogs and websites like YouTube.

The transition from monopoly to competition in telecommunications is well underway in the vast majority of countries and largely completed in many. The transition has proved beneficially transformational and has set in motion further dynamic changes that are delivering a vastly expanded set of global opportunities in electronic communications. These opportunities are again positively transformational and are encapsulated in the term "convergence." But in order to participate in and maximize the benefits of convergence, a new regulatory paradigm has to be put into place. The new paradigm must address the legacy of the earlier transition period while supporting investments in the new period and facilitating new investments in the new market space.

The costs - social, economic, and political - of being left behind in these transformations are very considerable. The ICT Regulation Toolkit is designed to help developing countries implement effective regulatory frameworks that can harness the latest technological and market advances, enabling them to best use ICT as a development tool.

[*] European Commission, Proposal for a Directive on the Coordination of Certain Provisions Laid Down by Law, Regulation or Administrative Action in Member States Concerning the Pursuit of Television Broadcasting Activities (2005) at

Reference Documents

- **GSR 2009 Discussion Paper, Draft Background Paper on Cybersecurity: The Role and Responsibilities of an Effective Regulator**
- **GSR 2009 Discussion Paper, Voice over Internet Protocol (VoIP): Enemy or Ally**

Next: 2 Competition and Price ➡

Competition and Price

Market Regulation for Information and Communications Technologies

This Module discusses some of the principal regulatory issues affecting the information and communications technologies (ICT) market. In particular, this module provides guidance on competition policy issues, including interconnection and price regulation. Services resulting from convergence, such as Voice over Internet Protocol (VoIP), are also discussed in order to underscore the necessity of market flexibility and to emphasize the impact of innovation on market structure.

2.1 OVERVIEW: PUTTING ICT REGULATION IN CONTEXT

Government regulation of ICTs extends into many disparate areas, ranging from pricing regulation, mergers and market entry to content, copyright, and privacy. This module considers challenges and opportunities with regard to competition and price regulation that may be significant for regulators.

This section discusses the regulatory challenges and opportunities facing all telecoms regulators. Special attention is paid to developing countries but the changes in technology and markets affect all regulators. It discusses how policy and regulation intersect in the context of differences between countries and as a result of changes in technology and markets. Specifically, this section provides information on:

- **Challenges and Opportunities for Developing Countries**
- **Policy Issues**
- **Regulatory Issues**
- **Key Developments in the ICT Sector**
- **Evolution of Competition**

2.1.1 CHALLENGES AND OPPORTUNITIES FOR DEVELOPING COUNTRIES

Establishing a regime to regulate the ICT sector can place significant demands on a developing country's legal and administrative infrastructure. In the context of competition and price regulation, for example, many developing countries do not have the resources to build large costing models. Institutional aspects of regulation are discussed in **Module 6**.

Compared to developed countries, telecommunications infrastructure in developing countries has a number of features that create both challenges and opportunities:

- Typically, wireless demand in developing countries exceeds fixed demand, which has assisted the rapid availability of affordable telephony.
- Wireless also provides more scope for competition; which should be reflected in less regulation.
- Fibre-based customer access networks are often not yet widely rolled-out. Customers may have limited or no access to either fixed or wireless broadband services, particularly in rural areas.

The fact that traditional fixed technologies are not deeply embedded in many developing countries enables regulators to implement interconnection policies that are more appropriate to wireless networks, **VoIP**, and other emerging technologies. For example:

- The prominence of per-minute rates is a product of fixed technology. Per-minute rates may be irrelevant, or even counterproductive, when applied to **VoIP** services,
- Policies seeking to "**unbundle**" network elements assume that the fixed incumbent enjoys a near monopoly position in the provision of critical telecommunications infrastructure. This assumption may not be valid in many developing countries.

The absence of a well-established interconnection regime may allow regulators in developing countries to bypass policies that are no longer appropriate, in favour of arrangements that are sustainable, minimize opportunities for **arbitrage** and are more in line with emerging technologies. This is useful market behavior unless the price difference between two services or markets is sustained only because of regulation. If legislatures and regulators do not promptly adjust the regulatory policy that triggered such arbitrage, the impact on the market can be substantial.

All countries are facing challenges and opportunities as digitisation **de-layers** networks. Digitisation separates 'carriage' and 'content' services allowing '**over-the-top**' services which dramatically impact traditional business models which used 'content' services (eg calls) to subsidise 'carriage' (ie line rental).

Regulation provides opportunities for market entry in unanticipated ways. For example, in Australia an entrant can arbitrage between the different ways the wholesale price of calls is regulated. It is inefficient to route all calls through the point of interconnect. The interconnection framework suggests that only long distance and international calls will be passed to the POI with PSTN originating and terminating access billed at 1 cent per minute at each end.

Local calls can be resold and are routed as they would be if provided by the incumbent. The reseller is billed 8.9 cents per local call (untimed in Australia).

The break-even point is 4.35 minutes. That is, for business customers where local calls are typically less than 4 minutes long, the entrant can programme the business customer's on-premises switchboard (Private Branch Exchange, or "PBX") to insert an area code so that calls can be presented at the POI as "long distance" calls.

◂ **Box 1.1: Australia: Arbitrage of Local Calls**

Source: Rates for the period to June 2014, ACCC Final Access Determination, July 2011

Practice Notes

- Forms of Arbitrage

Reference Documents

- ACCC, Final Access Determination for Fixed Line Services, July 2011

2.1.2 POLICY ISSUES

This section discusses the relationship between the policy and regulatory issues that are particularly relevant to developing countries.

Initially, many countries combined policy, regulation and the operation of the telephony provider in one government department. With market liberalisation and privatisation, these functions are placed in separate organisations.

The powers and purpose of the regulator are determined by the policy framework. For example, the approach to competition and price regulation depends partly on the balance between competition law and regulation [*]. The EU applies the "three criteria test", all of which have to apply for a market to require *ex-ante* regulation [*]:

	Test	Comment
1	The presence of high and non-transitory barriers to entry	These could be structural (eg scale) or legal/regulatory (eg spectrum rights)
2	A market structure that does not tend towards effective competition within the relevant time horizon	Technological developments or convergence may lead to competitive constraints on operators active in distinct product markets
3	The application of competition law alone would not adequately address the market failure(s) concerned	Competition law is unlikely to be sufficient where the compliance requirements of an intervention to redress a market failure are extensive or where frequent and/or timely intervention is indispensable

◂ **Table 1.1: The EU's Three Criteria Test**

Photo: T1.1

The EU is concerned that newly emerging markets should not be subject to inappropriate obligations, even if there is a first mover advantage due to their novelty because it is difficult to apply the three criteria and its desire to promote innovation. Meeting the three-criteria test does not automatically mean that regulation is warranted. In addition, one or more operators must be found to have **significant market power**. Using these three criteria, the EU finds the following markets may need *ex-ante* regulation [*]:

Market	Service	Comments
1	Retail access to PSTN	Retail line rentals (but not calls) unless Wholesale Line Rental or infrastructure (cable) competition established.
2	PSTN originating access	To support call/carrier selection
3	PSTN terminating access	To support call/carrier selection and any-any connectivity (between fixed mobile users)
4	Wholesale network infrastructure access	Mainly full or partially unbundled lines
5	Wholesale broadband access	Bitstream access which is downstream from market 4 which can provide market 5 access when combined with other elements.
6	Wholesale leased lines	For tails only as the trunk segment is deemed competitive in most Member States
7	Voice call termination on mobile networks	Includes SMS

◂ **Table 1.2: EU Markets Suitable for Ex-Ante Regulation**

Photo: markets st ex ante regulation EU

Note that only the first market is regulated at the retail level. A downstream market should only be subject to direct regulation if competition on that market still exhibits SMP in the presence of wholesale regulation on the related upstream market(s).

Regulators can apply regulatory remedies to other markets in the EU, but they have to satisfy the Commission that the three criteria test has been met.

A key role of policy is to set the goals to be supported by regulation. In all countries, regardless of their level of development, policy goals that drive regulation include:*

- **Universal affordable access** to communications: this has traditionally been about extending telephony services. Best practice is discussed in **Module 4**. Traditionally, it has been supported by cross-subsidies from usage to access (or handsets in the case of mobiles). This mechanism is inconsistent with competition (next point). However, politically mandated social policies such as geographically uniform tariffs still exist and can constrain the regulator's attempt to set cost-based tariffs in pursuit of **efficiency objectives.**
- **Competition**: until recently, the general policy has been facilities-based competition (also referred to as platform-based competition) which occurs between vertically-integrated players such as the telecommunications incumbent and a cable or mobile operator. Where policy makers have decided that fibre broadband networks are a **natural monopoly**, the policy focus has shifted to service-based competition rather than infrastructure based competition *. This seems to be the case for some developed countries building fibre customer access networks. Natural monopoly leads to **interconnection**, **unbundling** and **infrastructure-sharing** policies.
- **Efficiency**: Competition increases **efficiency** and drives prices towards costs. The cross-subsidies from call revenues that promoted universal access with monopoly are not possible when there is competition for call revenue. This means that line rentals and local call prices have to go up so that long-distance prices can move towards cost. Policy may dictate how fast this should occur, often through **price caps** and such policy should be reflected in both access and retail price regulation. In developed countries the cross-subsidy from fixed to mobile users is being eliminated with rapid reductions in **mobile termination rates.**
- **Broadband:** Ensuring widespread adoption of broadband is a key policy objective for most countries now. Since mobile broadband will be the main delivery platform in developing countries, a key policy task is the allocation of **wireless spectrum.** In markets aiming to upgrade copper networks with optical fibre, public investment is stepping-in where private investment lags.
- **Innovation**: a healthy ICT sector will see new services and applications constantly brought to market. Sometimes these may undermine existing service revenues. Examples of such game-changing innovation are **VoIP** and **Smartphone Apps**.
- **Private sector investment** in the ICT sector: For this to occur, both policy and regulation must be clear and applied predictably and consistently. An unsolved **investment issue** is how to set the policy rules for public investment.

The importance attached to different policy goals depends upon the circumstances and economic and social objectives of any country. As the table below shows *, the circumstances of countries can vary in several respects and this implies different policy objectives and issues.

Table 1.3: Differences between regions

	High Income Economies	Developing Economies
GDP per capita [1]	Over US$12,000	Under US$4,000
Fixed phone, 2010 [2]	40.9 per 100 inhabitants	12.1 per 100
Mobile, 2010 [2]	116.1 per 100	67.6 per 100
Fixed broadband [3]	24.6 per 100	4.4 per 100
Mobile broadband	Focus on rural areas	Main broadband platform
Household internet access 2010 [3]	65.6%	16.8%
Demand factors	Mass demand	Affordability issues
Investment factors	Can afford some duplication and experimentation	Access to capital poor
Telephony focus	Fixed network with some mobile substitution	Mobiles

1. http://data.worldbank.org/about/country-classifications
2. http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom.html
3. http://www.itu.int/ITU-D/ict/material/FactsFigures2010.pdf

Table 1.3: Differences Between Regions
Source: WorldBank/ITU

The policy focus in developed countries was originally on introducing competition in the call market, leading to the regulatory focus on switched interconnection *. With the advent of DSL technologies allowing broadband over the traditional copper PSTN (Public Switched Telephone Network) the business model shifted to competition for customer access and the regulatory focus shifted to **local loop sharing** and **line unbundling**. Currently, the main pre-occupation of policy in developed countries is deploying broadband networks so the regulatory focus has shifted again to **bitstream access** and **infrastructure sharing**.

As noted in **section 1.1** and as shown in Table 1.3 above, many developing countries have almost by-passed the building of fixed copper networks with mobile networks. They are so much cheaper to build that even smaller developing countries have been able to support mobile infrastructure competition.

Practice Notes

- Digital Dividend Spectrum
- EU Telecoms Reform Package [1]
- Forms of Market Failure
- Network Neutrality
- New Zealand: Using Competition Law to Regulate Interconnection
- White Spaces Spectrum [1]

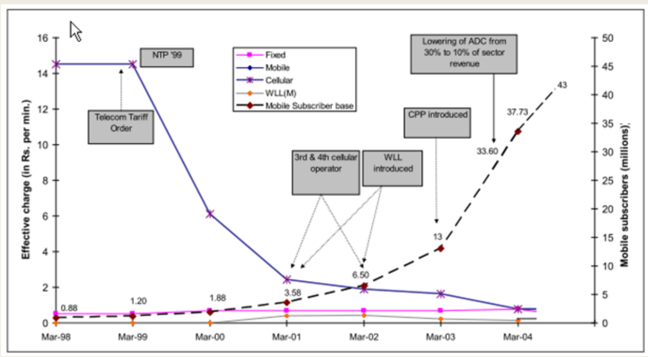
Reference Documents

- EU, Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation
- European Regulators Group -- ERG Report on Guidance on the application of the three criteria test (June 2008)
- GSR 2010 Discussion Paper, 10 "The impact of broadband on the economy: Research to date and policy issues"

2.1.3 REGULATORY ISSUES

As indicated in Section 1.2, regulation is an instrument of policy. Regulation takes second place to competition *. Competition is a desirable goal not for its own sake, but because of the benefits from competition. These benefits derive from the pressure competition places on firms to be efficient, innovative and customer focused in order to thrive and survive. They include lower prices, higher productivity, more service choices, and greater connectivity. Competition is held to be the most efficient mechanism available for organizing, operating, and disciplining economic markets *.

Box 1.2: The Benefits of Competition: India



Source: Fig 1.5 in ITU Telecoms Regulation Handbook, 2011

◂ **FIGURE 2.1: The Benefits of Competition: India**

Source: Fig 1.5 in ITU Telecoms Regulation Handbook, 2011

Competitive markets distribute resources efficiently and fairly without any need for a single centralized controlling authority. Competition maximizes benefits to society at large by increasing:

- **Allocative efficiency** – which refers to the optimal allocation of resources to meet consumer demand.
- **Productive efficiency** - which is achieved when resources are used to produce output at lowest cost
- **Dynamic efficiency** – which refers to changes in efficiency over time. It is generally regarded as being promoted where producers have incentives to invest and innovate to meet future consumer demand.

Regulation acts as a surrogate for competition where competitive forces are weak (eg in forcing monopolies to reduce prices and increase output) or where there are significant externalities. Where regulation is a proxy for competition, the notions of efficiency above are used as a guide to regulatory decisions; subject to policy.

Note that there may be a trade-off between the long-term dynamic efficiency objective (investment) and the short-term allocative efficiency objective (lower prices). Regulators are faced with a complex balancing exercise. Individual regulatory decisions need to balance:

- The long term objective of ongoing, sustainable competition, and
- The resolution of immediate short-term concerns, while
- Complying with the legislative provisions under which regulators operate.

Using regulation to make markets more competitive must be done very carefully. The impact of the regulator on competition may not be what was intended. Regulators may be tempted to micromanage the market to ensure that competition (or a particular form of competition) takes place. Alternatively, they may decide prematurely that the market is fully competitive. Neither of these paths is likely to result in sustainable competition.

Regulators have to be wary of rent-seeking * and aim for principled, consistent and predictable decision-making. A good example of best-practice is Ofcom's approach to regulation which emphasises regulatory forbearance in its operations; relying on markets where possible and operating with a bias against intervention *. Where intervention is required, Ofcom aims to intervene firmly and promptly, using the least intrusive regulatory mechanisms available. It has seven "**regulatory principles**".

Practice Notes

- **Forms of Competition**
- **Forms of Market Failure**
- **Jamaica: The Benefits of Mobile Competition**
- **Ofcom: Principles for Regulation**
- **Regulatory Forbearance in Canada**

Reference Documents

- **Kenya – Broadband Case Study: Build It and They Will Come**
- **Telecommunications Regulation Handbook**

2.1.4 KEY DEVELOPMENTS IN THE ICT SECTOR

Even in developed countries, many regulatory decisions remain based on three assumptions about the sector that no longer reflect reality. Some regulators appear to assume that,

- telecommunications mainly concerns voice calls.
- telecommunications networks remain natural monopolies.
- the firm that owns the network also provides the service - VoIP demonstrates that the basic premise of traditional voice telephony – the network and voice services must be owned and operated by the same firm – is no longer relevant.

Broadband technology in particular has challenged all three assumptions.

Both policy and regulation have to adapt to, but not over-react to, changes in the ICT sector. The nature and pace of change create challenges for both regulators and regulated firms. This section provides an overview of key developments in the ICT sector, across four categories:

- **Technological Changes**
- **The Emergence of New Services**
- **Changes in Market Structure**
- **Investment Issues in the Sector**

Reference Documents

- **Asia-Pacific: Telecommunications Regulation - Competition - ICT Access**

2.1.4.1 TECHNOLOGICAL CHANGE

Digital technologies are changing the ways in which the majority of people live, work, play and interact with each other. We can see this reflected in the language we use. Our vocabulary is evolving as existing words assume new meanings – app, burn, text – or appear in new combinations, such as smartphone, cyber-crime, file sharing. Some vocabulary is entirely new: the words blog, podcast and googling have become commonplace. The range of technology acronyms in everyday use continues to expand – P2P, SMS, MP3 – and adds to the sense that what we are witnessing is the dawn of a new information age, in which ICTs become part and parcel of daily life.

The most fundamental shift behind all these changes is the transition to all-digital networks which has profound implications for competition and regulation. Networks used to be built vertically around specific applications (eg voice or PayTV) but digitisation 'de-layers' networks (Box 1.3) so that content or applications are no longer network specific. A byte is a byte and Next Generation Networks are layered to serve all applications.

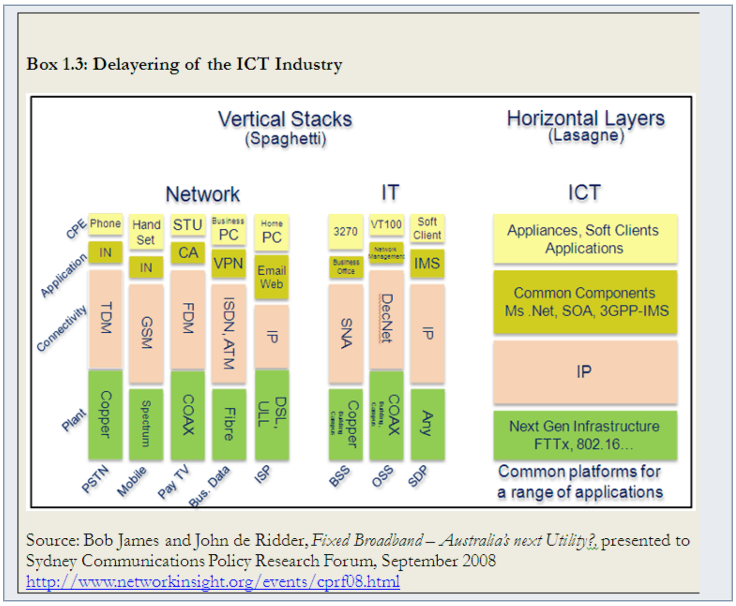


FIGURE 2.1: Delayering of the ICT Industry

Source: Bob James and John de Ridder, Fixed Broadband - Australia's next utility?, presented to Sydney Communications Policy Research Forum, September 2008 http://www.networkinsight.org/events/cprf08.html

The Next Generation Network operates seamlessly across a variety of infrastructure types. Figure 1.1 shows different digitised access platforms can communicate with each other instead of being limited to service-specific platform. Various services are delivered from a server. This means you can access the internet on your TV, listen to radio on your PC, and watch video on your mobile device.

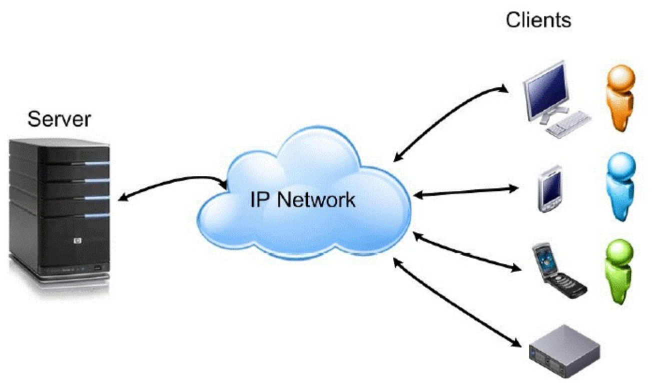


Figure 2.2: NGNs Combine All Digital Networks

Reference Documents

- **Telecommunications Regulation Handbook**

2.1.4.2 EMERGENCE OF NEW SERVICES

The combination of broadband (wired or wireless), the digitalization of media content, and the falling costs of producing digital content herald an age of abundance. New content producers have a means of distributing their creations instantly and globally. Content can be customized to the personal tastes of an individual rather than be defined for a mass audience.

High speed broadband technologies are underpinning the development of "always-on" and readily accessible applications. The always-on nature of connectivity-based applications has provided the catalyst for developments in e-health, e-education and teleworking.

In the legacy access environment, it is a simple task to identify the carriage provider and the party to whom the carriage service is provided. In the residential market, a carriage service is provided to an individual and any others at the residence for their use. All services are provided by an access provider, which charges for the telecommunications services acquired.

In the next generation access environment, the supply chain is fragmented. From a user perspective, many elements in the supply chain will not be known or will be beyond the user's control. For example, a user may use a smartphone to make a VoIP call via a Wifi network while at a cafe. The call uses the cafe's Wifi infrastructure and internet service to authenticate the user's service on a server that could be located anywhere. The call then can be carried via a number of packet networks before reaching its destination, which could be on a legacy network. Such a call can use private, carrier, internet and legacy networks for carriage, and be initiated by a service anywhere in the world.

Some telecommunication regulations assume that the provision of a service can be related to a specific carriage service or provider. Such assumptions may no longer be valid in a next generation access environment where the relationship between services and carriage may not be fixed or known. Next generation networks effectively remove legacy carriage technology barriers to provide a broad foundation for the development of applications and services in a converging industry.

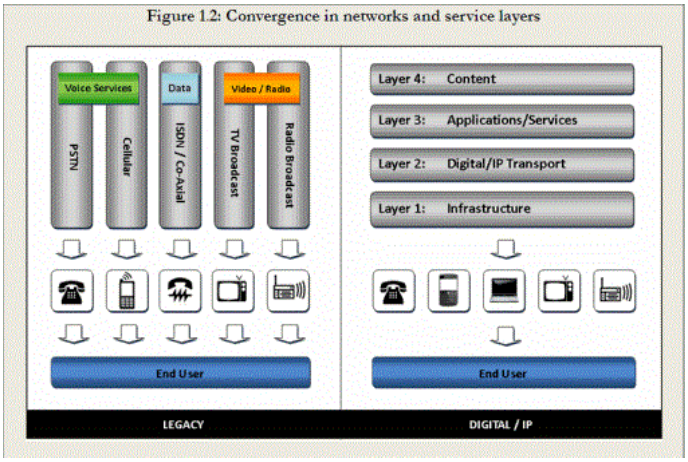
Reference Documents

- **Australia: Developments in next generation applications and services, ACMA**

2.1.4.3 CHANGES IN MARKET STRUCTURE

Convergence is blurring the boundaries between sectors. The historical distinctions between radio communications, telecommunications, broadcasting and the internet are blurring. Convergence is characterised by five key causes of change. These are *:

A. *Technological developments.* Digitalisation is separating services from transport layers. Previously distinct media, such as voice telephony, broadcasting and internet applications, are converging into common interfaces on single devices (Figure 1.2).



◂ Figure 2.3: Convergence in Networks and Service Layers

B. *Market developments and associated changes in industry structure*. Liberalisation of telecommunications markets has resulted in multiple competing networks offering electronic services. Broadcasting, media, information technology and telecommunications markets are merging into a broad communications market.

C. *Changing consumer and/or citizen engagement.* Data delivery is increasingly ubiquitous and consumers are increasingly substituting data-based communications (for example, email, short message service (SMS) and social networking applications) for voice services. Content production is also shifting away from industry as users generate their own content and share it via the internet. Private and public service delivery is also shifting online. These developments are changing the way citizens interact with each other, procure services and participate in the public sphere.

D. *Globalisation of markets and regulation.* Extended supply chains and the global reach of the internet is challenging regulation designed for local and national markets.

E. *National digital communications strategies.* Direct public sector investment in communications infrastructure is reshaping competition dynamics and presenting other public policy challenges (such as the delivery of consumer safeguards via industry obligations and the migration of telecommunications to IP delivery).

Several jurisdictions have integrated their media and communications laws into a converged legislative framework—Malaysia; the European Union (EU) and its member states of the United Kingdom (UK), Finland, Sweden and Italy; and South Africa. Korea, Japan and Taiwan are in the process of legislative change and have made some steps towards converging their laws *.

A common feature of converged legislative frameworks in the EU, Malaysia and Korea is the use of a regulatory model that is structured on the network layers (Figure 1.2 above) of next-generation networks or IP-based technologies, rather than on the vertical industry structures of telecommunications, broadcasting and IT. This is described as a technology-neutral approach, which is based on the functions of the different network layers of next-generation networks.

Regulators are realizing that their existing regulatory frameworks may impede the ability of operators to make triple or quadruple play offerings to consumers or use low-cost Voice over Internet Protocol (VoIP).

Banking and telecommunications are converging around mobile banking with smartphones and "near field communications" (NFC or "wave and pay" allows transactions between two devices in close proximity).

M-PESA is a famous early example of mobile banking where regulatory forbearance by a non-telecoms regulator led to satisfactory outcomes. M-PESA is a small-value electronic payment and store of value system accessible from ordinary mobile phones. Since its introduction by mobile phone operator Safaricom in Kenya in March 2007: it has been adopted by 13 million customers (over half of Kenya's adult population) and processes more transactions than Western Union does globally.The Central Bank of Kenya was concerned about the impact on existing deposit-taking institutions. But, it was even more concerned by the lack of access to financial services so it allowed the new payment mechanism to proceed under its watch.

Access to financial services is an issue not confined to emerging markets. In 2011, the European Commission reported that up to 30 million consumers aged 18 or over do not have access to basic banking and payment facilities. However, the EU is concerned that standards being developed by the Electronic Payment Council may exclude new entrants or those not backed by major banks.

http://www.microfinancegateway.org/p/site/m/template.rc/1.9.43376/

◂ **Box 1.4: Mobile Money**

Source: Mas, Ignacio, and Dan Radcliff. 2010. Mobile Payments Go Viral: M-PESA in Kenya, in *Yes Africa Can: Success Stories from a Dynamic Continent*, World Bank, 2010.

The emergence of new services such as (for instance) IPTV with guaranteed quality requires specific applications of traffic management which in turn create incentives for network operators and ISPs to vertically integrate into content, applications and services markets. But there may then be an incentive for operators/ISPs to in turn discriminate against competitor's equivalent services. This would be a violation of **net neutrality.**

Reference Documents

- **ACMA: Converged Legislative Frameworks**
- **Broken Concepts: The Australian communications legislative landscape**
- **ITU, Regulatory Impact of Convergence and Broadband for the Americas". Connect Americas Summit, July 2012.**
- **Telecommunications Regulation Handbook**

2.1.4.4 INVESTMENT ISSUES IN THE SECTOR

In the past, telecommunications operators have been viewed as stable, monopolistic utilities. The main challenge for regulators had been to prevent excessively high retail **pricing** (section 7) by incumbent operators.

With increasing competition from new providers and new services, the telecommunications sector is becoming more volatile. Average revenues per line from traditional services are declining under pressure from competing providers and modes of delivery. In particular, the emerging **de-layered structure** of the industry means that 'over-the-top' applications (like Skype) which have no intermediation by the carriage provider take revenues directly from the end customer. This loss of revenues is happening to both fixed operators and, with smartphones, also mobile network providers.

At the same time, network providers are expected to invest heavily in next generation fixed and wireless broadband networks. This may not happen fast enough to suit policy makers * with regulatory implications for open access, competition and price regulation.

A common reason for market invention is **market failure** due to 'positive externalities'. That is, investment in broadband is socially beneficial (public and private benefits exceed total costs) but private investment is not profitable (private costs exceed private benefits). This is most likely in rural areas where costs are high and demand is sparse, but may also occur in urban areas.

- The approved remedy for this kind of market failure is to provide a capital grant or subsidy to the private operator to make the investment profitable. This could be done through a public tender process and conditions could be attached to make the operator provide **open access**.
- Another remedy is to provide a regulatory 'access holiday'. This is what was done for Verizon and AT&T * and sought by Deutsche Telekom *
- A third option which has been used is direct public investment. This can range from local municipal networks to national networks like the Australian National Broadband Network *.

◂ Box 1.5: Public Investment

Public investment is popular with users but disliked by incumbents and regulators who want to prevent 'unfair' competition.

To justify a public investment, the European Commission requires detailed local mapping of availability, need, and rollout; an open tender process; acceptance of the most economically advantageous offer (which need not be the lowest bid); that the tenders be technologically neutral; that, where possible, they use existing infrastructure (except where the recalcitrance of the local monopolist is part of the problem); that the successful bidder offer its network for wholesale services to other providers at rates that are benchmarked against wholesale rates in competitive areas, and; that the tenders or laws pursuant to which a tender is made include claw back provisions allowing the state to seek restitution of profits found to have been excessive following such price benchmarking.

Another form of **market failure** is due to 'natural monopoly'. That is, duplication of fixed broadband access networks is uneconomic. That is of special concern to countries where investment resources are scarce but could also be of concern to developed countries if it meant that no duplicated network achieves the scale it needs to be viable.

- The approved remedy is **open access**; which is what the Australia's national broadband network will provide. It has persuaded incumbents to close their own fixed broadband networks and to move their customers to the new network in what is effectively a switch from infrastructure-based competition to service-based competition.
- A single broadband access network with open access can be seen as just another vital utility network. The days when networks were built around applications (i.e. telephony and television) are over. With **technological change**, control of the access network does not confer control of the customer or service.

Significant Market Power (SMP) could lead to an operator restricting output to increase profits. Even if there is latent demand for faster broadband, the operator may prefer to sell existing data services rather than provide broadband services where it cannot differentiate so easily between business and residential customers.

- One remedy is to force existing operators to provide **open access** to their networks (i.e. provide wholesale services).

Uncertainty over demand could lead to an operator not deploying next-generation broadband. This could be a market failure if there was enough underlying demand, but operators were not able to identify it.

- This potential market failure can be overcome by demand-side stimulation interventions.

Regulatory uncertainty could lead to operators not investing in new infrastructure as they are unclear on how regulation may impact their investment in future.

Practice Notes

- Forms of Market Failure

Reference Documents

- UK: Models for efficient and effective public-sector interventions in next-generation broadband access networks

2.1.5 EVOLUTION OF COMPETITION

Regulators have to understand how competition is shaped by regulation and technology and the appropriate responses. This section explores:

- Impact of the regulator on competition
- Impact of technology on competition
- Level of competition globally

2.1.5.1 IMPACT OF THE REGULATOR ON COMPETITION

Ideally, the actions of the regulator should lead to the same outcomes we would expect in a competitive market. Inevitably, the market will be different as a result of regulation. Even with the best intentions, outcomes may be poor because regulators do not have perfect foresight and knowledge. Sometimes, the costs of regulatory action are higher than taking no action. With fast-moving technology, inaction may be less costly than regulation.

The concept of the ladder of investment [*] influenced many regulators who believed they could help new entrants towards 'facilities-based' competition. The steps towards this goal that new entrants in developed markets have evolved through are:

- Retail arbitrage (resale)
- Switched reseller
- Unbundled local loop
- Facility based (fibre)

In developing markets, the addressable market for the above options is limited because the copper network in developing countries is less extensive. However, mobile technology side steps the ladder because it allows infrastructure competition to occur immediately. Below, we consider all these phases and the role of policy and the regulator [*].

The first rung of the ladder of investment is mandated resale. This requires no infrastructure investment by the new entrant but regulated profit margins are very small. Where the regulator is required to arbitrate a wholesale price, it is likely to be on the basis of the **retail-minus** method.

<table>
<tr><th></th><th></th><th>Access</th><th>Voice</th><th>Data</th><th>Mobiles</th></tr>
<tr><td>CBD</td><td>Corporate</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Commercial</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Metro</td><td>Commercial</td><td colspan="2" rowspan="4">Target Market</td><td></td><td></td></tr>
<tr><td></td><td>Residential</td><td></td><td></td></tr>
<tr><td>Rural</td><td>Commercial</td><td></td><td></td></tr>
<tr><td></td><td>Residential</td><td></td><td></td></tr>
</table>

◂ Figure 1.3: Retail Arbitrage Model (Resale)

Bulk discounts are used to sell into commercial and residential markets. Above, customers in the City Business District (CBD) are not in the addressable (target box) market because they already get the large discounts. The new entrant requires no infrastructure. Billing services can be purchased so the cost base is variable. There are no sunk costs; except in building brand awareness. The model is dependent on the arbitrage window between what the new entrant pays to the incumbent and what it receives from its customers. The new entrant carries the credit risk if end-customers to not pay [*].

Regulators are sympathetic to resale because it can help new entrants build a customer base ahead of investing in their own infrastructure. As the new entrant acquires customers, it can move up the ladder by acquiring a voice switch and leasing long-distance transmission. This lead to the model depicted in Figure 1.4.

<table>
<tr><th></th><th></th><th>Access</th><th>Voice</th><th>Data</th><th>Mobiles</th></tr>
<tr><td>CBD</td><td>Corporate</td><td colspan="2" rowspan="6">Target Market</td><td></td><td></td></tr>
<tr><td></td><td>Commercial</td><td></td><td></td></tr>
<tr><td>Metro</td><td>Commercial</td><td></td><td></td></tr>
<tr><td></td><td>Residential</td><td></td><td></td></tr>
<tr><td>Rural</td><td>Commercial</td><td></td><td></td></tr>
<tr><td></td><td>Residential</td><td></td><td></td></tr>
</table>

◂ Figure 1.4: Switched Reseller Model

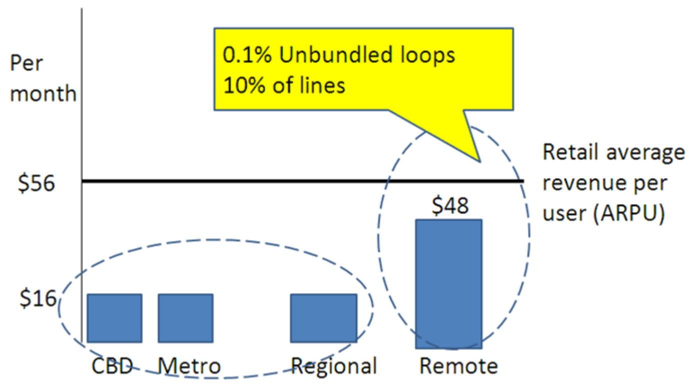
In this model (Figure 1.4), the entrant provides long-distance services by inviting its customers to preselect it for long-distance calls and pays the incumbent for originating and terminating interconnection at each end of its transmission network. Its profit margins improve compared with resale. The margins between retail prices and regulated, cost-based interconnection charges are much larger than regulated resale margins. However, there are now significant fixed costs, so scale becomes important.

With the model in Figure 1.4, the entrant still has to resell line rental and local calls to provide the customer with one bill for basic services. The next step is to acquire access more cheaply than resale.

		Access	Voice	Data	Mobiles
CBD	Corporate	Target Market			
	Commercial				
Metro	Commercial				
	Residential				
Rural	Commercial				
	Residential				

◂ Figure 1.5: Unbundled Local Loop Model

The **unbundled local loop** model shown in Figure 1.5 allows the entrant to provide differentiated broadband service as well as all other services provided over the copper loop (including terminating access fees). If the regulated cost of unbundled local loop is geographically de-averaged, it may be too expensive to provide services in rural areas, which can continue to be served with the previous models *. Apart from any higher cost of the loop in rural areas, there is a scale issue because there may not be enough customers to justify investing in DSLAMs * and transmission facilities.



◂ Figure 1.6: Geographically De-averaged Unbundled Loop – Australia 2011

Source: ACCC *Final Access Determination*, July 2011

European regulators have been keen on unbundling the local loop and some think the US should have followed the same path instead of relying on competition from cable networks *. However, new entrants have not stepped off the ladder to build their own fixed customer access networks dashing the hopes of regulators.

Also, the focus of regulators has shifted from providing access to existing fixed copper networks to stimulating investment in fibre broadband networks.

		Access	Voice	Data	Mobiles
CBD	Corporate	Target Market			
	Commercial				
Metro	Commercial				
	Residential				
Rural	Commercial				
	Residential				

◂ Figure 1.7: Facility Based Model (Fibre)

The communications market in City Business Districts is concentrated. So it is economical to build fibre rings to provide fibre access to the high value corporate customers passed by the fibre. The regulator's main task is to facilitate **infrastructure-sharing** to allow the entrant to lay its fibre in the incumbent's ducts.

Again, this model can co-exist with the use of one or more of the previous models in other regions. The new entrant chooses the models that will increase its markets and margins most efficiently.

All the above applies in the context of fixed, mainly copper, networks. Mobiles networks have proved a disruptive technology and a blessing for developing countries.

		Access	Voice	Data	Mobiles
CBD	Corporate				
	Commercial				
Metro	Commercial				
	Residential				
Rural	Commercial			Target Market	
	Residential				

◂ Figure 1.8: Mobile Model

Mobiles provide full-blooded infrastructure competition between mobile operators as well as against incumbent fixed networks. All services including broadband can be provided by mobile networks; except that major companies (and others) will also use fibre for broadband where it is available.

Mobiles are generally held to be competitive where three or more operators exist, but the regulator will have a number of issues to deal with including making spectrum available, lowering **termination rates** (6.4), adjudicating the terms of **mobile roaming** (6.5) and **network sharing** (6.6).

Just as the fixed network cross-subsidy from calls to access was eroded by call competition, there is increasing pressure on mobile operators as regulators force-down mobile termination rates, mobile call selection (e.g. Jordan) and as voice apps arrive on mobile phones.

Reference Documents

- ACCC, Final Access Determination for Fixed Line Services, July 2011
- Berkman Centre for Internet and Society, Harvard: Next Generation Connectivity

2.1.5.2 IMPACT OF TECHNOLOGY ON COMPETITION

In the USA, cable companies with networks designed to deliver television found they could use their networks to deliver broadband services including voice; encroaching on the traditional telephone business. At the same time, copper networks designed for voice found they could also be used to deliver broadband. With competition between these networks, the US decided it could be more relaxed about regulating telephone companies [*]. In fact, it ditched its mandatory unbundling requirements to encourage investment in fibre networks.

During the first broadband transition, a major assumption underlying the reliance on facilities-based competition was that cable and telephone infrastructures already in place needed relatively low and largely symmetric cost upgrades to provide Internet services. This meant that, at a minimum, there would be two facilities whose incremental upgrade costs were sufficiently low to be able to compete head-to-head in retail broadband markets. In addition, there were some hopes that the same would be

true of power lines and wireless systems. Together these meant that technological convergence could underwrite competitive markets among players, each of whom invested in—and owned—their own complete facilities.

Up to 70 per cent of the costs of developing broadband infrastructure in the fixed-line network are excavation costs. These costs may be reduced significantly if the various infrastructure providers become more open to collaboration and allowing third-party access to their own systems.

◂ Box 1.5: Fibre access as capital works projects

Source: Germany, Federal Ministry of Economics and Technology, The Federal Government's Broadband Strategy (February, 2009) http://www.bmwi.de/English/Navigation/Service/publications,did=294718.html

Transposing the experience of open access in the first generation to the next generation is taking a wide range of alternative forms. The shared core understanding is that the transition to next generation infrastructures re-emphasizes the high upfront costs involved in, or natural monopoly, characteristics of, telecommunications networks, and requires some form of shared infrastructure if competition is to be maintained in the teeth of such economies of scale.

Mobile technology has also evolved to the point where it can also offer broadband. Australia was the first country to launch a nation-wide 3G mobile phone service and now claims [*] to offer 4G mobile telephony (Table 1.4).

Service	Year	Features	Down*	Up*	Population Coverage
1G	1987	Analogue for voice	n/a	n/a	96%
2G	1993	First digital phone, sms	n/a	n/a	96%
2.5G (GPRS)	2001	Basic data, WAP	30kbps-40kbps	10kbps	96%
3G (HSDPA Phase)	2006	Next G®, faster downlink, first video	550kbps-1.5Mbps	60kbps-330kbps	98%
3G (HSPA Phase)	2007	Faster uplink data	550kbps-3Mbps	300kbps-1Mbps	99%
3.5G (HSPA+ Phase)	2008	Smart-phones, apps, games, social media.	550kbps-8Mbps	300kbps-3Mbps	93%
3.5G (HSPA+ Dual Channel)	2009	The above at faster speeds	1.1Mbps-20Mbps	300kbps-3Mbps	60%
4G	2011	High def video conferencing, faster up & download speeds, lower latency	2Mbps-40Mbps	1Mbps-10Mbps	40%

•Typical customer speed ranges that can be achieved with appropriately rated devices. Actual speeds vary due to factors such as location, distance from the base station, local terrain, user numbers, hardware & software configuration and download source/upload destination.

◂ Table 1.4: Telstra's Path to 4G in Australia

Source: Telstra

In developed markets, there is debate about the extent to which fixed and mobile broadband are complements or substitutes [*].

Mixing mobiles and fixed networks, Wi-Fi is also becoming important. Wi-Fi is in virtually all portable consumer devices and customers are actively seeking Wi-Fi hot spots to reduce data costs and improve their wireless broadband experience. The vast majority of tablets sold to date are Wi-Fi only devices. Wireless broadband is increasingly viewed as a portable and nomadic service for the consumption of media rich content and video.

Also, major wireless carriers worldwide are deploying Wi-Fi as means of offloading 3G/4G traffic on to the fixed network thereby reducing mobile network build costs, and improving capacity and coverage. Since Wi-Fi spectrum is free and there are no device subsidies, extensive Wi-Fi coverage can be built at a substantially lower cost relative to a traditional wireless networks and still provide customers with an excellent broadband wireless experience

Across all these network types, the biggest development which comes out of digitisation is the emergence of apps (applications). Some of these apps are especially disruptive because they undermine the business models of the network providers. For example, apps like Skype provide cheap voice. They can effectively kill the case for implementing **Carrier Selection** on fixed networks as the mobile market is far larger and smartphone penetration is already above fixed line penetration [*].

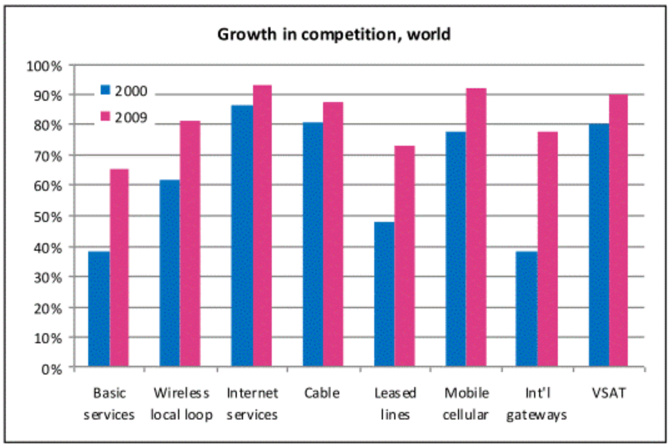
Reference Documents

- **Berkman Centre for Internet and Society, Harvard: Next Generation Connectivity**

2.1.5.3 LEVEL OF COMPETITION GLOBALLY

Over the last decade, many countries have opened-up various telecoms markets to new entrants. According to ITU data [*], at the end of 2009,

- As shown in Figure 1.9 below, over 65 per cent of countries now have either full or partial competition in basic services (local, long distance and international services).
- Competition in mobile and internet services is extremely common – 90 per cent of countries have either partial or full competition in the mobile sector.
- The most competitive sector is internet services area with 93 per cent of countries allowing full competition in the sector.



◂ **Figure 1:.9 Changes in the Level of Competition Globally**

Source: ITU, cited in Telecommunications Regulation Handbook, 2011

Monopoly provision of local service is still prevalent in some regions; particularly in Africa and the Arab States, where 44 and 57 per cent of countries respectively have a monopoly local service provider. The data show significant competition in Europe and the Commonwealth of Independent States (CIS), where 82 per cent of countries report full or partial competition in local service. This reflects the significant impact of the European Union's competition policy and telecommunications requirements.

The picture for domestic long distance is very similar to the local service sector. Approximately 40 per cent of African countries and 52 per cent of Arab States have a monopoly in the provision of domestic long distance services. Approximately 60 per cent of countries in Asia-Pacific, 83 per cent of countries in Europe, 55 per cent in the CIS and 66 per cent of countries in the Americas, report full or partial competition in this sector.

There are different approaches to development of broadband networks in relation to preferred platforms (mobile in the case of developing countries), the scope for infrastructure competition (natural monopoly in non-urban fixed networks) and the role of public investment (where private investment does not appear).

Competition for services is also emerging from non-traditional sources with digitisation. The separation of services and platforms (or "carriage and content") has profound implications for investment in business models and investment for networks.

Reference Documents

- **Telecommunications Regulation Handbook**

2.2 ANTI-COMPETITIVE CONDUCT

This section discusses anti-competitive conduct issues and remedies. Specifically, we address

- **Policy Issues**
- **Key Concepts**
- **Common Forms of Anti-Competitive Conduct**

- Mergers, Acquisitions, and Joint Ventures

2.2.1 POLICY ISSUES

As networks migrate to digital technologies, broadcasting networks are able to carry a range of services including voice telephony. This has important consequences for sector regulators and competition policy. Co-ordination across regulatory areas (between broadcasting, data services, and telecommunications) will be important to avoid 'regulatory arbitrage' *. Mergers between entities in previously separate sectors may now raise competition concerns.

Many competitive conduct issues can be addressed by competition law. But, *ex-ante* regulation of conduct can be quicker and cheaper. Regulators have to avoid over-reach and be consistent and predictable. In emerging markets, **forbearance** is wise.

Much of a regulator's work will focus on ensuring there is no anti-competitive conduct by the incumbent or dominant operator. But, the regulator must focus on protecting the process of competition which is not always the same as protecting new entrants. The integrity of competition can be compromised by possible new entrant practices such as "slamming" * and misleading advertising. Such practices should be stopped.

2.2.2 KEY CONCEPTS

The aim of **competition policy** is to promote **sustainable competition**. Before concluding that either a **merger** would harm competition or that **anti-competitive behavior** exists in a market, and then what remedies to apply, competition analysis follows the following steps:

- Define the **relevant market** or markets. For competition purposes, a market includes all those goods or services that are close substitutes in the eyes of buyers and all those suppliers who could produce those goods or services.
- Assess the level of competition in the market, with and without the trade practice or business acquisition in question. The level of competition in a market depends on the structure of the market, and whether it meets the conditions for **effective competition**. Important considerations include:
  - Decide whether any firm in the market is dominant or has **significant market power** and the impact of the trade practice or business acquisition in question on its market power.
  - Assess whether a firm with market power has abused this position to raise prices above competitive levels or engage in **anti-competitive practices**
  - Assess any **barriers to entry and exit** and the potential for competition from new entrants, and
  - Assess the role of any **essential facilities**.

Malaysia's Communications and Multimedia Act 1998 defines the remedies available to the Communications and Multimedia Commission to stop or authorise * anticompetitive conduct:

Issue	Possible Action
The conduct appears to have the **purpose** of substantially lessening competition	Interim injunctions or fines
The conduct appears to have the **effect** of substantially lessening competition	Direct to the licensee to cease the conduct and to implement appropriate remedies
Application for authorization of specific conduct	Issue an authorization of the conduct, or refuse the application

◂ **Table 2.1: Malaysia: Remedies for Anticompetitive Conduct**

Anti-competitive behaviour may also be inhibited by imposing some form of **separation** between the incumbent's upstream and downstream (competitive) activities.

Practice Notes

- Forms of Competition
- Two-Sided Markets

Reference Documents

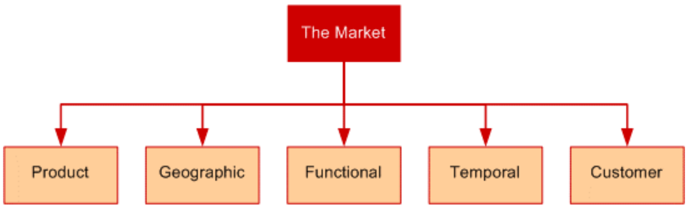
- ERG Common Position on the approach to Appropriate remedies in the new regulatory framework

2.2.2.1 DEFINING THE MARKET

Market definition focuses on the substitutability of differentiated products or services. But it must also consider other dimensions. New Zealand's competition authority, the Commerce Commission, defines markets in terms of five dimensions (see Figure 2.1):

- The goods or services supplied and purchased (the product dimension)
- The geographic area from which the goods or services are obtained, or within which the goods or services are supplied (the geographic dimension)
- The level in the production or distribution chain (the functional dimension)
- The time frame or timing within which the market operates, where relevant (the temporal dimension), and

- The different customer types within a market, where relevant (the customer dimension).



◂ Figure 2.1: Dimensions of Market Definition

The above is similar to the **European Commission's market analysis procedure**:

- Tentatively define the product market by determining whether two products belong in the same market.
- Tentatively define the geographic market in terms of competitors' market shares, prices, and price differentials.
- Conduct a more detailed analysis of demand-side and supply-side substitutability.
- Determine whether customers can switch to an alternate product or supplier in response to a small (5-10 per cent) increase in price; the "SSNIP" test *. If they can, the market definition is widened to include the alternatives.
- Determine whether other suppliers can readily switch to providing the alternate product in the relevant market *.
- Further investigate the conditions in which competing firms operate. This may entail exploring the recent past activities of those firms, consumer behaviour and preferences (through demand elasticities and other studies), regulatory or market barriers to entry, market segmentation and the viability of efficient price discrimination.
- Use consultations with firms and consumers and on-the-spot inspections to further inform and refine the market definition analysis.

Fibre-to-the-Node is being rolled-out through "cabinetisation" in New Zealand. The Commerce Commission had to decide whether this created two wholesale markets reflecting different supply characteristics: - exchange-fed (copper) lines versus cabinet-fed lines.

For exchange-fed lines, there is competition through both unbundled local loop (ULL) and unbundled bitstream (UBA). The regulated access prices for ULL and UBA are cost-based and retail price minus avoided costs respectively.

With cabinetisation, only UBA can be used to supply broadband. This affects about 50% of lines in urban exchange service areas. As cabinets typically serve 300 -350 end users, it is uneconomic for access seekers to unbundle at cabinets (sub-loop access).

The Commission decided there is sufficient demand-side constraint to treat all lines as one market. As Telecom has a uniform retail price, any retail and associated (and automatic) UBA price increase would be likely to lead to Telecom's exchange-fed customers switching to unbundlers using DSLAMs (cost-based ULL), resulting in lost revenues for Telecom, and making the UBA price increase unsustainable.

◂ **Box 2.1: Wholesale access in transition to fibre in New Zealand**

Source: New Zealand, Commerce Commission Decision No. 731, Final Review of the Standard Terms Determination for the designated service Telecom's unbundled bitstream access, September 2011 **http://www.comcom.govt.nz/1st-competition-test-for-uba-std/**

Market definition in the ICT sector can be difficult. Effective substitutes may not be only those services supplied by similar telecommunications carriers (or by carriers at all). For example:

- Voice and data services are now available from conventional wireline or wireless networks, using either circuit-switched or packet-switched technologies,
- Voice mail services are available from telecommunications networks, answering machines, or manned answering services, and
- Some markets may be **two-sided** which will have regulatory implications for both pricing and merger analysis.

Practice Notes

- **Malaysia: Defining the Communications Market**
- **Two-Sided Markets**

Reference Documents

- **European Commission Guidelines on Market Analysis and the Assessment of Significant Market Power under the Community Regulatory Framework for Electronic Communications Networks and Services**
- **European Commission: regarding the wholesale national market for IP traffic exchange (IP transit) and the wholesale market for IP traffic exchange (IP peering) with the network of Telekomunikacja Polska S.A.**
- **New Zealand: Final Review of the Standard Terms Determination for the designated service Telecom's unbundled bitstream access,**

2.2.2.2 MARKET POWER

Market power is only damaging if the firm concerned exercises its power. For example, if it raised prices above competitive levels, this would reduce demand, generate efficiency losses, and harm the public interest. In addition, firms with market power may engage in **anti-competitive behavior**.

The European Commission defined the concept of Significant Market Power (SMP) as the ability of a firm to act independently of competitors and customers. In some jurisdictions, the term dominance is used but has a similar meaning to SMP. The World Trade Organization defines dominance as the ability of an organisation to prevent effective competition being maintained in the relevant market by having the power to behave to an appreciable extent independently of its competitors, its providers, its customers and ultimately of the consumers. In the United States it has been largely left to courts to decide what constitutes dominance and, for the most part, they have applied criteria based solely on **market shares.**

Under the European model, firms that are found to have SMP are subject to additional *ex ante* regulatory obligations such as:

- Obligations to align interconnection prices with costs,
- Accounting separation requirements, and
- Mandatory publication of reference interconnection offers.

A high market share does not necessarily imply market power. A firm's market share may increase, at least temporarily, due to a successful new invention or better customer service. Or, incumbent telecommunications firms may have high market shares but as competition emerges, its market share cannot guarantee it the ability to charge prices higher than its competitors.

Market share in itself is neither necessary nor sufficient for market power. Firms with high market shares may be constrained from raising prices by a range of factors, including:

- Competition from other suppliers already in the market,
- Barriers to entry; a well-established firm may have exclusivity agreements with distributors, making it difficult for competitors to enter the market.
- Barriers to exit; if an entrant must incur high sunk costs to enter the market, then the entrant must be prepared to absorb those sunk costs in the event that it fails,
- The role of any essential facility; if an entrant needs access to an essential facility that is controlled by one of its competitors, this creates a barrier to entry.
- The "countervailing power" of customers in the market, for example their willingness to do without the service if the price increases.
- Any technological advantages, or privileged access to financial resources,
- Economies of scale and scope; in the telecommunications sector, a new facilities-based entrant may have no choice but to start out at a relatively large scale of operations, in order to achieve unit costs close to the incumbent's,
- Product differentiation, and
- The type and availability of sales channels.

Practice Notes

- **Quantitative Tests for Market Power**

Reference Documents

- **European Regulators Group -- ERG Common Position on Best Practices in Remedies Imposed as a Consequence of a Position of Significant Market Power in the Relevant Markets for Wholesale Leased Lines**
- **European Regulators Group -- ERG Report on Guidance on the application of the three criteria test (June 2008)**
- **Explanatory Statement and Notification of decisions on BT's SMP status and charge controls in narrowband wholesale markets**
- **Lebanon -- Significant Market Power Regulation**
- **Trinidad and Tobago: Determination: Dominance in Retail Domestic Fixed Telephony Markets**

2.2.2.3 SEPARATION

There are three main forms for separating a **dominant** firm's competitive activity from its monopoly activities:

- **Accounting separation** which requires separate income statements and balance sheets to be maintained for the wholesale division and the retail units. The objective is to make the costs of non-competitive services transparent so that regulators and others can more easily detect possible abuses. Accounting separation is at a high level of aggregation and may not be able to detect a **price squeeze** .The benefit of accounting separation is that it preserves the vertically-integrated structure of the firm thereby preventing the loss of vertical efficiencies. On the other hand, accounting separation does not prevent non-price discrimination – such as delays in switching customers to competitors.
- **Functional (operational) separation** which requires the retail and wholesale arms of the vertically integrated dominant access provider to act independently of each other [*]. The wholesale arm should not know if an order it receives has been placed by its sister retail unit or by a competing retail operator. Policing obligations for non-discrimination in vertically integrated operators is notoriously difficult. The 'six degrees of separation' (Table 2.2) form a spectrum of options between the other two main forms of separation.
- **Structural separation** is a last resort which requires an operator to separate its network infrastructure from its units offering services using this infrastructure. Also known as 'ownership unbundling' or 'divestiture', structural separation means that all of the network elements are placed in a separate legal entity.

	Structural (Ownership) Separation	
6	Legal separation (under same owner)	Functional Separation
5	Business separation with separate governance arrangements	
4	Business separation with localised incentives	
3	Business separation	
2	Virtual separation	
1	Creation of a wholesale division	
	Accounting Separation	

Table 2.2: Six Degrees of Functional Separation

Practice Notes

- Functional Separation
- Structural Separation

2.2.3 COMMON FORMS OF ANTI-COMPETITIVE CONDUCT

The focus of this section is on the forms of anti-competitive conduct engaged in by firms with significant **market power**. These practices include:

- Abuse of Dominance
- Refusal to Supply
- Vertical Price Squeeze
- Cross-Subsidisation
- Misuse of Information
- Customer Lock-In
- Exclusionary or Predatory Pricing
- Tying and Bundling
- Non Discrimination and Net Neutrality

In all cases, the object of regulation is to support competition as a process. Although only firms with significant market power may be stopped from engaging in the practices listed above, all firms must abstain from misleading the market (eg making false claims in advertising), "slamming" (ie claiming customers from the incumbent when the customer has not knowingly provided consent to switch providers) and unreasonable contract terms.

Reference Documents

- European Regulatory Group: Common Position on the approach to appropriate remedies in the ECNS regulatory framework

2.2.3.1 ABUSE OF DOMINANCE

A **dominant** firm abuses its power when it engages in practices with the aim of eliminating or substantially lessening. Abuse of dominance may entail:

- Refusals to deal, for example a **refusal to supply** an essential facility to a competitor,
- Exclusive dealing arrangements, in which a seller prevents its distributors from selling competing products or services,
- **Tying and bundling**, where a firm sells makes the purchase of one product or service conditional on the purchase of a second product or service,
- **Predatory pricing**, where a firm sets prices below cost in order to force a competitor out of the market,
- Non-price predation, where a firm adjusts the quality of its product offering to customers with the aim of harming its competitor. For example, an incumbent might offer an improved level of service to customers served by one new entrant.

A firm does not need to be dominant (in the sense of possessing a high market share) in order to implement these strategies. However, the consequences for competition can be particularly severe when the firm concerned is dominant.

If the firm is dominant in the relevant market, the behaviour does not necessarily constitute and abuse of its position: is the behaviour harmful to competition and to consumers? It is important to distinguish between aggressively competitive behaviour that harms individual competitors but benefits customers (for example by reducing prices), and behaviour that is anti-competitive because it harms competition.

A range of possible remedies exists. Which remedy is appropriate will depend on the specific nature and seriousness of the behaviour, and the likelihood that the firm may repeat the behaviour in the future.

Directive Remedies, such as injunctions or bans, require the firm to:

- Cease its abusive behaviour, or
- Make specific changes to its behaviour so it is no longer damaging to competition.

Directive remedies may require ongoing monitoring, to ensure that the behavioural change is sustained.

Punitive Remedies include:

- Fining the firm,

- Ordering the firm to pay compensation to its competitors and/or customers,
- Fining company officers with direct responsibility for the behaviour.

Punitive remedies are intended to discourage abusive behaviour in the first place by making such behavior unprofitable. However, this objective must be weighed against the potential to “chill” competition. If the penalty for abuse is very high, then dominant firms will “err on the side of caution” and compete less aggressively.

In June 2011, the European Commission imposed a fine of €127 million on telecoms operator Telekomunikacja Polska S.A. (TP) for abusing its dominant position in the Polish market.

Poland has one of the lowest broadband penetration rates in Europe - in January 2010 it reached only 13%, significantly below the EU average of 24%.Consumers have also suffered from lower connection speeds: 66% of Internet access lines in Poland do not exceed the speed of 2Mbit/s compared to an EU average of just 15%. Finally, monthly prices per advertised Mbit/s were much higher than the prices in other Member States and the second highest in the OECD area.

In order to provide broadband Internet access to end-users, new market entrants need to acquire wholesale broadband access and local loop unbundling. In Poland, these are exclusively provided by TP which proposed unreasonable conditions, delayed the negotiation processes, rejected orders in an unjustifiable manner and refused to provide reliable and accurate information to alternative operators. Together, these practices prevented alternative operators from competing effectively in the market and constituted an abuse of TP's dominant position on the Polish broadband market.

Telekomunikacja Polska’s total turnover in 2010 was € 3.9 billion (PLN 15.7 billion). The fine takes account of the duration and gravity of the infringement and has been calculated on the basis of the average value of TP's broadband sales between 2005 and 2009 in Poland. TP’s turnover in 2010 was € 3.9 billion.

◂ **Box 2.2: Abuse of Dominance in Poland**

Source: European Commission, Press Release, 22 June 2011.

Some form of **separation** may also be considered.

Reference Documents

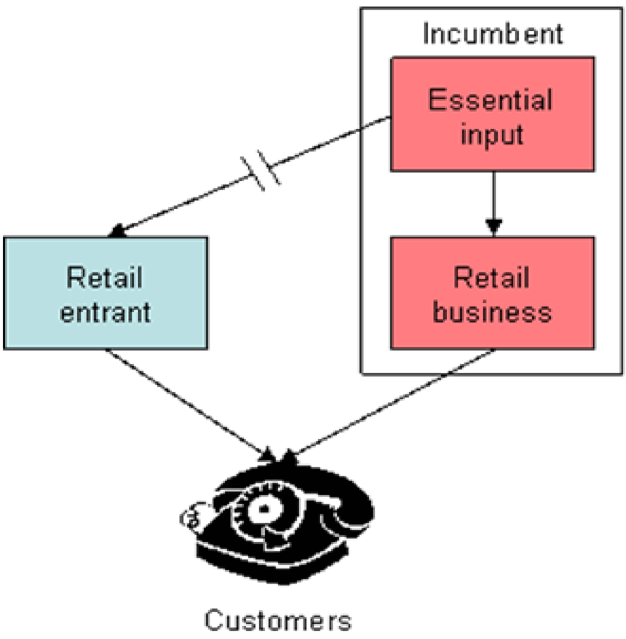
- **European Commission, Press Release, Antitrust Case in Poland: 22 June 2011**

2.2.3.2 REFUSAL TO SUPPLY

Incumbent firms often control access to facilities that are essential inputs in the supply of services at the retail level. Competing retailers depend on the incumbent for access to the **essential facility**. In the telecommunications sector, the local loop connecting end customers to the local exchange is often regarded as an essential facility.

Incumbent firms may attempt to prevent competitors from entering the market by refusing to provide access to an essential facility or withhold information..

The figure below shows a vertically integrated incumbent firm (red) and a downstream entrant (blue). The incumbent firm controls an essential input, on which the downstream entrant depends in order to provide services to its customers. The incumbent also competes with the downstream entrant at the retail level. By refusing to supply the essential input, the incumbent can prevent the downstream entrant from competing.



◂ **Figure 2.2: Refusal to Supply an Essential Facility**

To encourage competition, many jurisdictions require firms with control over essential facilities to provide access to competitors. Rules may also determine the way in which access prices will be agreed, and procedures for resolving any disputes.

Refusal to supply may include deliberate delays and obstruction such as 'losing the keys to the exchange' where a competitor has the right to co-locate equipment in an exchange under supervision.

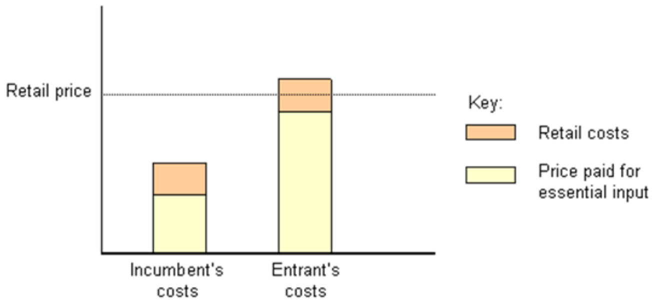
Practice Notes

- Ireland – The Role of Own-Use Requirements in Access Disputes

2.2.3.3 VERTICAL PRICE SQUEEZE

A firm which is vertically integrated and controls an essential input to the retail service implements a price (Figure 2.3) squeeze if:

- The price the firm demands makes it impossible for an equally-efficient retail-stage competitor to operate profitably (or even survive) given the level of retail prices, and
- The firm does not charge its own downstream operation this high price.



◂ **Figure 2.3: Example of a Vertical Price Squeeze**

A price squeeze has a similar effect to a refusal to supply an essential facility. In the extreme, the firm might demand a price for the essential input that is higher than the full retail price of the service.

The EU Commission fined Telefónica €151.9 million in July 2007 for a margin squeeze between its retail prices and the prices for wholesale broadband access at both the national and regional levels between September 2001 to December 2006. It was a large fine because Telefónica's 2001 business plan knew it would be engaging in a margin squeeze.

Wholesale access at national level allows alternative operators to offer retail broadband services throughout the Spanish territory by connecting to a single, "national" access point. Wholesale access at the regional level requires that alternative operators roll out a costly network reaching up to 109 "regional" access points.

Although Telefónica provides unbundled access to its local loops, this was not considered a substitute for the other two wholesale products because its investment intensity.

Lower and fairer wholesale prices putting an end to the margin squeeze were introduced at the end of December 2006 when, following a market analysis, the Spanish regulator reduced Telefónica's wholesale prices by between 22% and 61%.

European Commission (staff analysis), Margin squeeze in the Spanish broadband market: a rational and profitable strategy, Jean-Christian Le Meur, Iratxe Gurpegui and Katja Viertio
http://ec.europa.eu/competition/publications/cpn/2007_3_22.pdf

◂ **Box 2.3: Margin Squeeze in Spain**

Sources: *Antitrust: Commission decision against Telefónica - frequently asked questions*, MEMO/07/274 July 2007
http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/274&format=HTML&aged=0&language=EN&guiLanguage=en

International approaches to price squeeze differ:

- · In the EU, the existence of price squeezing by a dominant operator is sufficient to find an abuse of dominance; price squeezing is treated as an illegitimate use of market dominance in and of itself.
- In the United States, price squeezing is not linked to dominance and is not considered to be inherently anti-competitive. Price squeezing only attracts liability if it is predatory or if the firm concerned is obligated to provide the goods or services; on its own, however, price squeezing is merely part of a robustly competitive market.
- In New Zealand, a causal link has to be established between the impugned conduct and dominance. This is done by applying a counterfactual test whether the prices charged are no greater than the prices found in a hypothetical competitive market. If not, then the dominant firm would not have "used" its market powers. The basis for this test is the "Efficient Component Pricing Rule" (ECPR), which is discussed below.

A number of remedies for this price squeezing exist, including:

- Resale Obligations or
- Price floors, or
- Structural remedies

A price floor sets a minimum retail price for the incumbent's retail service, with reference to wholesale prices. A price floor should ensure that competitors that as efficient as the vertically integrated firm are able to cover their costs. The rule for setting a price floor, or "imputation rule" can be stated in a number of ways:

The retail price *must be no less than* the wholesale price plus the direct incremental cost of the vertically integrated firm's pure retailing functions.

Pr > Pa + Cr

Equivalently, the retail price *must be no less than* the vertically integrated firm's direct incremental cost to supply the product, plus the profit margin it could earn from selling the essential input to its competitors.

Pr > Ca + (Pr – Pa – Cr)

Or, the profit margin on the vertically integrated firm's price for the retail product *must be no less than* the profit margin it earns from selling the essential input to its competitors.

(Pr – Ca – Cr) > (Pa – Ca)

All the above imputation rules are equivalent, but provide different insights into the conditions that must hold for a vertical price squeeze to be impossible.

In 2003, Deutsche Telekom (DT) was found to have abused its dominant position by committing a price squeeze. From 1998, DT has been legally obligated to provide competitors with wholesale access to its local loops. The European Commission found that from 1998 to the end of 2001, DT charged new entrants higher fees for wholesale access to the local loop than what DT charged its retail subscribers for fixed line (analogue, ISDN, and ADSL) subscriptions – so the margin was negative (Pa > Pr) even before allowing for a competitors own retail costs. From 2002, there was a margin (Pa<Pr) but it was not big enough to cover retail costs (Cr).

DT argued that its wholesale prices were regulated and it had to meet competition in the retail market. But the Commission argued that DT had the freedom to terminate the squeeze itself. In fact, DT increased retail prices (but not enough) in 2002.

To remedy the competition concern, DT terminated the margin squeeze mainly by lowering its wholesale access fees.

◂ **Box 2.4: Price Squeeze in Germany**

Source: European Commission (Staff Analysis): Two Commission decisions on price abuse in the telecommunications sector, Competition Policy Newsletter, Autumn 2003

These measures may achieve the objective of preventing a price squeeze, but they can have substantial costs. In particular, under structural separation the firm would lose any efficiencies or cost savings from vertical integration. This loss would ultimately fall on customers, through higher prices.

Practice Notes

- **Comparative Approaches to Price Squeezes and Abuse of Dominance**
- **New Zealand Commerce Commission v. Telecom Corporation of New Zealand Limited and Telecom New Zealand Limited**
- **Structural Separation**
- **The U.S. Pacific Bell Price Squeeze Case**
- **Vertical Price Squeeze Charge Against Deutsche Telekom**

Reference Documents

- **European Commission, Antitrust: Commission decision against Telefónica, July 2007**
- **European Commission: Margin squeeze in the Spanish broadband market: a rational and profitable strategy**
- **European Commission: Two Commission decisions on price abuse in the telecommunications sector**

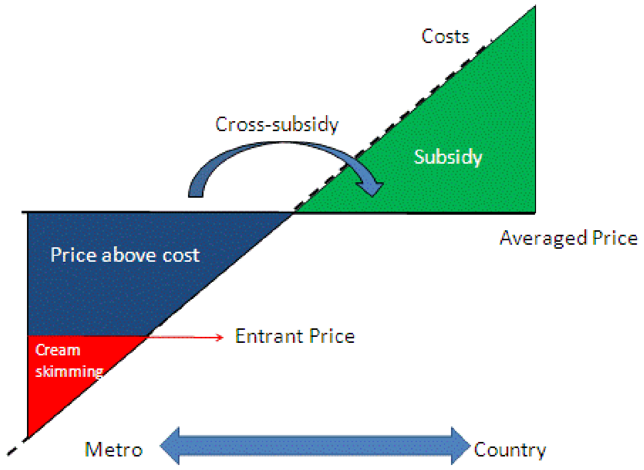
2.2.3.4 CROSS-SUBSIDISATION

A cross-subsidy may be anti-competitive when a firm with market power prices services in less competitive markets higher so that it can have lower price for services it sells into competitive markets.

Not all cross-subsidies are anti-competitive. Traditionally, telephone operators have cross- subsidized high-cost (under-priced) services from low-cost (over-priced) services:

- Line rentals or handsets from call revenues
- Residential customers from business customers in line rentals
- Country customers from metropolitan customers

Cross-subsidy has been important in driving adoption of both fixed and mobile services. But this worked only when access and calls were joint in both supply and demand, as with fixed monopoly and mobiles. With the introduction of competition for calls, cross-subsidies are "cream-skimmed" (Figure 2.4).



◂ Figure 2.4: Cross-subsidy and Competition

New entrants do not complain about the above cross-subsidies as they provide scope for profit in serving low-cost markets. Competition is very good at attacking cross-subsidy.

Incumbents complain about "cream-skimming" competition allowed by the cross-subsidies above. So, regulators assist incumbents with **price rebalancing** to meet competition, which generally increases line rentals so that call prices can fall. This is a politically sensitive process because raising access prices disadvantages the poorer users who make fewer calls; so some policy direction may be needed.

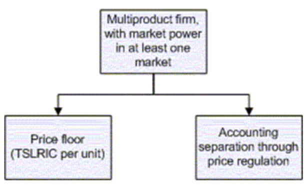
Anti-competitive pricing can be difficult to identify. Ideally, competition drives prices to marginal cost. But in network industries, the cost curve declines across the range of possible levels of output so prices must be set above marginal cost to recover all costs. Since the network supports many different services, it is difficult to say which services are cross-subsidising others.

The remedies for cross-subsidization are preventative in nature:

- Implement and enforce a price floor,
- Require accounting separation of the costs of the firm's competitive and non-competitive products.

◂ Figure 2.5: Remedies for Cross Subsidization

Price Floor



◂

For a firm that at least breaks even across all of its products, any single product receives a subsidy if the revenue it generates fails to recover its *total service long run incremental cost (TSLRIC)*. Thus, the effective price floor in a test of whether a product receives a subsidy is:

TSLRIC of the service / number of units produced

For a multiproduct firm, the rule for preventing cross-subsidization requires that, for a firm that at least breaks even, every product must satisfy this price floor test.

Accounting Separation

The objective of accounting separation in this context is to separate the costs of the firm's competitive and non-competitive products. This can be achieved through price regulation (either direct regulation, or a **price cap**). Such regulation can prevent cross-subsidization by allocating competitive and non-competitive products to separate "baskets", with separate controls or rules for the each basket.

2.2.3.5 MISUSE OF INFORMATION

It is common for vertically integrated firms to sell wholesale products to other firms, while competing against those same firms in retail markets. In this situation the vertically integrated firm can obtain sensitive commercial or business information through its wholesale transactions that gives it a competitive advantage in its retail activities.

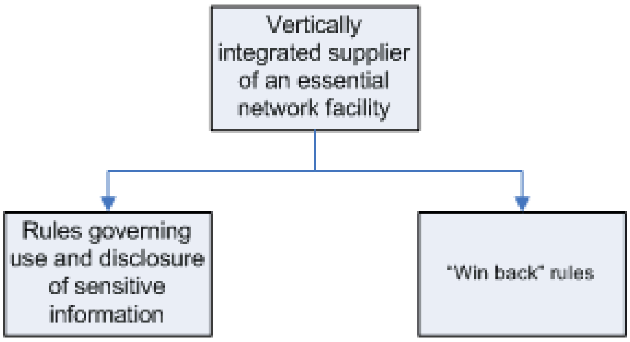
Two of the three anti-competitive practices proscribed by the WTO [*] concern misuse of information:

(a) engaging in anti-competitive **cross-subsidization**;

(b) using information obtained from competitors with anti-competitive results; and

(c) not making available to other services suppliers on a timely basis technical information about essential facilities and commercially relevant information which are necessary for them to provide services.

For example, suppose a vertically integrated incumbent firm is the sole source of dedicated access lines needed to provide retail private line services. Other firms may have no choice but to acquire wholesale dedicated access lines from the incumbent. To complete the wholesale transaction, the incumbent needs information about the identity, size, and other characteristics of end-users being targeted by its competitors. It could use this information to target the same end-users with superior service offerings, placing its competitors at a considerable competitive disadvantage. This would constitute a misuse of information.



◂ Figure 2.6: Responding to misuse of information

Remedies for misuse of information are generally *ex ante* in nature, and include:

- Establishing strict rules or procedures governing the use or disclosure of commercially sensitive information, and setting limits on the sharing of sensitive information between a carrier and its affiliates
- “Win back” rules, limiting the extent to which the vertically integrated firm may directly market to customers that choose to switch to a competitor.

Practice Notes

- Canada: Misuse of Information and \"Win-Back\" Behaviour
- United States: Rules to Prevent Misuse of Information

Reference Documents

- World Trade Organization - Reference Paper

2.2.3.6 CUSTOMER LOCK-IN

Service providers may attempt to “lock in” customers to prevent them from switching to alternative products, technologies, or suppliers. Customer lock-in involves raising customers’ **switching costs** to the point that the cost of switching outweighs the potential benefits from switching.

Switching costs may be:

- **Transactional,** for example the cost of replacing existing equipment and technology in order to move to a different service provider, or
- **Contractual,** for example penalties for breaking an existing contract with one service provider, in order to switch to a new service provider.

Contractual provisions that increase switching costs are not necessarily anti-competitive. Service providers may use contractual provisions that ensure customer loyalty to recover legitimate underlying costs over a period of time, for example:

- Service providers may incur substantial upfront fixed costs to acquire and serve customers. For example, it is common for mobile service providers to subsidize the cost of mobile handsets and recover the cost of the subsidy through service charges over time,
- Service providers may have incentives to spread non customer-specific fixed costs over as many customers as possible. In order to do this, a service provider may use contractual provisions to ensure customer loyalty and maintain its installed customer base.

Where the customer’s switching cost is less than the *present value* of the expected revenue from the customer, competing firms may offer to pay the customer’s switching cost. In this case, switching costs are not effective as a means of locking in customers.

High switching costs and customer lock-in tactics do not necessarily cause problems for competition or exclude competitors. Most service agreements that seek to lock-in customers do not warrant regulatory interference. Indeed, in some cases, high switching costs may trigger market responses that improve efficiency.

Cases of lock-in need to be considered on a case by case basis, taking account of:

- The degree of competition in the market,
- Whether the firm in question has market power, or a dominant position, and
- The effect of the locking-in arrangements on competition. Are the arrangements blocking efficient competitors?

Practice Notes

- **Mobiles: Customer Lock-In**

2.2.3.7 EXCLUSIONARY OR PREDATORY PRICING

Predatory pricing is a pricing strategy used by an established firm to eliminate competition from equally efficient firms, and secure a monopoly position in a previously competitive market. A firm practicing predatory pricing lowers its price below cost and maintains it there until equally efficient competitors are forced to incur unsustainable losses and exit the market. The firm then raises its price to a monopoly level in order to recoup its lost profits.

The US Supreme Court defines predatory prices as "below-cost prices that drive rivals out of the market and allow the monopolist to raise its prices later and recoup its losses".

Predatory pricing is a risky strategy. The firm involved incurs high up-front losses, with no guarantee of future gains from monopolization. The strategy will only be profitable if, once all competitors have been forced out of the market, the incumbent is able to raise its prices to a monopoly level and keep them there. If the firm is subject to either direct price regulation or some other form of control, predatory pricing is unlikely to succeed.

Predatory pricing requires high barriers to entry. If firms are able to enter the market easily, then each time the incumbent increases its price this will attract new entrants into the market, forcing the incumbent to drop its price again.

Predatory pricing is notoriously difficult to prove. It can be difficult in practice to distinguish predatory pricing from aggressively competitive below-cost pricing (such as "loss leaders" and promotional activities).

In 1995, a competing internet service provider, UUNet, alleged that BT was engaging in predatory pricing for its internet access service (provided through BTNet). UUNet complained that a BTNet offer at a price 9 times less then BT's comparable services was anti-competitive, and BTNet was not recovering its cost; furthermore, BT was offering a free trial period of subscription. The British regulatory agency Oftel (now Ofcom) found in 1997 under the following conditions:

- - Barriers to entry were low and, therefore, BT could not expect to exclude competitors from the market and gain the market power needed to recoup losses in the long run
- - BT's other internet services were distinguishable from the BTNet service and, therefore, UUNet's comparison was not well-founded
- - Early BTNet losses not recovered were consistent with start-up business trends and that BT's projected figures showed more profitability
- - Free promotional subscriptions were commonplace in the industry, and BTNet had limited the offer to the initial period

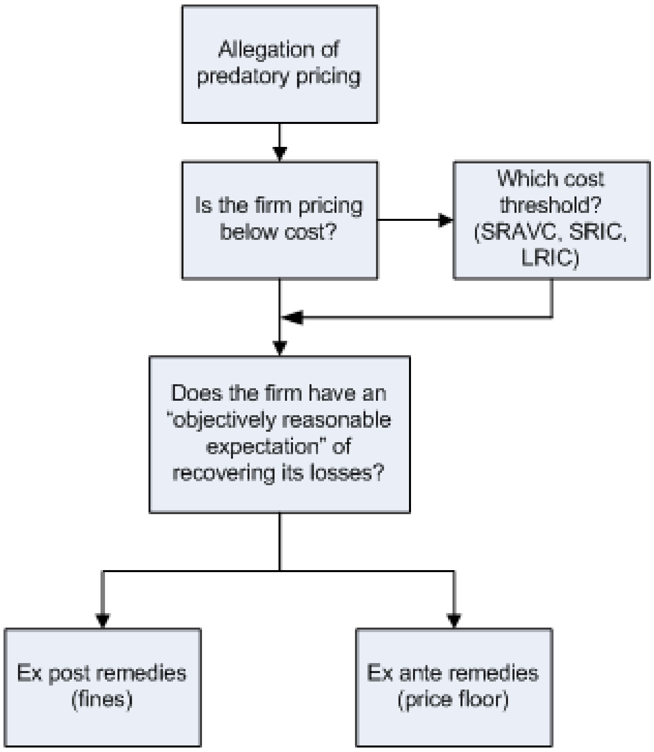
Oftel's final ruling was that BT had not engaged in any form of predatory pricing, although Oftel did continue to monitor BT due to its significant market presence.

◂ **Box 2.5: UK: UUNet's claims of predatory pricing against BT**

Source: Ofcom's Competition Bulletin Issue 6, October 1997

Establishing whether predatory pricing has taken place requires that two tests be met (see Figure 2.7):

- Is the firm pricing below cost? And
- Whether the firm has an "objectively reasonable expectation" of being able to recover the losses it must incur by pricing at below cost.



◄ **Figure 2.7: Remedies for Predatory Pricing**

Is the Firm Pricing Below Cost?

There is no universally accepted test to determine whether a firm is pricing below cost. According to EC case law two tests are possible to find an abuse in the form of predatory pricing:

- where variable costs are not covered, an abuse is automatically presumed;
- where variable costs are covered, but total costs are not, the pricing is deemed to constitute an abuse if it forms part of a plan to eliminate competitors.

From the end of 1999 to October 2002, Wanadoo, a 72% owned subsidiary of France Télécom, marketed Wanadoo ADSL at prices which were well below variable costs until August 2001 and then significantly below total costs.

Since the mass marketing of Wanadoo ADSL began only in March 2001, the Commission considered that the abuse started only on that date. Wanadoo suffered substantial losses up to the end of 2002 as a result of this practice. The practice coincided with a company plan to pre-empt the strategic market for high-speed Internet access. From January 2001 to September 2002, Wanadoo's market share rose by nearly 30 percentage points to between 65% and 75 % on a market which saw more than a five-fold increase in its size over the same period.

The abuse came to an end in October 2002, with a 30 percent reduction in wholesale prices charged by France Télécom.

◄ **Box 2.6: France: Wanadoo DSL pricing**

Source: European Commission (staff analysis), Two Commission decisions on price abuse in the telecommunications sector, Competition Policy Bulletin, No. 3, Autumn 2003

Under the Areeda-Turner rule, prices must be below a firm's short run marginal cost to qualify as predatory pricing. Recognizing that short run marginal cost is very difficult to measure, alternative short run measures of cost may be used *(short run average variable cost, SRAVC, or short run incremental cost, SRIC)*.

Many economists promote the use of *long run incremental cost* (LRIC) as the appropriate cost threshold for predatory pricing. If two firms are equally efficient, they must have the same long run incremental cost. When one of them sets a price below LRIC, the other firm cannot match that price without incurring a loss.

Regardless of the measure used, calculations of firm-specific costs for individual services can be highly contentious.

Does the Firm Expect to Recover its Losses?

Many practitioners are skeptical about the prospect that a firm could know in advance all of the information needed to implement a predatory pricing strategy. In order to have a reasonable expectation that the strategy will succeed, the firm must know:

- How long it must price below cost before it succeeds in forcing its competitors out of the market,
- The size of the loss that it must withstand while predatory pricing is in effect, and
- The probability that it will recover its losses once it has achieved a monopoly.

Remedies

Ex post antitrust remedies, such as fines or compensation, may be available for proven instances of predatory pricing. However, predatory pricing is difficult to prove with sufficient certainty to justify punitive measures.

A more useful remedy for predatory pricing is an appropriate price floor for the affected product or service. This is a preventive remedy, requiring *ex-ante regulation*.

Reference Documents

- **European Commission: Two Commission decisions on price abuse in the telecommunications sector**
- **Ofcom: Predatory pricing allegation by UUNet against BT, 1997**

2.2.3.8 TYING AND BUNDLING

Tying of services occurs where a service provider makes the purchase of one product or service over which it has market power (the "tying good") conditional on the purchase of a second, competitively supplied, product or service (the "tied good"). By tying services, a service provider can try to use market power in one market to give itself an advantage in another, competitive market. Customers who opt to buy the tied good from a competitor cannot find a feasible substitute for the service provider's tying good.

Tying is primarily a strategy to maximize profits. It can be profitable:

- where the demands for the two products are complementary, such that end users consume both products together (for example a network subscription and local calls), or
- if the tying good is regulated and the regulated price is below the service provider's profit maximizing level. In this case a successful tying strategy would enable the service provider to increase its overall profitability by increasing the price of the tied good.

Until 2002, Maroc Télécom was Morocco's only incumbent basic telecommunications service provider and operated the only fixed network in the country.

Amidst de-regulatory steps taken in Morocco in 1999 and after, Médi Télécom was licensed to operate a GSM mobile network in competition with Maroc Télécom. In early 2001, Maroc Télécom began offering a 10% discount to anyone calling a Maroc Télécom mobile phone from a fixed line. Its competitor, Médi Télécom charged that this was anti-competitive and complained to the Moroccan National Telecommunications Regulatory Agency (ANRT).

The ANRT reviewed the case and concluded that the discount offered only to Maroc Télécom customers was discriminatory and constituted an act of abuse of dominance, given that Maroc Télécom was to remain the fixed network monopoly until 2002. Maroc Télécom eventually suspended the 10% discount in light of the ANRT's ruling.

◂ **Box 2.7: Tying in Morocco**

Source: ITU Case Study of Effective Regulation: Morocco

Tying will not be profitable where:

- The demands for the two products are independent, so that end users are unlikely to consume them jointly,
- The price of the tying good is already at the service provider's profit maximizing level. In this case there is no room to increase profits further, or
- The two products are consumed in fixed proportions. To maximize its profits, all the service provider needs to do is set the price for the product over which it has market power at its profit maximizing level.

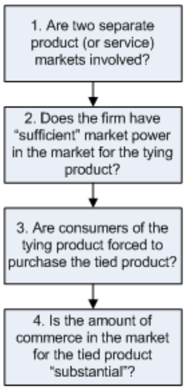
A tying strategy is only likely to exclude competitors from the market for the tied good if competitors are unable to overcome the loss of sales to customers who have been successfully tied. For example this might be the case if:

- Competitors face *economies of scale*, so that a loss of sales causes their average costs to increase, or
- The tied good is associated with *network externalities*, so that a loss of sales to some customers causes other customers to drop off as well.

Even where tying does have an exclusionary effect, this may be an unintended consequence of a strategy to maximize profits.

There are few circumstances in which tying can be profit-enhancing for the firm concerned. Accordingly firms with market power will often have no incentive to engage in a tying strategy.

In recognition of this, the courts in the United States have developed a four-part test for analyzing allegations of tying (see Figure 2.8).



◂ **Figure 2.8: USA: Test for Alleged Tying**

In addition to the tests illustrated in Figure 2.8, some courts require that the alleged harm exceed any efficiencies produced by the alleged tying, before allowing a complaint to proceed.

Service **bundling** occurs where a service provider offers two or more services separately, but gives a discount to customers who purchase the services as a combined bundle.

Bundling is common in telecommunications and other multiproduct industries, reflecting both cost savings from producing services jointly, and consumer preferences for service bundles. In telecommunications, local and long distance services are often bundled with services such as call waiting, call forwarding, voice mail, or Internet access.

Bundling is generally a pro-competitive, and customer friendly, strategy. As such bundling does not call for regulatory intervention.

Reference Documents

- Morocco: Effective Regulation Case Study

2.2.3.9 NON DISCRIMINATION AND NET NEUTRALITY

The Internet has flourished in part due to a "hands off" approach by governments and the apparent willingness of all stakeholders to cooperate and self-regulate. As the amount of video traffic increases, carriers may feel the need to adopt network management practices to control congestion of their networks. Some carriers may try to take the opportunity to extract value by prioritizing traffic in ways which violate the tradition of **network neutrality**.

In 2008, the U.S. Federal Communications Commission attempted to order Comcast, a cable TV and Internet access provider, to cease blocking or downgrading certain users' access to some high capacity peer-to-peer download services. There was no attempt to impose capacity charges or separate pricing tiers, and other high capacity usage, such as video streaming or VoIP, was not treated similarly. On the surface, it appeared that Comcast was simply trying to discourage peer-to-peer file sharing itself, although it had no specific policy to do so. The FCC's ruling, however, was subsequently struck down on appeal in court, leaving U.S. law undecided as to the FCC's authority to implement net neutrality regulations.

◂ **Box 2.8: USA: Comcast and the FCC**

Source: ITU, Telecommunications Regulation Handbook, 10th Anniversary Edition, 2011

Regulators are moving tentatively to decide how far they need to intervene. While many see the need for transparency about traffic management rules, only a few have moved to set traffic management rules.

Stage in process	Position along the spectrum (least to most stringent)	Country
No consultation	Considered net neutrality, but found no problems requiring a consultation and subsequent rule; will continue to monitor	Denmark Germany Ireland Portugal
	Non-binding neutrality guidelines	Norway
In consultation stage	Information gathering on current practices to potentially establish rules	Italy (Feb. 2011)
	Transparency/disclosure rules proposed, **but no** traffic management	United Kingdom
	Transparency/disclosure rules **and** traffic management/non-discrimination rules proposed	Brazil Sweden (Feb. 2011)
Rules/legislation adopted	Transparency/disclosure rules **but no** traffic management/non-discrimination rules	European Commission (Apr. 2011)
	Transparency/disclosure rules **and** traffic management/non-discrimination rules	Canada Chile (Jul. 2010 and Mar. 2011) France (Feb. 2011) United States (Dec. 2010)

◂ Table 2.3: Status of net neutrality initiatives in selected countries

Practice Notes

- Mobiles: Customer Lock-In
- Network Neutrality

Reference Documents

- European Commission: BEREC response to the EC consultation on the open Internet and net neutrality in Europe, September, 2010
- European Commission: The open internet and net neutrality in Europe, April 2011
- GSR 2012 Net neutrality: A regulatory perspective. Discussion Paper, ITU.
- infoDev: Broadband Strategies Handbook
- Telecommunications Regulation Handbook
- USA: FCC Open Internet Rules

2.2.4 MERGERS, ACQUISITIONS AND JOINT VENTURES

Mergers, acquisitions, and joint ventures are all different ways for two or more firms to integrate or coordinate their operations:

- A merger is a structural fusion of two firms that results in a common ownership and management structure. Mergers usually happen through stock swaps.
- An acquisition is a type of merger in which a firm with more resources and greater market strength may acquire another firm. The acquiring firm usually uses some combination of stocks, debt, and cash to finance the transaction.
- A joint venture is a strategic alliance between two firms that share resources, equity, revenues, expenses, and management to pursue a common goal. Each firm usually retains its own corporate identity.

There are three types of mergers: horizontal, vertical, and conglomerate. Conglomerate mergers occur between firms operating in separate markets. As such they do not generally raise competition concerns and are not covered further in this section.

Mergers, acquisitions, and joint ventures are motivated by a range of factors such as cost savings from synergies between the firms or economies of scale and scope, efficiencies from vertical integration, or geographical diversification or cross-selling of products.

The Role of Competition Authorities and Regulators

Provisions governing mergers and acquisition are generally included in competition or antitrust laws, where these exist. In this case, investigation of proposed mergers is usually the responsibility of a competition authority.

Some countries with no competition law have included sector specific merger provisions in their telecommunications laws (for example Hong Kong).

In countries with both a competition authority and a telecommunications regulator, both agencies may have a mandate to investigate mergers in the telecommunications sector. For example, in the US the Federal Trade Commission and the Justice Department have a general responsibility to investigate potentially anti-competitive mergers. However, the Federal Communications Commission may also investigate horizontal mergers between telecommunications firms to determine whether or not the merger is "in the public interest" [*].

Practice Notes

- Structural Separation

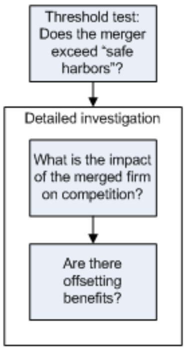
2.2.4.1 MERGERS AND ACQUISITIONS

Mergers can be horizontal - bringing together firms that produce the same product within the same market – or vertical – bringing together firms in potential customer-supplier relationships.

Analysing Horizontal Mergers

By definition, horizontal mergers reduce the number of actual competitors in the **market**. Horizontal mergers may also produce cost savings * and other benefits. If these benefits outweigh any reduction in competition, then the merger should be allowed to proceed.

Competition authorities commonly take a two-stage approach to analysing horizontal mergers (see Figure 2.9).



◂ Figure 2.9: Two Stage Process for Analysing Mergers

The first stage uses measurable thresholds or "safe harbors" to determine whether a merger is likely to raise serious competition concerns. If a merger falls within the specified threshold then it is considered to be "safe", and may proceed without further investigation.

Like the USA, the EU calculates the **Herfindahl-Hirschmann Index**. While the absolute level of the HHI can give an initial indication of the competitive pressure in the market post-merger, the EU looks at the change in the HHI as a useful proxy for the change in concentration directly brought about by the merger.

The purpose of these thresholds is to focus resources on investigating those transactions that are most likely to raise serious competition concerns. Those mergers that do not fall within specified safe harbors are investigated in depth.

The EU Commission * assesses "horizontal mergers" where the undertakings concerned are actual or potential competitors on the same relevant **market**. See **KPNQWest/Ebone/GTS Horizontal Merger** on one market assessment. The Commission's assessment of mergers normally entails:

§ definition of the relevant product and geographic **markets**;

§ competitive assessment of the merger.

The EU Commission also takes account of a number of factors (such as the possibilities for customers of switching supplier or the possibilities for competitors to respond to the merger) which may influence the likelihood that a merger will have significant anticompetitive effects.

The merger of Orange and T-Mobile (UK subsidiaries of France Télécom and Deutsche Telekom) into Everything Everywhere, cleared on 1 March 2010, reduced the number of network operators from five to four. The UK Office of Fair Trading (OFT) had two concerns about the impact on competition.

First, the smallest remaining mobile network operator, 3UK, depended upon T-Mobile for 3G (radio access network) infrastructure sharing and on Orange for 2G national (voice) roaming. The remedy was a revised commercial agreement between T-Mobile, Orange and 3UK on post-merger infrastructure sharing roaming including a fast-track dispute resolution process.

Second, the parties' combined contiguous spectrum could result in the new entity being the only mobile network operator in the UK able to offer next-generation mobile data services through Long Term Evolution (LTE) technology at the best possible speeds in the medium term. The remedy was a commitment that the merged entity would divest a quarter of their combined spectrum in the 1800 MHz band.

European Commission (staff analysis), Of spectrum and radio access networks: the T-Mobile/Orange joint venture in the UK,Competition Policy Newsletter, No. 2, 2010 and European Commission: T-MOBILE/ORANGE, March 2010

◂ Box 2.11: UK: Orange and T-Mobile Merger

Sources:

The EU Commission also undertakes to take account of efficiency or profitability criteria that undertaking might claim in order to mitigate any adverse impact on competition; in such cases, the undertakings would, of course, have to show that the efficiency was indeed attributable to the merger and would be beneficial for consumers.

If a merger is found to generate benefits that do not outweigh the damage to competition, then in some jurisdictions regulatory authorities may impose ex ante obligations on a merged firm, where the merger would otherwise be anti-competitive. In both the United States and Europe, National Regulatory Authorities may impose conditions on a merger that would otherwise be anti-competitive.

Conditions were imposed for the horizontal merger approved by the European Commission in April 2006. The Austrian subsidiary of T-Mobile (part of the Deutsche Telekom group) merged with a small competitor, tele.ring (controlled by US Western Wireless Corporation).

Some firms have more of an influence on the competitive process than their market shares would suggest. Before the merger, tele.ring exerted competitive pressure on the two largest Austrian operators, Mobilkom and T-Mobile Austria. The merger could have changed competitive dynamics significantly.

It seemed that no other operator could take over the role that tele.ring played. H3G had offered the next most attractive prices and in 2005 nearly half the customers who ported their numbers away from tele.ring went to H3G.But H3G was even smaller, had a network with only 50 percent population coverage and a roaming agreement with Mobilkom which raised its variable costs reducing its potential to be a vigorous price competitor.

The Commission approved the merger on the basis of T-Mobile's legally binding commitments to H3G to sell it UMTS frequencies and mobile telephony sites (including all necessary technical equipment). According to H3G, these acquisitions would allow it to achieve complete network coverage of the population quickly. Buildings its own network nationally would also eliminate H3G's dependence on the national roaming agreement with Mobilkom, reduce its variable per minute costs considerably and allow H3G to achieve much larger economies of scale. And the extended network and enhanced capacity would provide the incentive to price aggressively to "fill" the network.

◂ **Box 2.12: Austria: T-Mobile and tele.ring merger**

Source: European Commission (staff analysis), T-Mobile Austria/telering: Remedying the loss of a maverick, Competition Policy Bulletin, No. 2, Summer 2006

Analysing Vertical Mergers

Vertical mergers involve complementary services while horizontal mergers involve substitute services. Vertical mergers are generally considered beneficial where they can:

§ Reduce transaction costs by improving coordination between the services,

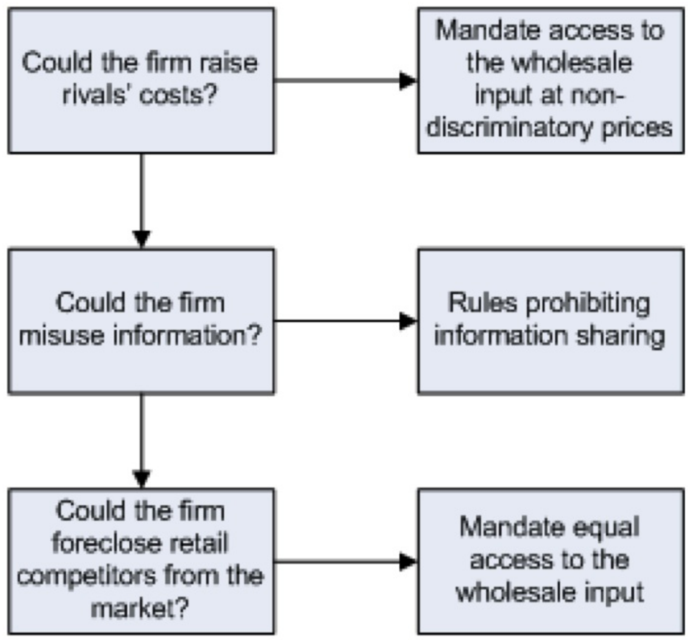
§ Improve efficiency through more integrated production, and

§ Eliminate "double markups" *.

Vertical mergers are more likely to increase efficiency than horizontal mergers but may raise competition concerns in limited sets of circumstances. Competition authorities in the Unites States typically pay attention to three issues (see Figure 2.10). Could the merged firm:

-
    - Raise the costs of its retail rivals? For example, suppose a retail firm merges with the supplier of a wholesale input. By removing a source of supply from the wholesale stage of the market, the retailer is able to increase the price of the input to its competitors (but not to itself). If it can, the remedy is a requirement that the wholesale resource be made available at non-discriminatory prices.
    - Misuse competitively sensitive information gathered about rivals when selling them the wholesale resource? If it can, the remedy is to implement rules and procedures to prohibit information-sharing between the firm's retail and wholesale operations.
    - Foreclose retail competitors from the market by exercising market power at the wholesale stage of the market? The merged firm may withhold supply of the essential facility to its retail competitors, preventing them from competing. If it can, the remedy is to require the merged firm to provide equal access to the wholesale resource to its non-integrated retail-stage competitors.

◂ Figure 2.10 Three Issues of Vertical Mergers



See the conditions imposed to allow the **Telia/Sonera Merger** which raised both horizontal and vertical merger concerns.

◂ **Box 2.13: EU and Vertical Mergers**

Sources:

In many merger cases in mobile telecommunications, the issue at stake could be that of horizontal overlaps in activities of the parties in their respective markets (reduced competition) or vertical relationships between the markets for wholesale international roaming and the markets for fixed and/or mobile telecommunications in the countries where the parties to the transaction operate.

In several cases of this type the Commission found that the transactions would not harm competition and the mergers were cleared without commitments. Examples include France Télécom/Mid Europa Partners/One (2007) and Deutsche Telekom/OTE (2008).

European Commission: Deutsche Telekom/OTE, October 2008 and

European Commissin: France Telecom/Mid Europa Partners/ONE, September 2007 with a third case in 2005 mentioned at http://ec.europa.eu/competition/sectors/telecommunications/mobile_en.html)

Analysing Acquisitions

There is no difference between mergers and acquisitions in terms of regulation.

Practice Notes

- KPNQwest/ Ebone/ GTS Horizontal Merger
- Quantitative Tests for Market Power
- Telia/ Sonera Merger

Reference Documents

- European Commission: Deutsche Telekom/ OTE, October 2008
- European Commission: FRANCE TÉLÉCOM / MID EUROPA PARTNERS /ONE, September 2007
- European Commission: Guidelines on the assessment of horizontal mergers
- European Commission: Spectrum and radio access networks: the T-Mobile/Orange joint venture in the UK, 2010
- European Commission: T-Mobile Austria/telering: Remedying the loss of a maverick, 2006
- European Commission: T-MOBILE/ ORANGE, March 2010
- OECD: Roundtable on Vertical Mergers, February 2007

2.2.4.2 JOINT VENTURES

Joint ventures can have many different objectives, and have different implications for competition. Telecommunications joint ventures raise three broad types of competition concern:

- The potential for collusion among the parties in the joint venture,
- A loss of potential competition, and
- The potential for market exclusion and access discrimination.

Joint ventures with the purpose of fixing prices, restricting output, or allocating markets between firms reduce competition, and generally should not be permitted. Regulators or competition authorities should consider whether the joint venture will increase market power sufficiently to cause a substantial lessening of competition. Will the joint venture lead to an increase in prices or a reduction in output?

The EU prohibits agreements and concerted practices which may affect trade and have as their object or effect the prevention or restriction of competition (Article 101) – in Europe. Telefónica and Portugal Telecom concluded a co-operation agreement in 1997 concerning markets outside the EU, which was notified to the Commission at the time.

In 2010, Telefónica acquired of sole control over the Brazilian mobile operator Vivo from Portugal Telecom. That agreement suggests that Telefónica and Portugal Telecom will not compete with each other in their respective home markets. The Commission has a copy of the agreement and of the non-compete clause, which runs from September 2010 to the end of 2011.

In January 2011, the European Commission opened an investigation into this agreement including the scope and effects of the co-operation between the parties in Spain and Portugal prior to the 2010 Vivo transaction.

Although the parties ended their non-compete agreement in February 2011, the Commission said on 25th October 2011 that is was pursuing the fact that such an agreement had been made.

◂ **Box 2.14: Collusion in Spain and Portugal**

Source: EU Commission, Press Release, 24 January 2011
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/58&format=HTML&aged=0&language=EN&guiLanguage=en

In some cases joint ventures include an agreement for the parties to acquire assets or voting rights in their respective firms. This type of arrangement is more durable than a conventional joint venture, and so requires additional scrutiny. The investigation should consider factors such as:

- The level of competition in the relevant market
- The number and power of competitors in the relevant market,
- The market power of the parties in the joint venture,
- The background of, and the relationship among, the parties in the joint venture,
- The setting in which the joint venture was created,
- The relationship between the lines of commerce of the joint venture and of the individual parties in the joint venture.

Ultimately, regardless of the benefits they produce for the collaborating parties, joint ventures must deliver consumer benefits and limited (in both duration and scope) integration in order to enhance the public interest.

Reference Documents

- **European Commission: Co-operation between Telefónica and Portugal Telecom on Iberian markets, January 2011**
- **European Commission: T-Mobile Austria/telering: Remedying the loss of a maverick, 2006**

2.3 ACCESS TO CUSTOMERS AND FACILITIES

The previous section discussed the conduct issues arising from market power. In this section, we discuss how the major source of market power can be countered through access policies.

Market power can be earned (eg by superior service or patented innovation) but in communications it often comes from control of an essential facility. Typically, the incumbent has a legacy access network which it is uneconomic to duplicate and for which there are no close substitutes (ie a natural monopoly). This market power is removed with mandated open access.

Specifically, this section will address:

• Policy Issues • Key Concepts • Interconnection • Unbundling • Infrastructure Sharing Section 4 will look at the important question of the price for access.

2.3.1 POLICY ISSUES

The regulatory approach to open access has evolved as competitive business models have changed. Changes in technology have been a major catalyst for these changes. The deployment of next generation fixed and mobile access networks (NGNs) creates opportunities for cost savings and the creation of new services. It also creates challenges for traditional business models and for regulation.

In fixed networks, many incumbents are replacing copper with fibre to the street cabinet (FTTC) and then using VDSL technology over the copper sub-loop between the street cabinet and the customer's premises. Other operators, where the network architecture does not support this model, are planning for fibre to the home (FTTH). These NGN access models will result in a completely different local network architecture, where the 'central office' or 'main distribution frame' will eventually cease to exist.

Ideally, competition should extend to competing infrastructure investments. But where there is a natural monopoly in the provision of, say, a fixed customer access network it is uneconomic and unreasonable to expect duplication of such a network. The object of regulated access is to make such 'essential' or 'bottle-neck' facilities available to stimulate competition.

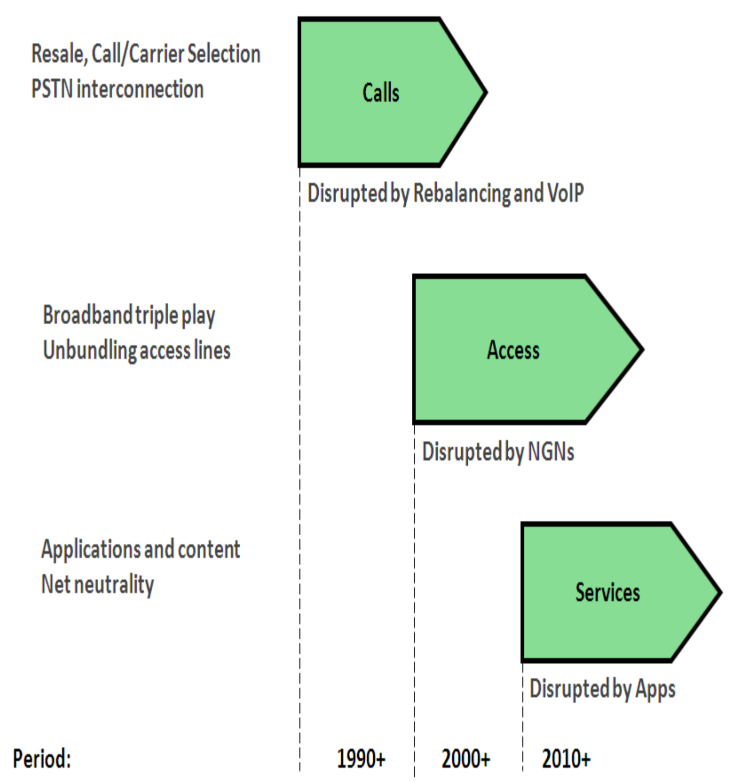
In the next two sub-sections, we explore how the focus of access policies has shifted with the evolution of competition (also discussed in more detail at section 1.5.1) and the emergence of digital communications.

- Evolution of competition
- IP interconnection

Policy issues include infrastructure versus service competition, **universal service** (Module 4) and affordability.

2.3.1.1 EVOLUTION OF COMPETITION

Competitive business models and the focus of regulation continually evolve:



◂ Figure 3.1: Evolution of Competition and Regulation

Three distinct phases are identified [*]:

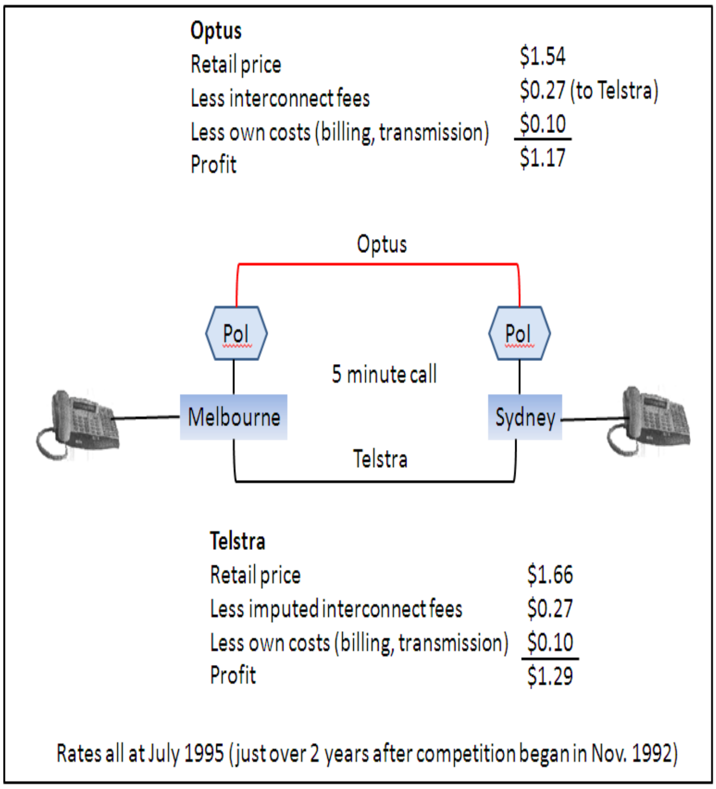
- **Calls:** When developed country fixed markets were liberalised in the early 1990s, incumbent pricing structures relied on subsidising take-up of fixed lines with high call tariffs; particularly for long-distance and international calls. Call markets were opened with Call Selection (dial a pre-fix to use a new entrant) and/or Carrier Pre-selection (all long-distance calls are automatically routed through the chosen service provider).

> Bahrain introduced Call Selection (8-digit call over-ride) in 2004 and then carrier pre-selection (CPS or dial-tone) access for calls. These were introduced at considerable cost to provide customers with greater choice and convenience in the selection of which operator should bill them for calls. But, according to the TRA, although five operators offered CPS services, less than 1,000 of the 195,000 fixed lines subscribed to CPS (representing 1.2 per cent and 0.3 per cent of business and residential lines respectively).

◂ Box 3.1: Call Selection in Bahrain

Source: Bahrain, TRA, Strategic and Retail Market Review, August 2007 http://www.tra.org.bh/en/pdf/Strategic_and_Retail_Market_Review_Consultation_Final.pd

Regulation in this era consisted of mandating Call and/or Carrier Selection and setting origination and terminating interconnection rates paid to the incumbent. These could be significantly lower than retail rates providing a significant margin for profit; as shown in Figure 3.2).



◂ Figure 3.2: Call Selection in Australia

Regulators spent a great deal of time on developing and setting interconnection rates and arbitrating access disputes and customer switching issues.

The calls-based competitive business model was disrupted by regulator-assisted rebalancing of line rentals and call tariffs, take-up of unbundled local loop and broadband enabled VoIP which reduced margins on long distance call services.

This form of market liberalisation has not been successful in developing countries because fixed networks present a smaller market opportunity than mobile networks and the margins between regulated fixed network interconnection rates and retail prices have been small. Rather than spending time on implementing fixed call selection on copper with a high non-adoption risk, regulators in developing countries should focus on prohibiting either fixed or mobile carriers blocking or degrading competing digital apps like VoIP *.

- **Access:** The advent of broadband and VoIP services shifted the focus of competition to control of the access line and consequently all services provided over it. The fight for control of the access line led to major players launching triple play (bundling voice, broadband and IPTV services) or even quadruple play (adding mobiles as part of the package).

The focus of regulation shifted from interconnection to unbundling of part of all of the copper line. A key policy issue is preserving investment incentives with unbundled access pricing. Forcing open access * to incumbent copper access networks to create competition has worked in developed countries but it made incumbents reluctant to invest in major civil works programmes to replace the copper access network with optical fibre partially (FTTN) or completely (FTTH).

Deployment of NGNs raises complex challenges on how to maintain access for all competitors. Many incumbents are rolling out fibre to the node at the street cabinet (FTTN) and then using VDSL technology over the copper sub-loop between the street cabinet and the customer's premises. Other operators, where the network architecture does not support this model, are planning for fibre to the home (FTTH; removing all copper from the access network).

The fixed costs below are for items such as new street cabinets which do not vary with take-up. The variable costs are those that increase with the addition of each new line, and so include costs for active equipment and the final fibre connection to the premises which are only installed when a premises migrates to the new network. It can be seen that for all technologies the fixed costs associated with coverage are dominant, at over 70% of the total costs. The large proportion of fixed costs means that the costs per premises connected are particularly sensitive to the take-up assumptions.

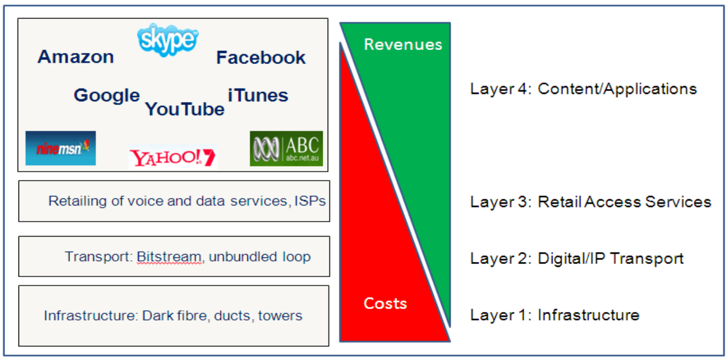
◂ Box 3.2: Relative costs of different fibre NGNs

Source: Figure 1.7, The costs of deploying fibre-based next-generation broadband infrastructure, Analysys-Mason for Broadband Stakeholders Group, September 2008 http://www.broadbanduk.org/component/option,com_docman/task,doc_view/gid,1036/

According to the BSG report (Box 3.2), the costs of deploying FTTC/VDSL (fibre to the curb with VDSL from the node at the curb) in the UK are around GBP5.1 billion. This is around a fifth of the costs of deploying FTTH/GPON (GBP24.5 billion where GPON shares the fibre infrastructure at the node with around 32 homes), with FTTH/PTP costing around GBP28.8 billion (point-to-point costs 18% more than FTTH/GPON, but regulators like PTP fibre because it can be unbundled like copper).

The assumption of business models in the access competition era was that control of customer access also controlled revenues delivered over that infrastructure. With digitisation this assumption no longer holds leading to the era of service competition (eg from Skype).

- **Services:** The de-layering of the industry that has arrived with IP has broken the nexus between carriage and content. None of the content providers at layer 4 in the figure below need to deal with the providers at the other levels.



◂ Figure 3.3: Revenues and Costs

With the shift of competition towards services on both fixed and mobile networks, the focus of regulation is on identifying new sources of market power and addressing new issues such as **network neutrality** and content regulation.

Broadcasting rights vary from country to country and even within countries. These rights govern the distribution of copyrighted content and media and allow the sole distribution of that content at any one time *.

Broadcast television and telecommunications have been regulated differently. As IPTV allows broadcasting over IP networks new regulatory issues arise *.

Netflix, based in California, began offering unlimited movie downloads in Canada for $7.99 a month in 2010. By August 2011, the service had signed up 10% of the broadband households; a feat that took six years in the United States.

Cable and satellite companies in Canada argue that Internet-based movie distributors like Netflix should fund Canadian broadcast content and face other regulations that cable and satellite distributors such as Rogers Communications Inc. must meet.

But in October 2011, the Canadian Radio-television Telecommunications Commission (CRTC) decided against regulating online-streaming companies such as Netflix Inc. that provide television and feature films over the Internet; noting there isn't "any clear evidence" that so-called over-the-top services (OTT) are negatively affecting the broadcast system.

◂ **Box 3.3: Canada and Video Regulation**
Source: Results of the fact-finding exercise on the over-the-top programming services, CRTC, October 2011
http://www.crtc.gc.ca/eng/publications/reports/rp1110.pdf

As an example of how technology can over-take regulation, copyright law often exempts copying for personal use and new technology has been used to stretch this permission to deliver services beyond what might have been anticipated (Box 3.4).

In Australia a mobile operator, Optus, has a cloud-storage service which enables customers to playback any of 15 free-to-air programs. It gives its mobile customers 45 minutes of free viewing for what it claims is just a time-shifting and format-shifting service. Optus argues that what it offers is equivalent to customers recording the content on their own hard drives for personal use, which does not breach copyright.

Key sporting organisations are concerned about the impact on revenues. The main mobile network operated by Telstra paid A$153m for the rights to stream matches live over the Internet over five years.

Optus won the first Federal Court case in February 2012, but this early decision was overturned by a full bench of the Federal Court in April 2012 with the High Court refusing leave to appeal in September 2012.

The same issue arose in the USA in 2006 when US pay TV operator Cablevision introduced a service that allowed customers to record, pause, and replay television content from servers located in Cablevision data centres rather than from hard drives in their living rooms.

Cablevision was challenged by Twentieth Century Fox and, in March 2007, a district court found in favour of the copyright owner but this decision was reversed in August 2008 by the Second Circuit Court of Appeal.

◂ **Box 3.4: Copyright for content**
Source:
http://en.wikipedia.org/wiki/Cartoon_Network,_LP_v._CSC_Holdings,_Inc.

Practice Notes

- Network Neutrality

Reference Documents

- Bahrain: TRA, Strategic and Retail Market Review, August 2007
- Canada: Results of the fact-finding exercise on over-the-top programming services, 2011

- **Carrier Selection in Developing Countries: Dead on Arrival?, September, 2011**
- **United Kingdon: Analysys-Mason report on the costs of deploying fibre-based next-generation broadband infrastructure, September 2008**

2.3.1.2 IP INTERCONNECTION

All next generation networks (NGNs) will be digital and existing fixed and mobile switched networks are migrating quickly to digital networks. So, switched interconnection is giving way to IP interconnection as networks become digital. The paradigms ruling each of these currently are very different (Table 3.4).

Switched (Telephony) Networks	Next Generation (IP) Networks
Circuits dimensioned for voice	Traffic types vary (different QOS needed)
Interconnection fee based on time	Packets have no time or distance dimensions
Fixed – Mobile interconnection asymmetric	Packets exchanged uniformly across platforms
Small but constant information delivery rate	Typically "bursty" traffic patterns
Little tolerance for delays and sound distortions	Handle time sensitive and delay tolerant traffic
Regulated interconnection at agreed POIs	Unregulated peering and transit
Traffic routed over a circuit to a dialed number	Connectionless, 'best efforts' routed on IP headers

◂ **Table 3.4: Comparison of Legacy (PSTN) and Next Generation (IP) Networks**

The good news for regulators is that IP interconnection removes the bottleneck in access. With switched networks, the access provider has a monopoly over the origination/termination of calls from/to customers on its fixed or mobile access network. With peering and transit, the access network does not have such control and there is no need to regulate; as shown in **Poland** (Box 3.5). Access regimes for switched telephony (PSTN) networks have been highly regulated while the **peering and transit** arrangements associated with the highly successful development of the internet are unregulated.

In 2010, the European Commission determined that peering and transit arrangements are demand side substitutes which should consequently be viewed as part of the same **market**. The case involved the Polish regulatory authority's proposal to regulate these services as separate markets.

The incumbent (TP) does not peer with any ISP in Poland and is the only provider of transit into the global internet for half of the country where no competitor has coverage. However, small ISPs can indirectly convey traffic to both TP and the global internet via international Tier 1 carriers present at public internet exchange points in Poland. The different options used by local ISPs persuaded the EC that direct and indirect traffic to TP are functionally substitutable on the demand side.

◂ **Box 3.5: Poland and IP interconnection.**

Source: European Commission, Commission **Decision of 3 March 2010**

Peering, also known as 'Sender Keep All' or 'Bill and Keep' is a zero compensation arrangement by which two ISPs agree to exchange traffic at no charge. Transit is an arrangement in which larger ISPs sell access to their networks, their customers, and other ISP networks with which they had negotiated access agreements.

Some argue that the peering and transit settlement regimes associated with the internet will not necessarily apply to all IP networks. They point out that although (managed) next generation networks (NGNs) and the (best-efforts) internet use IP as a common technology and are converging in the marketplace by offering similar or substitute services [*], they are organized differently and so remain separate and distinct, even though they share the same transmission infrastructure (such as fibre networks) [*]. That is, NGNs are a collection of 'closed' networks (i.e., packets are not allowed across the interconnection point unless they are authorized).

To 'authorise' packets requires 'deep packet inspection' which may violate **network neutrality** . For example, mobile operators who enjoy high termination rates for voice calls from fixed networks have blocked VoIP calls for which they receive no incremental revenue. This practice may become prohibited (see **Box 2.10** on KPN). This does not mean that with IP interconnection, a byte is a byte whatever it contains. It would not violate net neutrality to offer QOS on different types of traffic [*] and this would advantage carrier-grade IP networks over 'best efforts', '**over-the-top'** internet applications.

There is a regulatory issue with the transition from switched interconnection to IP interconnection because the different regimes offer arbitrage opportunities. But the arbitrage window between, say, fixed-to-mobile termination and VoIP closes as the difference in costs narrows [*]. Some other transitional issues include:

- Where there are service providers relying on **call selection**, they would get a windfall from not having to pay termination fees while network operators would lose termination revenue; unless fees for originating access are increased.
- If there is significant traffic with countries that continue to use CPNP, the operators in those countries will continue to enjoy termination revenues while the operators in BAK regimes do not; which means BAK provides a subsidy to the CPNP country.

- The speed at which terminating rates can be reduced under the CPNP regime before the step to BAK is made.

Since network operators cannot expect to make money from switched interconnection when they move to IP Interconnection, they have to remove cross-subsidy between high margin calls and low margin line rentals and move towards volume based charging (probably implemented as monthly data caps).

Practice Notes

- Forms of Arbitrage
- Network Neutrality
- Peering and Transit

Reference Documents

- European Commission: Commission Decision on the wholesale market for IP traffic exchange in Poland
- European Union: BEREC, Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, June 2010
- infoDev: Broadband Strategies Handbook
- Internet Protocol (IP)

2.3.2 KEY CONCEPTS

The vocabulary of access regulation is shifting with the move from switched to IP interconnection. Between these, unbundling became important.

In the switched interconnection world, key concepts include:

- **Originating and terminating access** – This refers to exchange of voice traffic and the interconnection rates are usually timed.
- **Fixed-mobile termination** – The rates for terminating calls on mobile networks have been high, encouraging the growth of mobiles, but are being reduced quickly to facilitate the transition to **IP Interconnection**.
- **Call selection and carrier pre-selection** – These were used to provide call services to the incumbent's customers. They are being replaced by unbundled copper loop and by apps on digital networks.
- **Number portability** – This can be mandated for either fixed and/or mobile numbers to reduce barriers to switching providers. Numbering plans are being reconsidered with VoIP services.
- **Points of interconnect** – These are the physical locations where traffic aggregated from either exchange service or fibre serving areas is exchanged between the owner of the access network and the providers of services to the customers in those areas.
- **Resale** – This is an extreme form of mandated access in which the incumbent operator is required to allow others to resell its services under their own brands. It is important part of the switched interconnection world because reselling retail access allows entrants to provide 'full service'.

As competition **evolved** from calls to access, new concepts emerged such as,

- **Full and partial unbundling of the copper local loop**
- **Infrastructure sharing** - Co-location and facilities access takes a number of forms.
- **Inter-modal or platform competition** – the USA relied on competition between cable and telephone networks. There is some evidence that wireless and mobile broadband networks could provide competition for fixed networks.

And, with the migration to all digital networks, came:

- **Next generation networks (NGNs)**
- **Bitstream access and dark fibre**
- **Peering and transit** - Peering, also known as 'Sender Keeps All' or 'Bill and Keep' is a zero compensation arrangement by which two ISPs agree to exchange traffic at no charge. Transit is an arrangement in which larger ISPs sell access to their networks, their customers, and other ISP networks with which they had negotiated access agreements.
- **Internet exchange points** (IXPs) – these are physical locations where several ISPs and content providers can exchange traffic more cheaply than paying transit fees [*].
- **IP interconnection**
- **Net neutrality**
- **Applications** (Apps)

Across all these stages, there are some constant principles and concepts such as:

- **Essential or bottleneck facilities** - are network elements or services that are provided exclusively or predominantly by a monopolist and are critical inputs to retail service. Also, it is not feasible, either economically or technologically, for retail competitors to duplicate the essential facility or develop a substitute for it.
- **Open access** - defined by InfoDev as "*the creation of competition in all layers of the network, allowing a wide variety of physical networks and applications to interact in an open architecture. Simply put, anyone can connect to anyone in a technology-neutral framework that encourages innovative, low-cost delivery to users. It encourages market entry from smaller, local companies and seeks to prevent any single entity from becoming dominant. Open*

access requires transparency to ensure fair trading within and between the layers, based on clear, comparative information on market prices and services." [Spintrack AB. 2005. Open Access Models: Options for Improving Backbone Access in Developing Countries, for infoDev/World Bank. **http://www.infodev.org/en/document/10**

- **Reference interconnection offer** (RIO)- this defines the price and non-price terms of the services for access or **interconnection** with the expectation that this will minimise **disputes**.

Practice Notes

- **Issues dealt with in Interconnection Agreements**
- **Peering and Transit**

Reference Documents

- **Open Access Models**

2.3.3 INTERCONNECTION

Interconnection is what allows users on each network to communicate with users on any other network. One of the ITU's most notable achievement has been the agreement of standards that allows a seamless, global telephone network. International two-way interconnection to allow exchange of traffic is relatively easy to achieve as there are mutual benefits.

> The WTO Reference Paper defines "interconnection" as: *"linking with suppliers providing public telecommunications transport networks or services in order to allow the users of one supplier to communicate with users of another supplier and to access services provided by another supplier, where specific commitments are undertaken.*

◂ Box 3.6 The World Trade Organization: Definition of Interconnection
Source: Section 2, WTO Regulatory Reference Paper being the Annex to the Fourth Protocol to the GATS Agreement, the "Agreement on Basic Telecommunications", February 1997, in effect on 1 January 1998. **World Trade Organization - Reference Paper**

Interconnection can be cooperative (eg calls between countries) or competitive. In the case of competitive interconnection, incumbents provide originating and/or terminating interconnection which they are reluctant to do because it is a 'zero-sum' game: new entrants make money at the expense of the incumbent.

Telecommunications operators will interconnect voluntarily in some circumstances. If two operators are not in direct competition with each other, then generally they will have an incentive to interconnect. This is because interconnection increases the value of a network to subscribers by increasing the number of people they can call and the range of ICT services they can access.

Regulators become involved where incumbent operators have little incentive to allow access to their network, or to allow access on reasonable terms. Where the interconnection seeker is a potential competitor, an incumbent may seek to limit competition, and preserve its market power, by:

-
    - Refusing to interconnect
    - Offering interconnection at a price, or on other terms, that make it difficult for an efficient entrant to compete, or
    - Seeking to 'sabotage' the entrant by providing a lower quality interconnection service to the entrant than the incumbent provides itself.

In these cases regulatory intervention can lead to a more efficient outcome. The motivation for interconnection regulation is that efficient competition in downstream markets would be difficult, or even impossible, unless entrants can access the incumbent's network at appropriate prices, terms and conditions.

Interconnection regulation can apply equally to all telecommunications carriers (symmetric regulation) or to incumbent carriers only (asymmetric regulation). However, the need for asymmetric regulation should be kept under regular review. As market conditions change, new firms enter the market and new competitive services emerge, market power can be eroded. Where this occurs, regulators need to reconsider the justification for asymmetric regulation and, if market power is no longer a concern, remove the additional requirements.

Price differences between regulated and unregulated interconnection services result in arbitrage opportunities and potential market distortions.

With new networks (both fixed and mobile) based on Internet Protocols (IP), switched interconnection is becoming a thing of the past. IP interconnection is becoming the new standard; although the rules have not yet been agreed.

Practice Notes

- **United States-Mexico Telecommunications WTO Dispute**

2.3.3.1 FORMS OF INTERCONNECTION

One-way interconnection occurs when payment goes only one-way (eg when rail operators seek access to rail networks). Two-way interconnection occurs with reciprocal payments (eg between networks with customers who communicate across networks). One-way and two-way interconnection can co-exist. For example, new entrants often obtain parts of their networks from the incumbent carrier (one-way interconnection), and then exchange traffic with the incumbent (two-way interconnection). There are several approaches to structuring interconnection payments which are discussed at 4.3

The distinction between one-way and two-way interconnection is less important than whether the parties concerned compete or cooperate.

International calls between countries do not compete with each other (subject to arbitrage). The accounting rate system was developed as a way to allocate revenue for international telephone services. The system is a series of arrangements between national operators in which the operators jointly provide international calls and divide the revenues from such calls between them.

For many less-developed countries, traffic on international routes is unbalanced — more calls are terminated in these countries than originate from them. As a result, the accounting rate system produced considerable revenue inflows to many less-developed countries. This regime has been undermined by markets and regulation. Carriers exploit numerous arbitrage opportunities to offer customers rates that are well below international accounting rates. The system has also come under regulatory pressure [*].

The accounting rate system has now been largely replaced by cross-border interconnection. Carriers directly negotiate rates to terminate traffic, in some cases with long-term contracts, in other cases on a short-term or spot basis [*].

2.3.3.2 INTERCONNECTION AGREEMENTS AND DISPUTE RESOLUTION

Often a regulator will require the development of a Reference Interconnection Offer (RIO) as part of opening the sector to competition. The RIO sets out the terms and conditions for interconnection services that a competing operator can choose to accept without further negotiations. The purpose of the RIO is to avoid disputes and to shorten the entry time for a new competitor. Or, a regulatory tool that accomplishes similar results is a 'most favoured nation' or non-discrimination requirement, whereby any operator can choose to accept the terms and conditions that have previously been agreed or ordered to be in place for another competitor. Many countries have adopted either or both of these measures. One example is described in the practice note on Jamaica's RIO.

However, disputes about access and interconnection are common in the telecommunications sector. Reliance on the courts to resolve disputes between telecommunications firms is costly and can involve substantial delays. Without a mechanism to resolve interconnection disputes quickly and effectively, innovation and competition in the sector will be threatened. Entrants will not commit resources unless they have confidence that their business will be viable and that they will be able to resolve any disputes in a timely fashion.

Advantages	Technique	Disadvantages
Flexible, consensual, encourages parties to find common interests and 'win-win' solutions	Negotiation & Mediation	A party to the dispute may delay an expected adverse resolution
Confidentiality, legally enforceable, quicker than alternatives	Arbitration	
Structured process Subject to review	Regulatory Adjudication	Delay 'gaming' of the process Lack of expertise in regulator
Finality and enforceability	Court Adjudication	Cost, time, and lack of telecoms expertise

◂ Table 3.5: Techniques for Dispute Resolution

Source: ITU, Dispute Resolution in the Telecommunications Sector: Current Practices and Future Directions /en/document/3032

The World Trade Organization - Reference Paper includes obligations relating to dispute resolution. Under the Agreement, Member countries must establish an independent domestic dispute resolution body, so that interconnection disputes can be settled within a reasonable period of time. This need not be the regulator, but it often is.

Dispute resolution presents a number of challenges for regulators, including:

- **Access to information:** Operators usually have better information than the regulator on the details of interconnection disputes. This makes it difficult for the regulator to come to a decision and be confident that it is the best one.
- **'Gaming' of the process:** Either party may engage in anti-competitive gaming of the dispute resolution process. For example, an incumbent may use delaying tactics to draw out the proceedings, in order to delay competitive entry. Or an entrant may not accept a reasonable interconnection offer from the incumbent if it believes that it can persuade the regulator (or dispute resolution authority) to mandate more favourable terms.
- **Capacity:** Many countries face a shortage of people with the necessary legal, economic, and technical expertise to resolve interconnection disputes.

There are several ways of tackling these challenges such as:

- **Improve information available to the regulator** – to enable the regulator to base its decision on better information.

o Ask parties to define areas of agreement and dispute and to provide information to clarify disputed issues;

o Require written submissions from operators on areas of dispute, supported by facts and research if necessary; and

o Allow others (for example customer groups and other service providers) to comment on areas of dispute.

- **Obtain expert assistance** – to supplement the regulator's in-house capability by drawing on external expertise.

o Use external advisors (for example an experienced interconnection expert) to assist in resolving the dispute. The expert's role could include clarifying areas of agreement and dispute, identifying information needs, and providing advice.

o Consider appointing an independent mediator (or, if the parties agree, an arbitrator).

o Consult with other regulators on their approach in similar cases.

o Review decisions and interconnection agreements approved by other regulators.

o Use outside parties for informal mediation, arbitration, information gathering or other assistance. This can be particularly useful in countries where the regulator lacks the legal authority to resolve the dispute

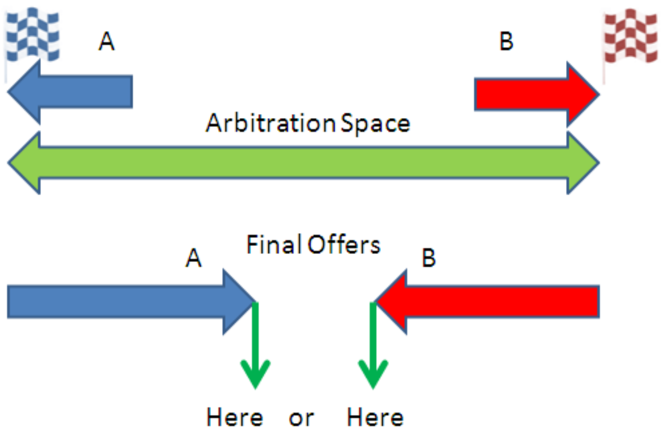
- **Improve transparency** – making more information publicly available should cause parties to consider their positions more carefully.

o Make parties' submissions available for comment by other parties and the public, with summaries to protect confidential information; and

o Publish a draft decision and give parties to the dispute and others an opportunity to make written submissions on it.

The problem with 'negotiate/arbitrate' regimes is that the two parties to the dispute exaggerate their differences hoping to draw any middle ground resolution towards their end of the arbitration spectrum. The problems with this for the regulator were discussed above. The solutions above still require the regulator to find the right spot on the arbitration spectrum to set a price; and they take time and are costly.

The Australian response to these problems was to dump the negotiate/arbitrate framework in 2011 [*]. The regulator (the ACCC) now has to set prices for all regulated ('declared') access services. It still has to use its own resources to find the right spot on a spectrum which is not bounded by previous commercial negotiations. Its interim finding is subject to consultation before it issues a final set of prices.



◂ Figure 3.4: Final Offer Arbitration

Another approach which solves some of the problems identified above and could work well for countries with limited resources is **'final offer arbitration'** (FOA). The regulator lays down the criteria by which the final offer brought to each party will be judged and chooses one. There is no compromise between the proposals of the parties. The regulator does not have to build its own cost models or justify its choice. This provides powerful incentives for parties to reach agreement rather than risk the other's proposal being accepted at arbitration. It also encourages each party to be reasonable and narrow their differences.

Practice Notes

- Anguilla: Disapproval of Proposed Interconnection Agreement
- Botswana: Interconnection Dispute Resolution
- Final Offer Arbitration [1]
- Interconnection Principles Contained in the WTO Regulation Reference Paper
- Issues dealt with in Interconnection Agreements
- Jamaica: Cable & Wireless Reference Interconnection Offer

Reference Documents

- Barbados: Equal Access and Indirect Access Policy
- Canada: Structuring the "Final Offer" Arbitration process for use in proceedings before the CRTC, November 2009
- Dispute Resolution in the Telecommunications Sector: Current Practices and Future Directions
- Jamaica: Reference Interconnection Offer: Tariff Schedule, 2009
- Jordan Mini-Case Study 2003: Dispute Resolution and Consensus Building in Interconnection
- Saudi Arabia -- Saudi Telecom Company Reference Interconnection Offer
- Singapore -- Advisory Guidelines Governing Requests for Dispute Resolution Between Licensees Under Sub-section 11.3 of the Code of Practice for Competition in the Provision of Telecommunications Services 2005

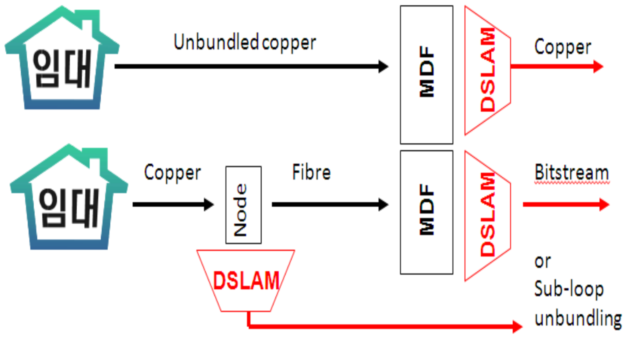
2.3.4 UNBUNDLING

Unbundling requires the incumbent to allow entrants to lease certain individual building blocks that make up a telecommunications network. Unbundling can be an enormous task for regulators. The administrative costs of defining, and setting prices for, a range of network elements can be high. In addition, unbundling can impose high compliance costs on incumbent carriers. Regulators should carefully consider the merits of unbundling on a case-by-case basis, with a thorough assessment of the likely costs and benefits. The main forms of unbundling are:

o **Resale** is often mandated as the first rung on the '**ladder of investment**' (1.5.1). Resale obligations require the vertically integrated firm to make its retail services available for resale by any competitor. This approach is used in many markets including the USA, UK and Australia.

o **Leased lines** are an important access product through all stages of competition except service competition. They may be long-distance transmission links on 'thin' routes *. Or, they may be data 'tails' providing originating/terminating access for data services. These have tended to be displaced by unbundled local loop where the entrant has more control over the service specification.

o **Line-sharing** (or partial line unbundling) where incumbent must provide access to the non-voice frequencies of a local loop and/or access to space within a main distribution frame where *DSLAMs* and similar types of equipment can be interconnected to the local loop. Where entrants use line sharing to provide broadband service, they can also buy resold local service (line rental and calls) to provide a more complete bundle of services.

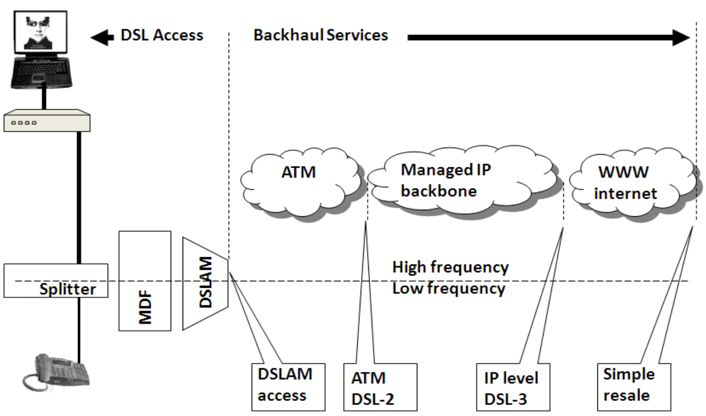


◂ Figure 3.5: Unbundled Copper Access

o **Local loop unbundling** is also known as full unbundling and occurs when the raw (unconditioned) copper pair is used by the entrant to provide both voice and data services over ADSL).

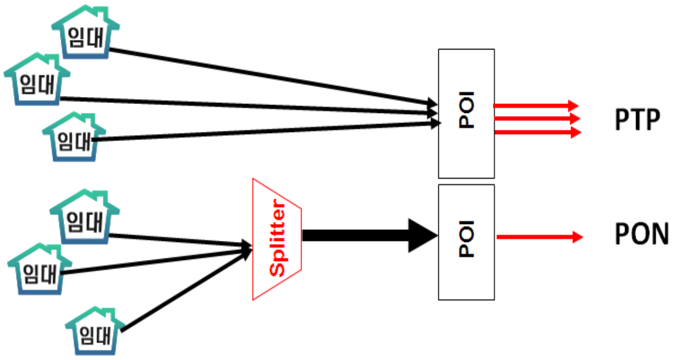
o **Sub-loop unbundling.** With FTTN, sub-loop copper between the node and the final customer may be mandated but it is unlikely to be commercially viable.

o **Bitstream** access was used in New Zealand as an alternative way of unbundling copper lines. Where fibre replaces part of the copper access network (Fibre to the Node) or all of (Fibre to the Home), Bitstream is the most common form of unbundling in fibre networks. It can be at Layer 2 (ATM or Ethernet, in most fibre networks) or Layer 3 (IP, as with New Zealand's copper bitstream service).



◂ Figure 3.6: Bitstream Access Options

o **Dark fibre** (unlit optical fibre) is another form which may be constrained by the architecture of the FTTH access network (Figure 3.7). It is possible with point-to-point (PTP) fibre where there is one fibre for each end customer back to the point of interconnect (POI). But it is cheaper to build FTTH with a passive optical network (PON) in which a fibre line is connected to a passive optical splitter, which splits the incoming light from the POI over typically 32 (but up to 128) fibres going to end customers.



◂ Figure 3.7: FTTH Design Options

o **Wavelengths** are likely to be unbundled on PONs in future but the standards do not yet exist for this solution [*]. With wave length multiplexing (WDM), the end-user is accessed by using a separate wavelength f not shared by other users.

Before unbundled local loop (ULL) was made available, entrants could buy unbundled bitstream access (UBA) and re-sell voice services (POTS, 'plain old telephone service') or buy UBA without POTS ('Naked' UBA; perhaps relying on their own VoIP or mobile service to provide voice). The Basic UBA price is $20.66 but Naked UBA is $44.59 per month where the difference ('uplift') is equal to the ULL price to cover loop costs (September 2011 prices). With ULL, entrants could provide their own voice and broadband services.

Telecom New Zealand (TNZ) is in the process of deploying fibre to the node ('cabinetisation'). Where this happens, copper is not available to provide broadband and POTS over ULL. The entrant has three options:

First: unbundling the sub-loop (SLU) at the cabinet and using their own or leased fibre backhaul ('sub-loop backhaul'; at about 60 per cent of ULL cost); but this is uneconomic with cabinets typically serving only 300-350 customers.

Second: basic UBA can be bought with resold POTS. The wholesale operator, Chorus, provides these from the cabinet to the exchange over fibre and copper respectively for entrants and Telstra Retail. When copper is no longer available, POTS will be carried over fibre.

Third: where copper between the cabinet and exchange has not been de-commissioned, it can be bought as the un-regulated (and unpublished) sub-loop extension service (SLES) which together with sub-loop access provides a copper path for POTS. Naked UBA provides broadband. Entrants claimed that they should only pay the Basic UBA price or they would be paying contributions to the cost of the loop twice; unlike Telecom Retail.

The Commerce Commission agreed and noted that Telecom had breached it separation undertakings because option three did not provide access on the same terms as Telecom Retail. Because TNZ moved to address this issue promptly, the Commerce Commission agreed to limit compensation to NZ$31.6m; the commercial gain it estimated TNZ to have made. This was distributed between the five new entrants affected.

◂ Box 3.7: New Zealand SLES dispute

Source: New Zealand, Commerce Commission Decision No. 731, Final Review of the Standard Terms Determination for the designated service Telecom's unbundled bitstream access, September 2011
http://www.comcom.govt.nz/1st-competition-test-for-uba-std/

Unbundling usually requires **facilities sharing** (3.5) or **collocation**, where the incumbent operator houses the communications equipment of competing operators to facilitate connectivity, or permits entrants to share infrastructure such as cell-site masts, cable ducts, or telephone poles.

Because unbundling copper has been so successful in stimulating competition, regulators have looked for fibre analogues to the unbundled local loop (ULL) and line sharing service (LSS) found in copper networks. Unbundling of copper loop is not easy with fibre-to-the-node (FTTN) and impossible with fibre-to-the-home (FTTH). Regulators are still struggling to determine both what access products are appropriate in the new environment and how they should be priced without discouraging further investment in next generation networks (NGNs).

Ofcom's new regulatory model rests on the following core elements:

Virtual Unbundled Local Access ('VULA'), which will allow competitors to deliver services over BT's new NGA network, with a degree of control that is similar to that achieved when taking over the physical line to the customer;

Physical Infrastructure Access ('PIA'), which will allow competitors to deploy their own NGA infrastructure between the customer and the local exchange, using BT's duct and pole infrastructure, to provide broadband and telephony; and

Local Loop Unbundling ('LLU') which Ofcom expects will continue to provide a basis for competition in current (copper) generation services, allowing competitors to physically take over (or share) BT's copper lines between the customer and the local exchange.

Ofcom concluded that prices for LLU, PIA and SLU must be related to the cost of providing them. However, it decided **not** to regulate the prices of the product(s) that BT provides under its VULA obligation. It considered that this approach will give BT the flexibility to price its VULA services according to emerging information on the demand for, and supply costs of, NGA services. At the same time, the prices of these services will be constrained by the availability of current generation broadband services and by competition from services provided over cable TV network infrastructure.

◂ Box 3.8: UK Approach to NGN Access Products

Source: Review of the wholesale local access market – Statement, Ofcom, October 2010
http://stakeholders.ofcom.org.uk/consultations/wla/statement

In developing countries, unbundling copper is not a useful option for creating competition because copper networks are not extensive. In developed countries, incumbents have been slow to roll-out fibre networks because they could not see a business case or they felt that regulated access prices would be too low. The fact that broadband is increasingly expected to be delivered over wireless networks in developing countries brings to question the importance of focussing on local loop unbundling where the copper local loop is less important relative to wireless penetration.

Practice Notes

- United States: Unbundling

Reference Documents

- European Union: BEREC, Next Generation Access – Implementation Issues and Wholesale Products, March 2010
- New Zealand: Commerce Commission Decision on unbundled bitstream access
- UK: Ofcom Review of the wholesale local access market – Statement, October 2010

2.3.5 INFRASTRUCTURE SHARING AND COLOCATION

One of the most important policy concerns underlying the growing regulatory interest in sharing is the promotion of rapid and efficient network deployment. In many developing countries, the network in question is the mobile network, which is increasingly becoming the dominant form of infrastructure in these countries, as well as the backbone for the provision of universal access. In more developed and industrialized countries, the emphasis is on national broadband core and access networks and Next-Generation-Networks (NGNs). Although the modes of sharing differ and although each network raises particular policy concerns, broadly speaking, sharing facilitates a rapid, less costly and less disruptive deployment of networks, whether the network is mobile, fixed broadband, or NGN [*].

Sharing helps to address three obstacles to efficient and timely network deployment:

- the high costs of network roll-out;
- restricted access to bottleneck facilities and
- poor investment incentives, particularly in un-served or under-served areas.

Due to competition in Vietnam's telecommunications market (there are around a dozen enterprises providing telecommunications infrastructure), providers have a common need in sharing, but sharing telecommunications infrastructure is difficult, leading to overlap in investment in the access network. This causes problems of wasted resources, difficulties for users, visual pollution, etc. There are too many businesses providing infrastructure development making it difficult for interconnection because every operator applies different technology. This does not lead to harmonization in national telecommunications infrastructure and is not sustainable to meet the development needs of the country in the future. The service providers are now trying to develop a shared co-operation network infrastructure but so far no specific measures have been implemented due to disagreement on the benefits as well as a lack of appropriate regulatory guidelines.

◂ Box 3.9: Vietnam

Source: Vietnam, Broadband in Vietnam: Forging Its Own Path, Tran Minh Truan, InfoDev, Nov 2011
http://www.infodev.org/en/document/1127

There is a distinction between passive and active infrastructure sharing:

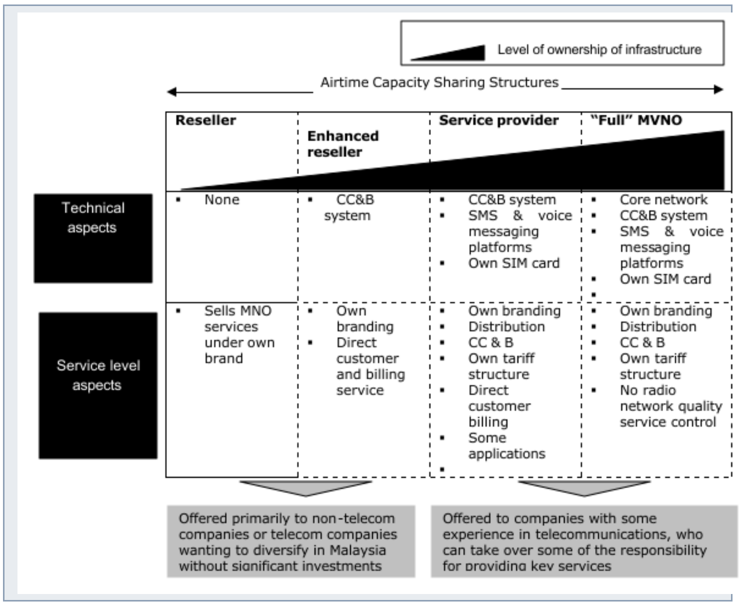
- Passive infrastructure includes all the civil engineering and non-electronic elements of infrastructure, such as physical sites, poles and ducts (and also power supplies).
- Active infrastructure covers all the electronic telecommunication elements of infrastructure like lit fibre, access node switches, and

broadband remote access servers.

Infrastructure sharing is particularly important to the building of broadband networks where the cost of civil works (eg digging trenches) is significant. The Fibre-to-the-Home Council identifies four business models used in the FTTH market *:

- Vertically integrated – one major player covering passive, active and service layers, who offers services directly to their customers, conveys traffic on their networking equipment and uses their own passive infrastructure (exclusively or with wholesale to other communications providers).
- Passive sharing – in this model, the infrastructure owner deploys the passive infrastructure and provides passive access to other players, who concentrate on the active and service layers.
- Active sharing – the vertical infrastructure provider deploys both active and passive infrastructure, and opens it up to service providers, with each service provider taking care of its base of subscribers.
- Fully separated – in some countries the fully separated model has emerged, featuring an infrastructure owner, a network operator and a series of service providers.

Active infrastructure sharing can be a matter of degree. Mobile Virtual Network Operators (MVNOs) do not own their own spectrum but may rely to a greater or lesser extent on components provided by the incumbent.



◂ Box 3.10: MVNO Options

Source: Telekom Malaysia Berhard business plan reported by the Malaysian Communications and Multimedia Commission, February 2005

The policy issues related to competition and sharing are complex. Sharing offers both the possibility of enhancing competition and the risk of hindering competition.

On the one hand, sharing policies can help to increase competition in the ICT sector. One of the greatest impediments to market entry in the sector is the cost of network deployment. Sharing allows operators to enter the market at a much lower cost than what they would encounter if they were required to construct their own network infrastructure. Sharing also helps to overcome barriers to competition such as the control of bottleneck facilities by dominant operators.

On the other hand, too much sharing undermines the incentives for investment in infrastructure-based competition. In the early days of liberalisation, some regulators prohibited facilities sharing. A very permissive sharing regime makes it possible for operators to become active without investing in their own infrastructure. If most operators rely on the same underlying infrastructure providers, it is likely that there will be little ultimate differentiation in their services. The benefits of competition like lower prices and consumer choice are reduced as a result.

Ultimately, there is an inevitable tension between the equally important goals of reducing barriers to market entry and stimulating investment in infrastructure. Both of these goals are relevant to maintaining healthy competition in the ICT sector. Striking the appropriate balance between these goals is a delicate matter for policy makers and regulators.

In India the regulator, TRAI, proposed sharing rules for the mobile sector in 2007, both for active and passive components. Since then, Bharti Group, Vodafone Group, and Aditya Birla Telecom (Idea Cellular) have created Indus Towers, a joint venture that controls over 100,000 towers and provides passive infrastructure service to its shareholders and others.

In order to raise capital for 3G auctions and deployment, 2010 saw significant divestment of mobile towers to independent companies that operate them on an open access basis. For example, in January 2010 an Indian tower company, GTL Infrastructure, acquired 17,500 towers from Aircel, making GTL one of the largest independent tower companies in the world. GTL was subsequently in negotiations with Reliance Communications to acquire 50,000 additional towers, but those negotiations fell through in the middle of 2010.

But there are limits. India has 22 service areas with Bharti Airtel, Idea Cellular and Vodafone Group present in 13, 11 and 9 areas respectively. In July 2011 they made an agreement (in apparent breach of their licence conditions) to allow customers to roam across each other's networks. Roaming was allowed on 2G networks but in late September 2012 it was reported that these companies would shortly be issued with notices forbidding these pacts with immediate effect.

◂ **Box 3.11: India**

Source: TMG, Broadband Strategies report for ITU and http://www.totaltele.com/view.aspx?ID=469845&mail=662&C=0

Practice Notes

- Cost Analysis for FTTH

Reference Documents

- Backbone networks: Extending Open Access to National Fibre Backbones in Developing Countries, Feb 2008
- Bangladesh -- Guidelines for Infrastructure Sharing
- GSR 2008 - Mobile Network Sharing,
- infoDev: Broadband Strategies Handbook
- Malaysia: Guidelines on Regulatory Framework for 3G Mobile Virtual Network Operators, February 2005
- Vietnam: Broadband in Vietnam case study, Nov 2011

2.4 REGULATING ACCESS PRICES

The heart of regulation is regulating access prices. It is the key to new entrant business models. The previous section warned of regulatory over-reach on mandating access services because not all inputs are essential, bottle-neck input services so making them available will deter new investment. This section alerts regulators to how access pricing can shape competition.

The final column of Table 4.1 provides a mapping between the access products discussed in the previous section and the approaches to pricing them which are discussed in this section. The first two columns come from **Table 1.2** defining markets suitable for *ex-ante* regulation in the EU.

Benchmarking is a pricing methodology that can (and has) been used for every service and is probably the most practical method for small developing countries.

In developed countries fundamental changes in the approach to access pricing are taking place with the transition to all digital networks. Developing countries have the opportunity to leap-frog legacy pricing approaches as the networks being built now are digital.

This section explores the following topics:

- Policy Issues
- Key Concepts
- Pricing Interconnection
- Pricing Unbundled Access
- Pricing Infrastructure Sharing
- Pricing Resale

Market	Service	Product	Pricing	Sections
1	Retail access to PSTN	Line rental (WLR) Local calls (LCS)	Retail Minus (RMAC), Benchmarking	3.6 + 4.6
2 + 3	PSTN originating and terminating access	POTA, IP interconnection	LRIC, BAK, Benchmarking	3.1.2 + 3.3 + 4.3
4	Wholesale network infrastructure access	Unbundled loop (ULL) Line sharing (LSS) Infrastructure sharing	LRIC, Benchmarking	3.4 + 4.4
5	Wholesale broadband access	Bitstream, Dark Fibre	LRIC, GB, Benchmarking	3.4 + 4.4
6	Wholesale leased lines	Data tails	LRIC, Benchmarking	3.4 + 4.4
7	Voice call termination on mobile networks	FTM	LRIC, BAK Benchmarking	6.4

◂ Table 4.1: Access Products and Pricing Options

2.4.1 POLICY ISSUES

Mandating access usually * means that access prices have to be regulated too: the owner of the essential facility cannot use its market power to control supply because open access is mandated and regulated access pricing stops it using its market power to control the price.

In trying to support competitive processes, regulated access pricing seeks to achieve three forms of economic efficiency:

- **Allocative efficiency** requires that resources, products, and services are allocated to the person or persons who value them the most. For this to happen, consumers of final products or services (such telephone calls to other customers) should pay prices that reflect the cost of the resources used to provide those products or services
- **Productive efficiency** requires that market participants use scarce resources as productively as possible. This means that the most efficient provider should not be precluded from serving customers, and
- **Dynamic efficiency** requires that all firms (entrants and incumbents) should have proper incentives to invest in technologies that reduce costs and/or expand product offerings.

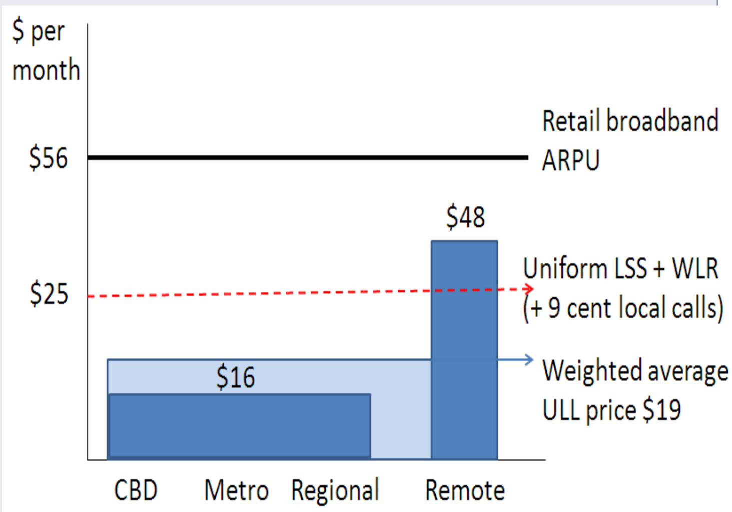
It is unlikely that these can be achieved simultaneously. More importance has been given to dynamic efficiency as the policy focus has shifted from accommodating legacy issues associated with opening access to copper networks to encouraging investment in fibre networks.

In addition, there are social objectives. Historically, many incumbent operators have maintained high prices for long distance and international services, and used the proceeds to support below-cost prices for basic services. This was made possible by statutory monopoly and allowed the wide-spread adoption of affordable telephone service. However, with the introduction of competition for calls these cross-subsidies became unsustainable. Competitive pressures eroded long distance and international prices and regulated low prices for basic service became unsustainable.

◂ **Box 4.1: Geographic Cross Subsidy**

Source: ACCC **Final Decision** on Fixed Services, July 2011 and Telstra's FTTN Briefing, 7 August 2006

Policy makers generally like uniform pricing; a social objective that conflicts with economic efficiency objectives. In Australia, Telstra argued that the ACCC was a 'rogue regulator' because it de-averaged unbundled local loop (ULL) prices across four regional types. Other access products like line sharing (LSS), wholesale line rental (WLR) and local calls are not de-averaged. This means that entrants can opt to use these instead of ULL in remote areas.



The presence of different access products reduces the ability to extract cross-subsidies.

When Telstra sought to build a metro-only FTTN, it was agreed that the access price for the new bitstream service should include a contribution to support telephony services to 1 million rural and remote customers. But the gap between the $1.77 per month offered by the ACCC and the $13.69 per month sought by Telstra was too big and the FTTN plan was dropped.

In the era of call competition, regulators had to rethink the justification for pricing policies aimed at keeping prices for basic service low and consider rebalancing tariffs to better reflect economic costs.

Among the policy challenges in moving to digital networks,

- the relative prices of wholesale services may affect the transition from copper to fibre and consistency among them is essential. Take-up of fibre access has been slow where it has to compete with copper access services which have low regulated prices
- off-setting the above, as users move off copper to fibre, cable and mobile services the unit costs of copper and consequently access prices increase; which raises affordability concerns got the users left on copper
- the migration to IP Interconnection raises transitional issues and there is no consensus yet on how to price digital interconnection

Fibre presents a new challenge for policy. Operators are facing potentially significant investment costs to upgrade existing infrastructure to keep up with technological change. However, revenues for new broadband services are uncertain and existing revenue streams are threatened by 'over-the-top' services. The most certain source of revenue is retail access pricing – and that is threatened by open access and increasingly capable mobile broadband.

◂ **Box 4.2: Asymmetric Risk Example**

Suppose an operator is considering whether to build a FTTH access network in a particular region. Revenues are uncertain. If demand is strong, the network could generate profits of $10m a year but if there is a lack of demand there will be annual losses of $8m. If these cases are considered equally likely, the expected profit is $1m and the investment will be made – if the operator has a monopoly.

	Probability	Monopoly	Open Access
Success	50%	+$10m	+$6m
Failure	50%	-$8m	-$8m
Expected		+$1m	-$1m

If, however, the network is successful and a new entrant gets access and takes 40 per cent of the market, the profits to our investor could be cut from $10m to $6m a year. The expected return is now minus $1m a year – the investment is not profitable with open access. That is, the risk of open access can make a profitable and socially desirable investment unprofitable and it will not proceed.

Private operators have been slow or reluctant to invest in broadband. In the USA, the FCC broke the impasse by forbearing to regulate broadband access * The FCC decided to forbear from unbundling and price regulation of FTTH in August 2003, extended this to FTTN in October 2004 and also DSL in September 2005. and the German and Australian incumbents unsuccessfully sought 'access holidays' long enough to get a return on their prospective investments * Initially, the Federal Network Agency in Germany supported Deutsche Telekom but under pressure from the EU it made an order in September 2010 subjecting VDSL (FTTN) , FTTH lines and Ethernet-based bitstream access to regulation. In Australia, Telstra sought concessions from the Australian government in 2005 ahead of building an FTTN network but these were refused so it chose to invest instead in unregulated HFC and mobile broadband networks.

The problem with 'access holidays' is that it gives the incumbent too much of a 'first-mover' advantage. That leaves the problem of how to set an access price for fibre networks that satisfies a number of objectives simultaneously:

- It must provide a return on large investments
- It must ensure that broadband access remains affordable to end users
- It must provide affordable open access for wholesale customers
- It must not foreclose investment (eg FTTH extensions to FTTN)
- It must satisfy government social equity objectives (eg USO and uniform pricing)

Pricing for copper networks appeared to discourage investment in fibre access networks leading some regulators to seek new models for **pricing interconnection** .

Reference Documents

- **ACCC, Final Access Determination for Fixed Line Services, July 2011**
- **European Commission: Public Consultation on Costing Methodologies for Key Wholesale Access Prices in Electronic Communications, October 2011**

2.4.2 KEY CONCEPTS

Broadly, the key concepts in the regulator's access pricing tool kit are:

- **Cost oriented prices** - as required by the WTO Reference Paper can be developed from bottom-up or top-down cost models or from benchmarking rates in similar countries who have used cost models.
- **Cost models** - bottom-up costing for LRIC (long-run incremental costs) where a firm prices in such a way as to cover only the incremental costs of the product (ie the product's LRIC), sales of that product make no contribution to the firm's common costs. There are many variations around this but it is sufficient to consider LRIC to understand the issues and principles *.
- **Regulatory accounting** - top-down costing associated with FDC (fully distributed costs) where all costs, including joint and common costs, are fully allocated to all the operator's services/products according to a specified distribution/allocation key. The costs of a given service/product are composed of direct volume-sensitive costs, direct fixed costs and a share of joint and common costs.
- **Benchmarking** – compares access prices across a peer group of countries to determine what price would be reasonable.
- **ECPR** – the efficient component pricing rule which is closely related to 'retail minus avoided retail costs'. ECPR is cost-based because it includes 'opportunity cost' *.
- **BAK** - Bill and Keep has been around for mobile termination in countries with 'receiving party pays' (eg USA) and seems related to 'peering' in internet traffic exchange.
- **GB** – Volume based charging. This is a possible alternative access pricing to address changes in the industry that BAK cannot address.

Related technical concepts:

- **DAC** (depreciated actual cost) – based on historic cost accounting (**HCA**). Some regulators also require current cost accounting (**CCA**) in which assets are re-valued at replacement cost; which may then require further adjustment to 'mean equivalent assets'
- **DORC** (depreciated optimised replacement cost) – takes accumulated depreciation from **ORC** calculated for **TSLRIC**
- **SAC** (stand-alone-cost) – the sum of the incremental cost of the product, plus all the costs which are common between that product and other products. The stand-alone cost is therefore higher than long-run incremental cost (**LRIC**).
- **WACC** (weighted average cost of capital) – derived from the capital asset pricing model and used to set the return to capital.

2.4.2.1 COST BASED PRICES

Regulated pricing is needed where an unconstrained provider of an essential facility could exploit its position to charge well above cost. Regulation is a proxy for competition which tends to drive prices towards cost. But cost is a flexible concept.

The WTO Reference Paper requires "*cost-oriented rates that are transparent, reasonable, having regard to economic feasibility*". This leaves a wide degree of flexibility in how to define and measure cost-oriented prices [*]. How it is interpreted in practice is a combination of national guidelines and case law.

The two main options are the **Bottom-Up** and **Top-Down** costing approaches. Some regulators use a hybrid of these by taking account of actually incurred costs adjusted for efficiency. The two broad options are compared below.

	Bottom-Up	Top-Down
Advantages	Can model costs that an efficient entrant would face Flexible – can change assumptions readily Transparent – much of the information used is publicly available	Incorporates actual costs Useful for testing results from bottom-up model May be faster and less costly to implement, but this depends on how well categories in the financial accounts match the data required
Disadvantages	May optimize —too much or omit costs. If this happens, the operator will be under-compensated and will reduce investment in the network Modeling of operating expenditure is usually based on simple margins instead of real-world costs Data needed for the model may not exist The modeling process can be time-consuming and expensive	Includes actual costs, which are likely to incorporate inefficiencies Less transparent – confidentiality issues mean other stakeholders may not have access to the information used The parties may dispute the cost allocation rules used (the rules used to allocate shared and common costs among specific services) Data may not exist in the required form

◂ Table 4.2: Bottom-Up and Top-Down Cost Models

Both costing approaches are demanding for a small, developing country with limited resources. A cheaper alternative is **benchmarking**.

Bearing in mind that the object of pricing regulation is to produce what be expected in **competitive markets**, contestable market theory suggests outcomes will lie between a range with the ceiling defined by stand-alone cost and a floor defined by long-run incremental cost.

Practice Notes

- **Forms of Competition**
- **Two-Sided Markets**

Reference Documents

- **Directorate General Information Society and Media 2012 Costing methodologies and incentives to invest in fibre. Final Report.**
- **European Commission: Public Consultation on Costing Methodologies for Key Wholesale Access Prices in Electronic Communications, October 2011**
- **UK: Ofcom, Review of cost orientation and regulatory financial reporting in telecoms, Nov 2011**
- **World Trade Organization - Reference Paper**

2.4.2.2 COST MODELS

Bottom-up cost models are favoured by many regulators because they reduce reliance on information provided by the incumbent; a necessary feature of top-down models, even when the accounting framework is specified by the regulator.

Bottom-up models for fibre access are appropriate because they are new. Assuming fibre networks are built in an efficient manner, operators can be fully compensated for their construction at today's prices.

The bottom-up approach develops the cost model on the basis of the expected demand in terms of subscribers and traffic and sets the network design and estimates the related costs on the basis of a network engineering model. Bottom-up modelling has the following steps:

Step 1: Define the services to be modelled (for example local access services). This step includes gathering data on the number and location of customers in the geographic area under consideration

Step 2: Determine the design of the network — what facilities are required to provide the service, and where should they be located?

Designing the network to be modelled requires the regulator to make choices about how much optimization to include in the modelled network:

- The scorched earth approach represents one extreme. It assumes that nothing is fixed, not even the location of the nodes. The scorched earth network is what an entrant would build if no network existed, based on the location of customers and forecasts of demand for services.
- The scorched node approach assumes that the location of network nodes is fixed where they currently exist, and the operator can choose the best technology to configure the network around these nodes.

Step 3: Determine the amount of each type of equipment needed to construct the network

Step 4: Estimate the costs of each element. For each type of equipment multiply the amount required by its unit prices to arrive at the total investment cost. (TSLRIC models usually use current, best-in-market costs)

Step 5: Annualise the total investment cost for each network element. This amount equals depreciation costs and cost of capital for the firm in question

Step 6: Estimate opex. Operations and maintenance costs and non-network costs include direct out-of-pocket operating expenses associated with the investment and indirect expenses, such as corporate overheads

Step 7: Estimate total costs for each network element by adding the annual (monthly) amounts calculated in Steps 5 and 6

Step 8: Unitise costs by dividing the total costs of each network element by the relevant cost-driver, to arrive at unit costs. For example, use the number of lines to derive the unit costs for subscriber loops, or the number of minutes to derive unit switching costs.

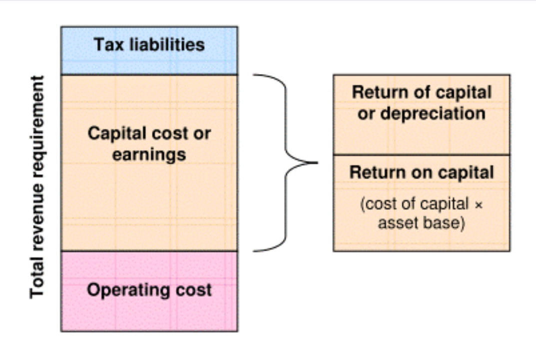
In the long term all costs are considered to be variable because the production capacity is not a constraint (as it is the case in the short term). Therefore long run incremental costs include capital and the volume-sensitive costs resulting from a substantial change in production.

Some regulators have become disenchanted with bottom-up costing models because they essentially rebuild the network from scratch each time the access price is reviewed and each time the models and their many assumptions are contested. As Ofcom puts it: *"This* (TSLRIC+) *approach is suitable to current generation access networks as they are legacy networks with low demand side risk and substantial sunk costs that have already generated a return on the initial investment. ..This approach may be less appropriate for next generation access networks. So far, these networks are characterised by high uncertainty about consumer demand and willingness to pay, with limited clarity on the applications and services they will deliver. In this situation, investors in a free market would seek higher returns from their investment to compensate for the higher degree of risk."* [Ofcom, 2007, paras 5.2 and 5.3]

This is why the Australian regulator shifted from bottom-up modelling to a top-down 'building block' approach in 2011.

The ACCC has shifted from its previous pricing methodologies (TSLRIC+ and RMRAC) to a new building block model (BBM) pricing methodology.

The new BBM method is simple – once the opening value of the Regulated Asset Base (RAB) is established. The method takes the asset base for each class of asset (eg 'ducts and pipes') subtracts depreciation and adds investment. The cost of capital, depreciation, operating expenses and tax liabilities are then added together to determine the revenue requirement.



The ACCC believes that there is no uniquely correct value for the initial value of the RAB – but says that it must lie in the range bounded by the depreciated historic value of Telstra's investment in network assets (that is, depreciated actual cost or DAC) and the depreciated optimised replacement cost (DORC) where the ORC value must be depreciated to reflect the age of Telstra's actual assets.

DAC is a top-down method drawing on management reports and DORC uses bottom-up cost modelling once to calculate ORC and then makes an adjustment for accumulated depreciation. The result is then rolled forward year by year using actual investment and depreciation.

◂ **Box 4.3: Australia's Building Block Method**

Source: **Final Access Determination** (FAD) for Fixed Services., ACCC, July 2011

Bottom-up costing is still the preferred method in many jurisdictions (eg the EU).

Practice Notes

- Commonly Used Cost Models

Reference Documents

- ACCC, Final Access Determination for Fixed Line Services, July 2011
- Bahrain: Development, implementation and use of bottom-up fixed and mobile network cost models, October 2011
- Jordan -- Instructions on Adoption of Long Run Incremental Cost Methods and Interconnection Rate Structure
- Nigeria -- Determination of Interconnection Rate
- Saudi Arabia -- LRIC Model Guidelines for the Kingdom of Saudi Arabia
- UK Ofcom, Future Broadband – Policy Approach to Next Generation Access, September 2007

2.4.2.3 REGULATORY ACCOUNTING

Top-down modelling attempts to measure LRIC starting from the firm's actual costs as set out in its accounts [*]. This method does not involve detailed network modelling. Instead, a top-down model separates the firm's assets and costs into service groups, and then adds the extra costs associated with interconnection to arrive at an estimate of LRIC.

This usually involves the following five steps:

Step 1: Identify the firm's services and separate out interconnection services

Step 2: Identify and separate all costs and assets in the firm's accounts

Step 3: Allocate all directly attributable costs. If a cost item or asset is attributable to only one service, allocate it to that service

Step 4: Allocate shared and common costs across services using allocation rules. Allocation is essentially arbitrary. Possible allocation techniques include:

(1) Combinatorial tests - consider whether the prices for different combinations of products lie between the LRIC and SAC of those combinations. Where all the different combinations satisfy this test, there is no over-recovery of common costs. Depending upon the size of the product portfolio of the firm, and the types of common costs, the number of combinatorial tests could be impracticably high.

(2) Fully allocated cost - As FAC involves allocating all the firm's common costs across all products, the costs for individual products would normally be above LRIC and below SAC. However, the FAC approach allows no flexibility in terms of pricing; common costs are allocated according to a formula (eg number of lines or minutes).

Step 5: Calculate LRIC for each service by adding up the costs allocated to that services, including an appropriate return on those assets allocated to the service.

Top-down modelling uses the firm's current operating costs and either historic cost accounting (HCA, which HCA reflects the cost at the time of purchasing the asset) or current cost accounting (CCA, where network assets are valued at replacement costs). Normally regulators would be expected to use either HCA or CCA and not mix the two approaches. In practice, some regulators recognize that those assets which cannot be economically replaced (such as for example ducts) must not necessarily be valued at their full replacement costs.

In Australia, the regulator's accounting separation report finds that for all services except local call services, the costs of transformation are at least twice as large as the access costs. This means that whether an access seeker can successfully compete with Telstra in the supply of these services is more likely dependent on its own efficiency as well as service quality and differentiation rather than the access price charged by Telstra.

	Retail Price	Access Costs	%
Local service	$88.99	$80.47	90
Domestic long distance	$0.10	$0.02	20
International calls	$0.21	$0.01	5
Fixed-mobile	$0.35	$0.01	3
ADSL	$149.48	$49.96	33

◂ **Box 4.4: Imputation Reports - Australia**

Source: Accounting separation of Telstra: Imputation testing and non-price terms and conditions **report for the June Quarter 2011**, ACCC, October 2011

Practice Notes

- Commonly Used Cost Models

Reference Documents

- Australia: ACCC, Accounting separation of Telstra: Imputation testing and non-price terms and conditions report for the June Quarter 2011, October 2011
- European Union: BEREC report on regulatory accounting practice in 2010
- UK: Competition Appeals Tribunal, British Telecommunications Plc v Office of Communications (Partial Private Circuits), 14 December 2009
- UK: Ofcom, Review of cost orientation and regulatory financial reporting in telecoms, Nov 2011

2.4.2.4 BENCHMARKING

Both bottom-up and top-down cost models are complex to develop and lead to uncertain outcomes. In some markets the detailed information required may not be available. Even where regulators can apply the same cost model for the same access product, divergences in implementation can lead to large divergences in price [*].

A more practical alternative to developing cost models for a developing country with limited resources is benchmarking. Regulators in many jurisdictions have used benchmarking to set initial interconnection rates. For example Botswana used benchmarking to resolve an interconnection dispute quickly [*].

Benchmarking has two main purposes in interconnection pricing. In situations where detailed cost models can be estimated, benchmarking can be used as a common sense check on the results of the modelling. Alternatively, benchmarking can be used directly to set interconnection prices.

In a benchmarking exercise, adjustments need to be made for differences among jurisdictions, for example population density, local area size, extent of urbanisation, traffic patterns and call durations, input prices, scale economies, exchange rates and taxes.

Practice Notes

- **Benchmarking: Adjusting for Exchange Rates**
- **Botswana: Interconnection Dispute Resolution**
- **Final Offer Arbitration [1]**

Reference Documents

- **European Commission: Public Consultation on Costing Methodologies for Key Wholesale Access Prices in Electronic Communications, October 2011**
- **Namibia: Interconnection Benchmarking Study, Final Public Report**
- **New Zealand: Benchmarking Telecom's Unbundled Partial Circuits Service, September 2004**

2.4.3 PRICING INTERCONNECTION

With the exception of countries using 'receiving party network pays' (RPNP) for calls to mobile networks, in the switched interconnection context the main basis for pricing originating and terminating access has been some form of LRIC; determined from bottom-up or top-down cost models (or benchmarking countries that do either or both).

The exception (RPNP) uses Bill and Keep (BAK) where the calling party's network retains whatever revenue it raises through retail usage charges. This is the system used for mobile networks in the USA. One advantage of a bill and keep policy is that it can be adopted quickly without the need to employ a cost analysis.

Except for RPNP, pricing interconnection becomes problematic in an IP environment because many parties can be involved in handling any packet. BAK looks very similar to internet **peering**, so it has been suggested that pricing IP interconnection will converge on BAK. This makes BAK look attractive except for mobile operators in countries with 'calling party network pays' because they have enjoyed high termination rates.

BAK is the IP Interconnection model favoured in Europe (BEREC, June 2010) because:

- Costs are falling with the transition to NGN networks so the difference between switched and IP interconnection rates is getting smaller. In mobiles, this convergence is being helped along by regulation and market forces [*].
- BAK reduces regulatory cost and uncertainty. Also moving cost recovery from termination, which is a regulated market, to competitive retail markets increases incentives for cost minimization.
- Assuming usual plausible cost and utility distribution and bearing in mind their uncertainty, BAK is likely to internalize call and network externalities better than CPNP.
- BAK is expected to lead to higher average usage per capita and a lower average price per minute. BAK decreases the marginal costs of traffic and the cost risk related to flat-rate offers that drive higher usage. Higher usage in combination with the large scale effects (economies of scale present in fixed and mobile networks) create lower costs per minute and so BAK feeds a positive feedback loop of higher usage and lower prices.

However, there are a couple of problems with BAK. First, it does not address the leakage of revenues that comes from the de-layering of the industry. BAK assumes there is some reciprocity: '*You can keep revenues from your customers and so shall I*'. But, 'over-the-top' service providers like Skype get to BAK without having a network and making no direct contribution to any networks its customers use. Indirectly, Skype's customers pay their respective network provider for data traffic they generate using Skype services. Such leakage could increase the risks of investing in broadband networks.

Second, while vertically-integrated network operators can BAK retail customers with managed IP voice and SMS services enabling them to maintain a premium over services delivered over 'best-efforts' internet (like Skype), the options for wholesale-only network operators are more limited. The options are discussed in the next section.

Practice Notes

- **Peering and Transit**

Reference Documents

- **European Commission: Public Consultation on Costing Methodologies for Key Wholesale Access Prices in Electronic Communications, October 2011**
- **European Union: BEREC, Next Generation Networks Future Charging Mechanisms / Long Term Termination Issues, June 2010**
- **Kenya -- Review of Implementation of the Interconnection Determination No. 1 of 2007**
- **Tanzania -- Determination on Review of Telecommunication Network Interconnection Rates in the United Republic of Tanzania, Issued in 2007**
- **World Trade Organization - Reference Paper**

2.4.4 PRICING UNBUNDLED ACCESS

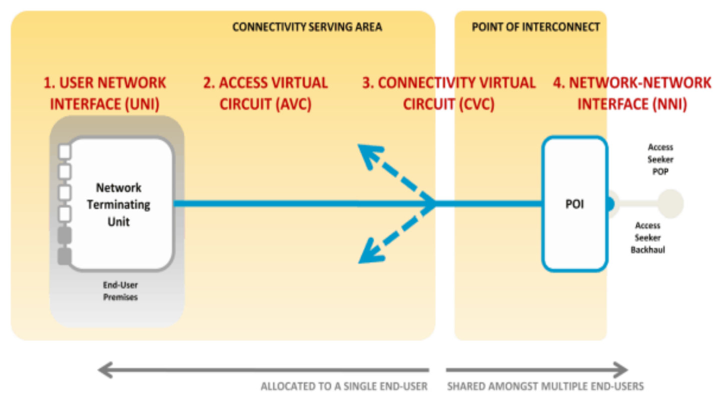
Regulating unbundled access has traditionally been done in the context of fixed copper networks and priced to some form of LRIC. Models have been used to calculate the LRIC costs of unbundled local loop, line sharing and transmission (both access tails and transmission links).

The approach to pricing access on fibre networks is still evolving to deal with both the different kinds of access products required (eg bitstream access and sub-loop) and the different level of risk associated compared with copper networks. Mindful of the need to encourage investment in fibre networks, the FCC chose to forbear from mandating access while Ofcom mandates bitstream access but forbears from regulating the access price [*].

At the same time as adjusting for risk, the relativity between access prices for copper networks and fibre networks has to be managed as this will affect the transition to fibre networks. And, the price relativity between different kinds of access products on each access platform will affect investment choices.

With FTTN, there is no analogue replacement access product for unbundled local loop. Two choices may be offered: bitstream access (much like line-sharing) or sub-loop unbundling at the node (street cabinet; combined with a back-haul access product). In practice, only bitstream will be used as the addressable customer market at the node is too small to make a business case for unbundling at that level.

With FTTH, unless it is a PTP network (which would allow dark fibre), the access product will be wholesale bitstream access (WBA). There are four components to the price in the FTTH network being built in Australia (Figure 4.1) where the critical link between the end customer and the POI is split between the individual fibre to the end customer (AVC, priced by speed and QOS to the end customer) and the aggregation link (CVC) dimensioned by the wholesale customer to handle its AVCs.



◂ **Figure 4.1: Bitstream Access in Australia**

Source: NBN Co. Product and Pricing Overview for Access Seekers, Dec 2010

This model is the same [*] as in Canada which has mandated two pricing options (Box 4.5). The other option is flat-rate. Flat rate is like copper based access pricing (eg ULL and LSS) but it does not take account of the growth in data traffic. The problem with flat-rate pricing is that it puts the onus on the access provider to increases the capacity of the network to handle extra traffic without a proportionate contribution towards the cost of doing that.

In Canada in 2000, the CRTC, permitted cable carriers to introduce usage caps and/or usage-based billing (UBB) charges for their wholesale services if UBB was also applied for their retail customers. Later, this option was extended to telephone companies offering broadband access.

On 25 January 2011 (Decision 2011-44), the Commission set the UBB rates at retail minus 15 percent. But the concession was not enough for many independent ISPs which together account for just 6 percent of the residential retail market - they were hoping for the CRTC to grant them a 50% discount.

The January decision ignited a consumer backlash and a wave of public scorn hit Ottawa ahead of the May federal election, quickly turning into a hot-button issue for a minority Conservative government and opposition parties alike. Also Netflix Inc. expressed serious concerns about its future in Canada - "[usage-based billing] *is something we're definitely worried about,*" (Reed Hastings, chief executive of Netflix). On Feb. 3 2011, the federal Cabinet advised the CRTC that if it did not review the decision and come back with a new one, it would be reversed.

The revised model that the CRTC finally produced on 15 November 2011 offers two options. First, for companies that proposed a usage-based model, their tariffs have to be based on the approved capacity model, effective 1 February 2012. For companies that proposed a flat rate model, their tariffs were approved effective immediately.

The capacity model requires ISPs to choose what bandwidth of pipe it wants in order to carry traffic between aggregation points (eg street cabinets) and the handover point. This is similar to the wholesale model proposed or the new broadband network in Australia. If ISPs do not order enough capacity, their traffic will become congested without affecting other ISPs.

This should appease content providers like Netflix but there is no incentive for ISPs to buy bigger pipes to accommodate traffic for which they little or nothing?

◂ **Box 4.5: Canada**

Sources: CRTC Telecom Regulatory Policy CRTC 2011-703 [15 Nov 2011]
http://www.crtc.gc.ca/eng/com100/2011/r111115.htm

An obvious neutral solution is volume based charging: exactly what the CRTC blocked [*]. The days when customers enjoyed unlimited downloads on broadband may be numbered. Twenty OECD countries currently have no data caps at all among their broadband offers (OECD, 2011). But things are changing. One of the twenty is the USA where AT&T slapped 150GB and 250GB data caps on its broadband DSL and U-Verse customers. Ultimately at the wholesale level, a monthly fixed fee for each access line plus a charge per GB for total volume downloaded across those lines may become a best practice option.

Another reason for moving in this direction is that both mobile and fixed broadband networks have had content and carriage effectively unbundled by the de-layering of the industry brought about by digitising networks. The network operators' responses and the regulator's role in this development are discussed in Section 5.

Reference Documents

- ACCC, Final Access Determination for Fixed Line Services, July 2011
- Australia: NBN Co. Product and Pricing Overview for Access Seekers, Dec 2010
- European Commission: Commission Recommendation on regulated access to Next Generation Access Networks, 2009
- European Regulators Group: -- Report on ERG Best Practices on Regulatory Regimes in Wholesale Unbundled Access and Bitstream Access
- Netherlands: The business case for fibre-based access in the Netherlands, December 2008
- OECD, Communications Outlook, 2011
- UK: Models for efficient and effective public-sector interventions in next-generation broadband access networks
- United Kingdon: Analysys-Mason report on the costs of deploying fibre-based next-generation broadband infrastructure, September 2008

2.4.5 PRICING INFRASTRUCTURE SHARING

There is a general consensus that infrastructure sharing should be based on cost-oriented pricing and open access models. Countries have differed, however, on the approach taken to establishing costs.

The EU considers infrastructure sharing to be just another example of unbundling. It says access to existing civil engineering infrastructure of a regulated operator on Market 4 (wholesale network infrastructure access) should be priced with the same methodology used for pricing access to the unbundled local copper loop taking into account actual lifetimes of the relevant infrastructure. The same method applies to new (fibre) infrastructure except that a higher risk premium [*] may be allowed in the return to capital (WACC).

The New Zealand regulator accepted the advice of the industry that it was not required to regulate access pricing for mobile co-location [*].

Reference Documents

- Botswana: Guidelines on Sharing Communications Infrastructure, January 2010
- European Commission: Commission Recommendation on regulated access to Next Generation Access Networks, 2009
- New Zealand -- Standard Terms Determination for the specified service Co-location on cellular mobile transmission sites

2.4.6 PRICING RESALE

The generally accepted price rule for resold services, Pa, is 'retail minus avoided retail costs' (RMAC). Under this rule, the price paid by resellers is equal to the providing firm's retail price of the service, Pr, less its cost of retailing functions, Cr, avoided with resale:

Pa = Pr – Cr

RMAC is equivalent to the Efficient Component Pricing Rule (ECPR) also known as the Baumol-Willig access pricing rule which says that the marginal costs of access include not only the direct costs, Ca, but also the 'opportunity costs'. That is the access price, Pa, should be:

Pa = Ca + (Pr – Ca – Cr)

So long as the reseller's own retail costs are less than Cr, it can compete with the incumbent.

Although DSL is not a 'declared' (ie regulated) access service in Australia (because entrants can build and resell their own DSL services based on ULL or LSS), the incumbent has volunteered [*] to resell its ADSL services in all areas at RMAC (Box 4.6).

In Australia, unbundled loop pricing is regulated but resold ADSL services are not regulated. As part of the negotiations around the National Broadband Network (NBN), the incumbent agreed to resell ADSL2+ services set equal to Telstra's retail price minus its avoidable retail cost.

The Retail Price input is based on the weighted average price over all plans, including when supplied as part of a bundle. Avoidable retail costs sourced from Telstra's internal management accounts include the costs that Telstra would avoid if, instead of supplying its retail ADSL services through retail channels, it supplied those services through the wholesale channel. Some examples of such costs are retail sales and marketing costs and call centre costs. Zone 1 includes 90 per cent of fixed lines.

National Average Retail Price for ADSL Pr = $56

– Short Run Marginal Avoidable Retail Cost Cr = $15

– Fixed Avoidable Retail Cost Allocated to Zone 1 Cr = $10

Equals ADSL2+ Wholesale Reference Price (Zone 1) Pa = $31

Even if an entrant is not as efficient in retail as Telstra, it may choose to resell Telstra's ADSL services to build market presence ahead of the roll-out of the NBN.

A guide to Telstra's price-related interim equivalence and transparency obligations, 5 September 2011 http://www.accc.gov.au/content/index.phtml/itemId/1003999 and

Accounting separation of Telstra: Imputation testing and non-price terms and conditions report for the June Quarter 2011, October 2011 http://www.accc.gov.au/content/index.phtml/itemId/670198

◂ Box 4.6: Telstra's ADSL2+ prices

Sources:

In New Zealand, the unbundled bitstream access (UBA) service was made available as a regulated product before ULL was made available. UBA has been regulated at RMAC.

Not all competitors are interested in using resale as their retail market strategy. If they use, say, unbundled local loop to provide both voice and broadband services there could be some inconsistency with resold local services.

An issue with RMAC is that comparisons between retail services and wholesale services are complicated because retail business units do not necessarily use the same cost elements, in the same quantities, in the same geographic areas and for the same end-users as wholesale customers.

2.5 REGULATING 'OVER-THE-TOP' SERVICES

OTT services are enabled by the **de-layering** of the industry. IP has separated carriage from content and allowed 'over-the-top' content and applications providers to deal directly with end users over networks whose owners and operators are excluded from these transactions. The move to LTE's all-IP architecture will create a more open environment for these OTT providers and third party services.

It is not only telecommunications that is affected. Internet television over broadband fixed and mobile networks is de-stabilising existing broadcasting industries.

In the following sections, we look at the policy issues raised by VoIP and other OTT services and the new concepts that apply before turning to regulatory options for managing VoIP and other OTT services.

- **Policy Issues**
- **Key Concepts**
- **VoIP**
- **Other OTT services**

Internet telephony, or "Voice over the Internet Protocol" (VoIP), is the first 'over-the-top' (OTT) service with major implications for the business models of both fixed and mobile network operators. More recently, text messages (SMS) have also been delivered OTT affecting the revenues of fixed and mobile operators.

◂ Figure 5.1: OTT voice and messaging smartphone applications.

From left to right: Skype, Google Voice, Viber, Talktone, Whatsapp, Blackberry and iMessage.

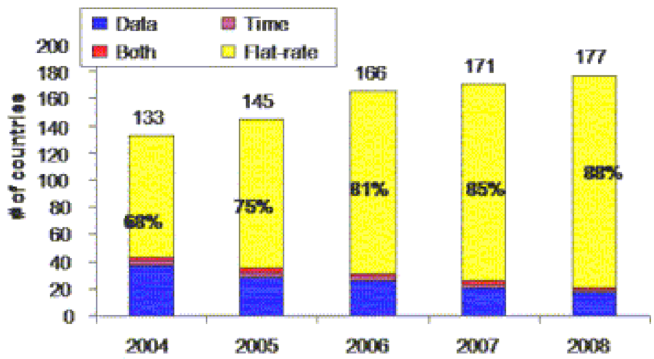
2.5.1 POLICY ISSUES

Proliferation of content and applications services is to be welcomed – they add utility for users. Some new 'over-the-top' (OTT) services did not previously exist and do not undermine the current operator business models (eg location-based GPS mobile services). Some new OTT services may threaten the economics of investing in fast broadband networks and (eg internet television).

But, change is inevitable. As network operators migrate to next generation networks, voice services will become software applications riding over the network. During this transition, policy-makers are finding different paths to balancing innovation, investment and competition.

The many policy and regulatory issues specific to **VoIP** are considered below.

Regulators cannot hold back the tide of changes to maintain the status quo. To a large extent, existing operators are able to change their business models to stay afloat. For example, OTT services manifest themselves on networks as traffic. If network builders and operators align revenue models more with traffic, their financial position is more secure. This would reverse current trends [*].



◂ Figure 5.2: Growth of Flat-Rate Pricing Strategies for Broadband Internet

Source: Figure 4, Voice over Internet Protocol (VOIP), **GSR Discussion Paper**, November 2009

These changes are disruptive and inconvenient for those with a stake in existing arrangements. But the benefits of change outweigh the costs. For example, VoIP leads to dramatic reductions in the cost in telecommunication and this has beneficial impacts on the development of business and economic growth. India found that VoIP opened up new employment opportunities with call centres serving overseas markets.

Regulators generally support innovation. They prevent fixed and mobile operators from blocking or degrading competing services.

Practice Notes

- **Regulatory Implications of VoIP**

Reference Documents

- **GSR 2009 Discussion Paper, Voice over Internet Protocol (VoIP): Enemy or Ally**
- **OECD, Communications Outlook, 2011**

2.5.2 KEY CONCEPTS

VoIP has been around for a number of years but there are several other 'over-the-top' (OTT) concepts that will become increasingly important. The concepts are all the product of the digitisation of fixed and mobile networks. Key concepts include:

- **VoIP** also known as voice-over-broadband (VOB) or internet telephony takes a number of different forms. Across different platforms, VoIP services can be phone-to-phone, PC-to-PC ('on-net'), PC-to-phone ('inbound'), phone-to-PC ('outbound') and phone-to-phone ('bi-directional' between different networks). The different forms are reflected in licensing conditions. [*].
- **SMS** – the short message service (texting) has been a very lucrative business for fixed and mobile operators. While network quality is a major constraint to some OTT voice applications, SMS applications are less reliant on QOS, due to them using less data and having a higher tolerance for latency.
- **Applications (Apps)** – This term is now associated with smartphones. Early examples include Skype (first on fixed networks but now also mobiles) and there are now thousands provided by mobile operators and third parties [*]. Their important characteristic is that they are carried over the data part of mobile service.
- **Cloud Services** - The general idea of the 'cloud' is to store your media on the internet so you can access it from any device anywhere, as opposed to leaving it on a hard drive. Apple, Google, Amazon, Microsoft and Dropbox all offer cloud services.

- **Internet Television** – With Internet ('best-efforts') TV (e.g. Apple TV, Google TV, Netflix) the consumer pays for the content package separately, and in addition to, the broadband access package. There is no guarantee of the quality of service. The content provider may use a VPN (Virtual Private Network) to try and secure the content from copying or may be encrypted and decrypted. But, it is delivered over the top of the Internet Service (ISP) provider's network.
- **IPTV** - IPTV is not 'over-the-top' because it is provided directly by carriers and ISPs. The consumer pays the ISP for both the content package and the broadband delivery package (e.g. 'Triple Play' bundles telephony, broadband and television). This allows the ISP to 'guarantee' some quality of service with its Content Delivery Network (CDN) to ensure that the video content is coming from the nearest possible server to the consumer's premise and over its own network.

Our focus in this module is on what these concepts mean for the regulation of competition and pricing. But we shall look also at consumer protection and other issues that arise in the context of VoIP.

Reference Documents

- **Peter Ingram, Voice Over Internet Protocol—An Introduction.**

2.5.3 VOIP

VoIP is the first of the apps enabled by IP to threaten traditional telecommunications business models because they depended on voice revenues (and mostly still do). Policy and regulatory issues and responses have evolved with the maturity of the VoIP market.

Early VoIP Market	Maturing VoIP Market	Mature VoIP Market
'Grey market' (self-help) bypass and illegal termination		
Quality of service (QOS)		Consumer protection
Universal Service		Security of transmissions
Defining VoIP and its legality	Regulatory capture	Net neutrality and blocking
Licensing	Emergency services	Location correspondence
Numbering	Number portability	Market size and growth
Promoting competition		(Anti-) competitive issues

◂ **Table 5.1: VoIP Regulatory Issues**

Source: Adapted from Table 1, VoIP enemy or Ally?, GSR 2009, P Biggs

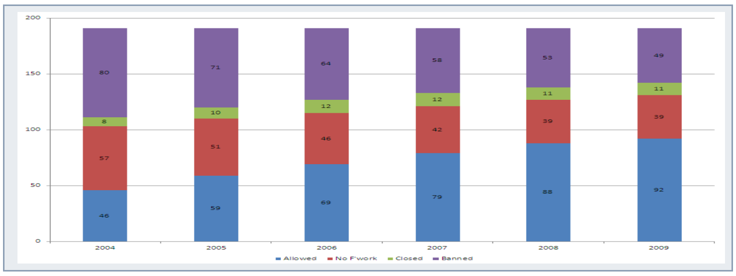
The key policy issue is how to regulate VoIP compared with the telephone services it replaces * or displaces. Some countries view VoIP as a voice service while others view it as data: a 'value-added' or 'information' service. For example, Bolivia, Czech Republic, Egypt, Jordan and the United States view VoIP as data, while Dominica views it as voice. In the European Union, VoIP can be classified as either an Electronic Communication Service or as a Publicly Available Telephone Service.

Despite its limitations, users increasingly view VoIP as 'functionally equivalent' to conventional telephone service. The quality of VoIP has improved and users can now obtain a PSTN telephone number and receive calls originated on the PSTN. Technical and consumer protection aspects are discussed in **regulatory implications of VoIP**.

Most countries licence different types of VoIP service. Policy makers then have to decide what aspects of conventional telephony regulation should apply to each class of VoIP service because the differences between VoIP and conventional voice service will have implications for universal service arrangements, telephone number management, public safety, and national security. For example, VoIP services are generally unable to provide access to emergency service if there is a power cut or to give reliable location information in the case of an emergency.

Recognizing the difficulties of translating existing regulatory frameworks into the IP world, the European Commission advocated a 'light regulatory touch' when it first examined VoIP regulation in 2004. The United States initially took a similar approach, but VoIP is becoming more regulated over time in the United States; especially in the context of security concerns (whether and how VoIP traffic can be monitored) and access to emergency call services. With a 'light touch', regulation is confined to specific matters such as access to telephone numbers, number portability, access to emergency services, universal service, and national security.

The number of countries attempting to ban VoIP is continuing to decline:



◂ **Figure 5.3: Status of VoIP Regulation Across ITU**

Source: Figure 2, **GSR 2009 Discussion Paper, Voice over Internet Protocol (VoIP): Enemy or Ally** November 2009

But it is very difficult to stop unlicensed VoIP services which can traverse the telephone network without detection. Even where regulators permit only limited or no VoIP services, incumbent operators will still face VoIP competition.

The licensing of VoIP in Bangladesh was delayed while attempts were made to establish a common platform to route all VoIP calls for national security reasons and to monitor VoIP revenues. Then when the current licenses were issued in 2009, they were set high to minimize the number of competitors.

At that time, it was thought that up to 200 illegal VoIP providers were operating in Bangladesh; mainly connecting international calls from pre-paid card users, using VSAT links. The use of VSAT for voice services is not permitted. VoIP-based call termination business captured over 40 per cent of the market of incoming and outgoing international calls.

Bangladesh now requires all calls including inter-operator VoIP calls to be routed through Interconnection Exchanges or International Gateways. Intra-operator VoIP calls and other domestic data traffic must be routed through National Internet Exchanges.

The regulator, the BTRC, is still catching illegal VoIP operators. In the first eight months of 2011, the Rapid Action Battalion seized Voice over Internet Protocol (VoIP) equipment from eight unauthorised VoIP business centres — seven in the capital and one in the port city of Chittagong. And the BTRC has a running banner on its site saying: 'Urgent Notice on Illegal VOIP: If you receive any overseas call which has a CLI display of any Bangladeshi mobile or PSTN number, please send us that number (contact details provided)'. Changing the calling number from international to local before presenting it for termination on a fixed or mobile service reduces the interconnection payable (and if it terminated as data on, say, a PC no number substitution is necessary and no fee is paid).

◂ Box 5.1: VoIP Licencing and Bangladesh

Sources: International Long Distance Telecommunications Services Policy, Bangladesh Ministry of Posts and Telecommunications, May 2010, TeleGeography, 6 Aug 2009 and VoIP and relevant Issues: Bangladesh's Context

The ability of mobile broadband users to access Skype using iPhones led certain European operators to block Skype access over their networks to prevent loss of revenues. Regulators are now beginning to stop such practices on the basis that it is inconsistent with net neutrality .

VoIP class licences have different rights and obligations attached to each type of licence depending upon how closely the licensed service resembles PSTN voice services. Barbados has four different classes of VoIP services.

Singapore also has just two class licences. VoIP providers who want PSTN numbers (starting with '6') must adhere to all PSTN rules VoIP providers can also get 8-digit numbers starting with '3' where PSTN rules do not apply.

Hong Kong also adopted a two-class approach to regulating IP Telephony. Both classes of service provider must provide access to emergency services and to reserve power, but they differ in the requirements they face for number portability and numbering. Class 1 is equivalent to PSTN voice service with number portability, but Class 2 lacks numbering rights.

and http://www.ofca.gov.hk/mobile/en/consumer_focus/education_corner/guide/advice_lfs/ipts/

◂ Box 5.2: Singapore and Hong Kong VoIP Licensing

Sources: Asia-Pacific Economic Cooperation Telecommunications and Information Working Group, Tuesday, 25 April 2006, VoIP in Singapore, presented by Muhd Hanafiah

In the future voice telephony will migrate completely from circuit switched telephony to VoIP. Once this happens, Internet interconnection and pricing models may replace the current arrangements. Until that happens, VoIP network operators will need to interconnect with incumbent network operators' PSTNs.

VoIP providers require access to the PSTN to terminate calls to recipients who do not subscribe to the VoIP provider's service. Interconnection typically occurs between a VoIP operator's gateway and the PSTN operator's point of interconnect closest to the call originator or recipient. For calls terminating on fixed networks, VoIP operators should pay PSTN operators for call switching and routing in much the same way that other carriers (such as mobile and long distance operators) do. This may be hard to enforce (Box 5.1).

Call originations from fixed networks may require a different pricing and access mechanism. For many VoIP services, the caller originates the call over a broadband access link or a wireless network. Carriers have no visibility of such VoIP calls originated on their access networks; they are just part of data traffic. However, no originating interconnection fee should arise because the customer is paying for the access link and any traffic carried over it.

Wireless networks will have a substantial impact on VoIP service development, particularly in developing countries. As wireless and VoIP traffic increase, differences in the terms and conditions under which wireline, wireless and VoIP operators interconnect networks will create opportunities for arbitrage and distort markets. Differences in call termination rates and interconnection arrangements can cause operators to adjust traffic flows to obtain the lowest possible rate, and to minimize regulatory fees.

Practice Notes

- Barbados: Regulation of Voice over Internet Protocol (VoIP)
- Forms of Arbitrage
- Regulatory Implications of VoIP

Reference Documents

- Asia-Pacific Economic Cooperation Telecommunications and Information Working Group, Tuesday, 25 April 2006, TEL 33 - Regulatory Roundtable, "What are APEC Member Economies' laws, policies, and/or regulations on Voice Over Internet Protocol (VoIP)? How many VoIP users are there in each Economy?"

- Bangladesh - VoIP and relevant Issues
- Bangladesh: International Long Distance Telecommunications Services Policy, May 2010
- Barbados Voice over Internet Protocol (VoIP) Policy
- Finland -- Application of Communications Legislation to VOIP Services in Finland
- GSR 2009 Discussion Paper, Voice over Internet Protocol (VoIP): Enemy or Ally
- Hong Kong China - Regulation of Internet Protocol (IP) Telephony
- Malaysia -- Guidelines on Telephony Services over IP
- Singapore -- Guidelines on Licensing and Regulatory Framework for IP Telephony in Singapore

2.5.4 OTHER 'OVER-THE-TOP' SERVICES

There are a number of other OTT services apart from VoIP that have been enabled by IP and which all have significant implications for market developments. They may pose a challenge for existing providers but do not seem to be as challenging for regulators as VoIP.

Apps that enable instant messaging and voice communication via data plans compete directly with the SMS and voice services upon which operators depend for a substantial portion of revenue. The average revenue per delivered byte is dropping, as SMS bytes, are replaced by 'over-the-top' bytes.

AT&T provides a typical example of how lucrative SMS is for mobile carriers and how they may respond to the threat from OTT messaging apps.

AT&T charges 20 cents per text message if a customer does not have a messaging plan or has exceeded the allotted number of texts. From August 2011 AT&T eliminated the $10-per-month 1,000 messages option and the $5-per-month 200 messages option for individuals. New customers have the choice of either $20 per month for unlimited texting or paying $0.20 for every text and $0.30 for every multimedia message that they send or receive.

Given that an SMS message is at most 160 bytes in size, this cost scales to $1,310 per megabyte sent via text message. A one-minute phone call uses up the same amount of network capacity as 600 text messages, so that if the same cost-per-MB were applied to phone calls, mobile phone calls would cost $120 per minute.

To deal with OTT messaging apps, AT&T replaced its $30 per month unlimited data plan in June 2010 with two options. One offers up to 200MB for $15 per month (with additional use charged at $15 per 200MB). The other offers 2GB for $25 per month (with additional use charged at $10 per 1GB).

◂ **Box 5.3: SMS and AT&T**

Sources: AT&T June 2, 2010 Press release http://www.att.com/gen/press-room?pid=17991&cdvn=news&newsarticleid=30854&mapcode and http://en.wikipedia.org/wiki/Text_messaging#Pricing_concerns

But SMS is not dead *. The apps that compete with it depend upon both ends of the communication using the same app: they are closed systems. But SMS is on every phone: not just smartphones.

SMS is almost as good as email which runs on every platform and carrier throughout the world. Email is not available on every phone but in some cases it is better than SMS. For example, in Japan SMS is not cross-carrier. So a DoCoMo customer cannot text a Softbank user. But, if the phone has an e-mail client and an email address, it is the best messaging option in Japan; as long as you have a cheap data plan. And, it is more easy for manufacturers to build email clients into phones than anything else, because email has standard protocols behind it.

Cloud Services

Traditionally, users had to physically connect devices to move, say, a photo from a smartphone to a home computer. With cloud services, as soon as a photo is taken it can be uploaded immediately to the cloud to be viewed anywhere, on any device. Google, Microsoft, Apple, and Amazon have all made significant investments in their operating systems and cloud services so that computers and mobile devices will seamlessly and silently upload files to one master location.

Cloud services put more pressure on network capacity. Traditional (physical) syncing placed no demands on the network but the cloud changes things. Now, instead of consuming no bandwidth when syncing 100 MB of photos back to a computer, cloud syncing uses 100 MB of data when uploading data and then an additional 100 MB downloading to each device connected to the cloud. While most services offer the option to sync only when on WiFi networks (e.g. coffee shops, living rooms), these cloud services could still result in significant additional bandwidth costs and potential bill shock for consumers. For subscribers who perform complete system back-up, the shock could be even greater.

There are no clear issues yet for competition and pricing and any that emerge are likely to be addressed first in developed markets.

Internet Television

Digitisation of broadband networks (both fixed and mobile) is causing tectonic shifts in business models. Traditionally, carriage and content went together: not any more. Video was the 'killer app' that prompted the building of cable and broadband networks. The network builders assumed they would be the providers of the content. But the impetus for delivering content over broadband is now coming from non-traditional sources that do not build the networks they rely on.

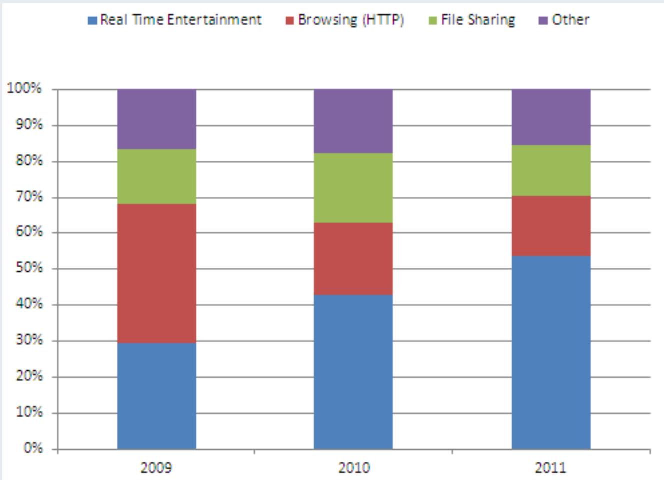
In 2007, Netflix started streaming back-list movies to subscribers in the USA and now has over 20m customers globally. It began offering unlimited movie downloads in Canada for $7.99 a month in 2010 and by August 2011 it had signed up 10 per cent of Canadian broadband households; a feat that took six years in the United States.

Sandvine reports that Netflix accounted for 32.7 per cent of all North American peak fixed access downstream content in the Fall of 2011. That put Netflix ahead of the other three top Internet protocols or services by daily volume—approaching double HTTP (17.48 per cent), almost three times YouTube (11.32), and nearly four times BitTorrent.

◂ Box 5.4: Netflix

Source: Sandvine ***Global Internet Phenomena Report***, Fall 2011

Content producers, equipment vendors and communications service providers have a 'three screen' strategy to deliver content to TVs, computers and mobile devices *. More than half the peak-period traffic over fixed access networks is real-time entertainment with more than half going to game consoles, smart TVs, handhelds and mobile devices rather than to desktop and laptop computers.



◂ Figure 5.4: Peak Period Traffic Composition, North America

Source: Sandvine ***Global Internet Phenomena Report***, Fall 2011

Not only have the builders of networks been deprived of the revenues that they expected out of video but also they have to augment their networks to keep-up with the growth in video traffic; on which they earn very little. Most video traffic adapts to network congestion by shifting to lower bitrates and quality, which impacts the subscriber experience on broadband. When capacity is increased, adaptive video simply upshifts to a higher fidelity and fills the new capacity * One of the features of TCP is that each data packet must be acknowledged by the receiver or it will need to be retransmitted to guarantee in sequence delivery of the original data stream. If these acknowledgements are unable to quickly return to the originating server, then the TCP streams carrying the subscriber's video will slow down. This is seen by the subscriber as a downgrade in their quality of experience..

Regulators do not want to stifle innovation across content and devices. Carriers will have to adapt their business and pricing models.

Reference Documents

- **Internet: Sandvine, Global Internet Phenomena Report, Fall 2011**

2.6 MOBILE AND WIRELESS NETWORK REGULATION

Mobiles have been a spectacularly successful communications technology in both developed and developing countries. Most markets can support mobile competition. Also, mobile is the best way to extend telephone service in developing countries because mobile infrastructure is cheaper to deploy than fixed networks. Compared with the fixed network, regulation of mobile competition and pricing is light because competition makes regulation less necessary.

In developing countries, the fixed network is relatively immature with mobiles being the platform of choice for cheap deployment. According to ITU data, as at the end of 2009, over 65 per cent of countries worldwide have full or partial competition in basic services (local, long distance and international services) and 90 per cent of countries have either partial or full competition in the mobile sector.

Wireless networks share many of the same competition and pricing issues as the fixed network and examples of mobiles have been used in previous sections. In this section, we focus on issues which are specific to wireless and mobile networks * Some might distinguish between fixed wireless and mobile platforms. The former include 'fixed mobile' services and WiMAX. For convenience, we shall refer to mobiles because the regulatory issues are largely the same. Also, the idea of what constitutes a mobile phone is changing fast. How should we count e-readers, tablets, wireless broadband dongles and machine-to-machine communications which all depend upon wireless connectivity?. **Where specific issues are covered in depth in other Modules** * For example, specific issues covered in other modules include **spectrum**, **licensing** and **Universal Service.**, we shall touch only on how they affect competition and pricing.

In this section we shall explore:

- **Policy Issues**
- **Key Concepts**

- Spectrum Policy
- Interconnection
- Roaming
- Infrastructure Sharing
- Enhancing Competition

The important guiding principle emerging from these topics is that regulation should neither dictate users' preferences nor interfere with the flood of innovation flowing through mobiles.

An extreme example of light-handed regulation is Somalia. Since January 1991, most of Somalia has had neither security nor stability. Yet, the business success story of the last 20 years has been the growth of the mobile telecommunications sector. There are nine networks to choose from and they offer services from texting to mobile internet access.

There is no need to get a licence and there is no state-run monopoly to prevent new competitors being established. And of course there is no-one to demand any taxes, which is one reason why prices are so low.

Despite the absence of law and order, bills are paid and contracts are enforced by relying on Somalia's traditional clan system. The warlords realise that if they cause trouble for the phone companies, the phones will stop working again, which nobody wants.

◂ Box 6.1: Somalia

Source: BBC, 26 January 2011
http://www.bbc.co.uk/news/world-africa-12278628

2.6.1 POLICY ISSUES

There are a number of policy issues with aspects specific to mobiles *:

- Spectrum Policy (6.3)
- Interconnection (6.4)
- Roaming (6.5)
- Infrastructure Sharing (6.6)
- Enhancing Competition (6.7)

Mobile and other wireless services are becoming effective substitutes for fixed telecommunications services for some users. Indeed, in many developing countries, wireless minutes of use exceed fixed minutes of use. This trend brings into question the long held assumption that an incumbent telecommunications operator will necessarily be the dominant operator in the market.

An open question is whether the success of mobiles will hinder the development of fixed broadband services. There has been call substitution from fixed to mobiles for some years and now there is mounting evidence of line substitution too (Box 6.2). It probably does not matter if fixed services are available to businesses in cities and residential customers find mobile broadband adequate *.

Kenya was a slow starter with only 114,000 subscribers seven years after mobile was first introduced. It was thought to be too expensive for the mass market. But following market reform and liberalisation the mobile market penetration took-off. Also, mobile broadband has emerged as the dominant form of broadband access accounting for 99 per cent of internet subscriptions.

◂ Box 6.2: Mobiles Dominate Voice and Broadband: Kenya

Sources: http://www.itu.int/ITU-D/icteye/ and http://www.cck.go.ke/

As with the fixed network, digitisation is presenting mobile operators with the same challenge to traditional business models. In the case of mobiles, both voice and text messaging revenues can be diluted by apps. Since digitisation has separated access and services, in emerging business models access must 'pay its own way' and cannot rely on cross-subsidies from services. Of course, this may make affordable universal access harder to achieve and presents a policy challenge.

The digitisation of mobile networks puts capacity pressures on both mobile 'access networks' (spectrum) and 'backhaul' (transmission networks). The availability of spectrum is considered in **Section 6.3.** For backhaul, mobile networks have relied on microwave to connect base stations but with increasing volumes as traffic moves from voice to data, transmission will have to be carried by fibre.

Policy makers have been generally sympathetic to infrastructure sharing where mobile operators seek to share the extra sites required to migrate to new technologies and accommodate increased traffic.

Unbundling of the kind seen on fixed networks has not generally been applied to mobile networks. Mobile operators have not been obliged to accommodate call competition with carrier or call selection * and the nearest equivalent to unbundled local loop and bitstream access, which is the MVNO (6.6), is not usually mandated.

2.6.2 KEY CONCEPTS

A key difference between fixed and mobile networks is the technology used in the customer access network. The fixed network uses copper or fibre (or both) to provide wired connections. Mobiles use radio spectrum to connect the end-user; mobiles are 'wireless access lines'.

- **Spectrum (6.3)** is made available across different frequency bands for many different purposes. Lower frequency bands are suitable for mobile coverage and higher frequency is used to support capacity (eg video).
- **2G, 3G and 4G** are successive 'generations' of mobile technology. 2G is voice and 3G is a combination of voice and data and 4G is designed expressly for (IP) data (see **Telstra's path to 4G**). (1.5.2)
- **Interconnection (6.4)** is similar to the fixed network except where RPNP applies.
- **RPNP** (Receiving Party Network Pays) is less common than CPNP (Calling Party Network Pays) and does not apply in fixed networks.
- **BAK (6.4)** or 'bill and keep' is associated with RPNP and is similar to **peering** (3.1.2) in the internet.
- **SIM (6.7)** (Subscriber Identity Module) card is used in all GSM mobiles. Multiple SIM cards allow the same phone to be used on different networks.
- **MVNO** (Mobile Virtual Network Operator) is a form of **infrastructure sharing (6.6)** used by entrants without spectrum and using varying amounts of other capacity.

2.6.3 SPECTRUM POLICY

In developed countries, access to spectrum for mobiles is more of an issue than for developing countries where making spectrum available in developing countries may be less costly and is typically is used less intensively.

A key issue for wireless due to the growth in mobile data traffic is access to more spectrum. **Radio Spectrum Management** is covered in another Module. Here, we focus on competition and pricing. The choice of spectrum is important because it affects the cost of equipment (and hence the price of services), coverage (universal service objectives) and inter-operability.

In the US and Europe a major source is the spectrum released in the migration from analogue to digital television; the **digital dividend.** More recently, there has also been interest in making more effective use of broadcast television spectrum with the US being the first country to allow the unlicensed use of **white spaces.**

Mobile's need for spectrum is a direct result of the growth in data services; in particular, video which takes up a lot of bandwidth.

Australia has tried restricting access to spectrum to encourage market entry. The Government gave itself this ('competition limits') power in 1997 when Australia already had three established mobile operators (Telstra, Optus and Vodafone).

Although two entrants did emerge, they did not survive: OneTel went into receivership and Hutchison has merged with Vodafone.

The Productivity Commission, which reports to the Treasury, recommended that the power to exclude operators from spectrum auctions should be removed as '*unnecessary, potentially distortionary and procedurally deficient*'. However, the recommendation was rejected by the Government in December 2002.

◂ **Box 6.3: Australian spectrum restrictions**

Source: Productivity Commission, Radio Communications Inquiry Report, 2002

The price of spectrum can also have a bearing on competition because some auctions have crippled operators who paid too much for spectrum. In developing countries, there may be more public benefits in seeing spectrum used well than getting high prices for spectrum; which leads to other methods of allocating spectrum (e.g. 'beauty contests' where applicants explain how they would use any allotment of spectrum).

The regulator in Morocco ran a 'beauty contest' in 2006 awarding three 3G licenses. The results were astounding – mobile broadband subscriptions increased 530 per cent between 2007and 2008.

Bidders included Maroc Telecom, Méditel, WANA (Maroc Connect at the time) and Maroc Nejma (a Kuwait-based company). The evaluation was based on four criteria: 1) deployment of infrastructure, 2) service quality engagement, 3) diversity, innovation, and incentive packages to customers, and 4) financial viability of bidder and shareholder relations.

The aspiring new entrant WANA made a great impression and was ranked first, followed by Maroc Telecom and Méditel. WANA's launch of its restricted mobility service (branded as Bayn) in 2007 and full mobility service (branded Wana Mobility) in 2008 expanded mobile broadband as well as its own public reach and penetration.

When the company launched WANA mobility using CDMA technology (not the GSM standard that Méditel and Maroc Telecom used), they gave away free phones (two for the price of one). The promotion was so popular that WANA sales exceeded expectations and the company faced two major challenges: 1) a still under-developed infrastructure that could not handle the burden of so many users at once, and 2) technology incompatibility resulting in unexpected roaming issues (most neighbouring countries were using GSM). Eventually, many of the customers switched back to Maroc Telecom and Méditel.

Since 2010, WANA has been recapitalized by the Zain Group, changed management, and adopted a new brand name; INWI which claims the greatest 3G coverage, providing CDMA2000/EVDO for all new customers and 1X (an IMT-2000 technology but slower) where coverage areas have not yet been enhanced with EVDO technology.

◂ **Box 6.4: Awarding 3G licences in Morocco**

Source: Broadband in Morocco: Political Will Meets Socio-Economic Reality, info/DEV October 2011

Practice Notes

- Digital Dividend Spectrum
- White Spaces Spectrum [1]

Reference Documents

- Australian Productivity Commission, Radio Communications Inquiry Report, 2002
- Broadband in Morocco: Political Will Meets Socio-Economic Reality, info/DEV October 2011
- European Commission: Spectrum and radio access networks: the T-Mobile/Orange joint venture in the UK, 2010
- GSR 2012 International Mobile Roaming Services: A Review of Best Practice Policies. Discussion Paper, ITU.
- GSR 2012 Spectrum Policy in a Hyperconnected Digital Mobile World. Discussion Paper, ITU.

2.6.4 INTERCONNECTION

The interconnection issues associated with mobiles depend on which of two charging regimes apply. Most countries use Calling Party Network Pays (CPNP) but a few countries (e.g USA and Canada) apply Receiving Party Network Pays (RPNP) which allows for bill and keep (BAK) payment systems where there are no inter-operator payments (end users at each of the call may pay a fee to their respective operators) *.

IP interconnection will eventually replace switched interconnection as new mobile technologies are data-centric and data traffic is becoming more significant than voice traffic. The transition will be harder for operators in CPNP countries if voice interconnection rates are high because IP interconnection is very cheap.

There is no access pricing issue with RPNP because there are no wholesale termination charges. The end-user placing the call pays the operator providing the mobile phone without the operator completing the call receiving any payments (BAK).

BAK is now finding favour as a possible wholesale charging arrangement in both fixed and mobile next generation networks for IP interconnection (see sections 3.1.2 and 4.3) because it is similar to 'peering' on the internet. This regime also reduces the amount of interconnection issues that a regulator has to deal with.

The Australian regulator asked the industry if would consider moving to BAK *. But the majority of stakeholders preferred a uniform approach to regulating MTM and FTM termination. One concern was the risk of arbitrage which arises if traffic originating on a fixed network is presented by an access seeker as mobile-originated traffic. Such traffic would be terminated at zero price under a BAK system while fixed-originated traffic would normally be charged at the FTM termination rate. There are potentially significant costs associated with monitoring arbitrage activities and rectifying their consequences.

For CPNP countries the cost of terminating traffic on mobile networks continues to be a key regulatory issue. Both main forms of mobile termination under CPNP may be regulated:

- Fixed to Mobile call termination (F2M)
- Mobile to Mobile network call termination (M2M)

Calls to the fixed network (M2F) are usually terminated at the same rates as fixed (F2F) calls.

A special case of M2M is machine-to-machine communication * which is rated more cheaply than person-to-person M2M calling and is not currently regulated; perhaps because machine-to-machine communications tend to be on-net services offered by an individual operator to an individual business.

The wholesale termination rate is usually the same for both F2M and M2M; which also has to deal with text messages (SMS, short message service) and MMS (picture and video transfer).

CPNP is generally believed to cause a market failure problem requiring regulation of mobile call interconnection. With CPNP, charges are ultimately borne by the customers of the originating operator and there is no competitive pressure on the terminating operator to constrain its wholesale charges *. Price controls imposed on wholesale mobile termination have been justified on the basis that a high mobile termination rate:

-
    - is due to each mobile network operator having monopoly power over the termination of calls on its network
    - leads to high retail prices, as the termination fee generally sets a floor on the retail price which discourage calling ;
    - makes it harder for a much smaller mobile competitor to expand because of the additional cost that is linked to off-net calls;
    - makes it harder for smaller mobile competitors to grow because larger networks have more extensive off-net calling opportunities to offer customers.

Where there is a large fixed network, mobile operators have used high F2M termination rates to promote mobile adoption through cheap SIM cards and handset subsidies. However, in many developing countries the fixed network is often not large so the fixed network cannot provide cross subsidies to mobile users (and is not recommended anyway).

In the Mobile to Mobile (M2M) context, mobile networks typically price on-net calls lower than (off-net) calls to other networks. If M2M termination rates are high, larger mobile networks are more likely to attract customers in a sort of 'club effect': to get cheaper calls, customers select the mobile operator that the people they call most also use. Without regulation, an operator could increase its termination rate to generate more revenue without affecting its own customers. The new revenue could be used to offer deeper on-net discounts to attract more customers which then generate more incoming calls and more revenue for bigger on-net discounts and so on.

Box 6.5: Namibia M2M disputes

Sources: Namibian Telecommunication Sector Performance Review, 2010

MTC is the largest of the three mobile operators with about 85 per cent of the mobile market. It has tried to use its dominance to maintain its position it two ways; which have both been remedied by regulatory intervention.

MTC used high M2M termination charges to offer low on-net call charges to its customers. In 2008, the M2M rate was N$1.06 and MTC charged its customers N$2.5 for off-net calls compared with N$1.79 charged by its nearest rival (CellOne, rebranded later as Leo). Since most customers were already on MTC, this created a 'club effect'. Keeping its retail prices high caused traffic imbalances with the other network operators (both fixed and mobile) making net interconnection payments to MTC.

Following complaints and a benchmarking exercise, in July 2009 the regulator forced the M2M rate down to N$0.60 immediately (equal to the fixed termination rate) and required it to fall to N$0.30 (about 4 US cents) by the beginning of 2011. This removed the justification for the different retail prices between on-net and off-net calls.

But MTC did not pass through falls in M2M wholesale charges to the retail prices its customers paid to call off-net customers. Unless customers can move easily to other mobile networks, the 'club effect' continues because the difference in on-net and off-net retail charges is maintained. So in February 2011 the regulator prohibited different retail prices for these two types of calls.

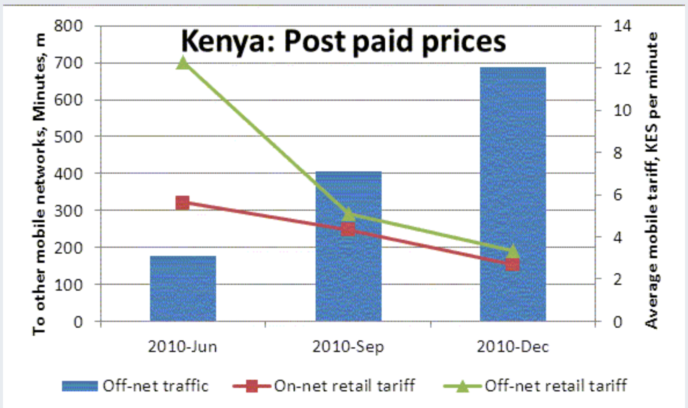
Despite dire warnings from MTC about the impact of these changes on its profitability and ability to invest, MTC has continued to prosper.

There is little cost justification for high mobile termination rates. Reducing mobile termination rates to cost leads to more traffic between networks increasing consumer welfare.

Box 6.6: Kenyan M2M rate cut

Source: Sector Statistics Report, 2nd Quarter 2010/2011 **www.cck.go.ke**

In Kenya, the regulator reduced the mobile termination rate from KES 4.42 per minute to KES 2.21 in August 2010 and this combined with increased mobile competition led to 70 per cent increase in calls to other mobile networks over 3 months compared with a 3 per cent increase in on-net call traffic.

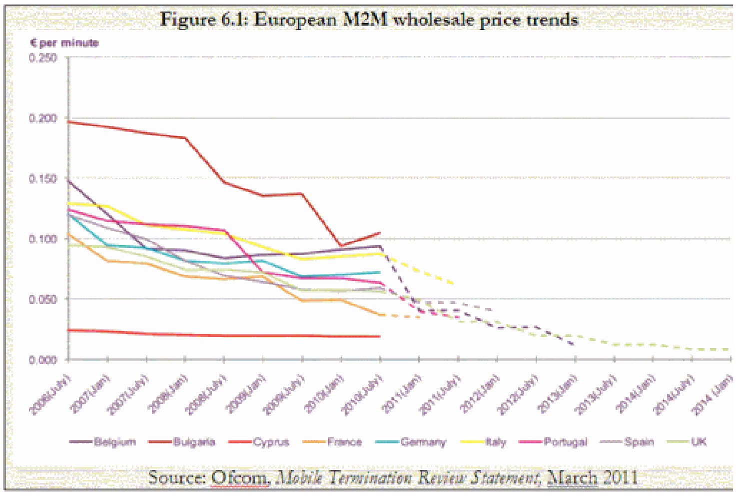


Kenya does not have a large fixed network; and what it has is losing customers. At December 2010, there were just under 0.4 million fixed lines (of which, over half were fixed wireless) and 25 million mobile subscribers.

In 2008 mobile termination rates in Europe ranged from 2 eurocents per minute in Cyprus to 8 eurocents in Germany, over 10 eurocents per minute in Greece and almost 16 eurocents in Bulgaria. This fragmented price regulation was seen as a serious risk to creating a single borderless market for telecoms services in Europe and a real threat to Europe's competitiveness. As a result of an agreement in May 2009 on regulatory treatment of termination rates, they are required to fall to 'pure' [*] **LRIC**. This is expected to result in rates between 1.5 and 3 eurocents by the end of 2012 [*].

◂ Figure 6.1 European M2M Wholesale Price Trends

Source: Ofcom, Mobile Termination Review Statement, March 2011



Practice Notes

- Two-Sided Markets

Reference Documents

- ACCC Inquiry to make a final access determination for the Domestic Mobile Terminating Access Service (MTAS), 7 December 2011
- Namibia: Interconnection Benchmarking Study, Final Public Report
- Namibian Telecommunication Sector Performance Review, 2010
- Ofcom, Mobile Call Termination Statement, March 27, 2007
- Ofcom, Mobile Termination Review Statement, March 15 2011
- South Africa- The case for the regulation of call termination in South Africa: an Economic Evaluation.

2.6.5 ROAMING

Roaming can be domestic or international. Operators normally pay a wholesale roaming charge (usually a charge per minute of use) in order to let their customers make or receive calls on another mobile network. Operators pass these roaming charges along to their customers with a mark-up.

In the case of domestic roaming, a new entrant will seek arrangements with other operators to extend coverage to its customers into areas where it has no network. Since coverage can be an important differentiator between mobile networks, this is an arrangement that may not appeal to larger mobile networks*.

National roaming is generally simpler and less costly to manage than active infrastructure sharing. But national roaming may lead to a greater degree of uniformity among operators' retail offerings. The roaming operator must rely on the choices made by the 'visited' operator running the network in that area. In addition, price competition may be restricted, since the retail tariffs charged by the roaming operator will be based, to a large extent, on the wholesale charges paid to the visited operator.

In 2002, T-Mobile and O2 notified the European Commission (EC) that they wished to allow roaming between their respective 3G networks in Germany. The EC argued that national roaming restricted competition because of its effect on coverage, roll-out, prices, and quality of service, especially in urban areas where there were good opportunities for the roll-out of competitive networks.

O2 challenged this decision before the European Court of First Instance (Court), claiming that there was no restriction of competition, and that the EC analysis of the effect of the agreement on competition was flawed.

In 2006, the Court agreed that the EC had not properly assessed the extent to which the agreement was necessary for O2 to enter the market. It found that the EC analysis had no objective discussion of what the competition situation would have been in the absence of the agreement, which distorted the assessment of the actual and potential effects of the agreement on competition. Also, the EC's claim that national roaming restricts competition was based on general statements about roaming agreements, not on concrete evidence specific to the agreement for that market. The EC also failed to demonstrate that any price dependence between the parties limited the freedom of O2 to set its prices on the market.The Court considered that such a roaming agreement, rather than restricting competition between network operators, may actually increase competition by letting a small network operator (in this case O2) compete with a large one (in this case T-Mobile).

◂ Box 6.7: Roaming in Germany
Source: O2 (Germany) v. Commission

Despite the concern about greater uniformity among operators' retail offerings, roaming may be the only alternative to bring coverage to a certain area. Roaming can make services more available and more affordable in many areas.

France provides an example of using roaming to extend mobile coverage throughout a country, including its rural regions. In 2006 the French government launched a programme called 'programme zone blanche' ('dead zone programme') aimed at providing mobile coverage in rural zones where operators had no coverage. The intention was to provide mobile coverage to 99 per cent of the French population by the end of 2007, covering more than 3,000 rural communities in France. Coverage in these areas may be achieved either through site sharing or through roaming. ARCEP's 2010 Annual Report says 2G mobile coverage now stands at 99.9% of the population, which means there are virtually no more dead zones and fewer and fewer 'grey areas' where only a single operator is present.

◂ Box 6.8: Roaming for Universal Service in France
Source: ARCEP, Annual Report 2010

International roaming is a monopoly like **mobile terminating access (section 6.4)** but is more complicated because of the international dimension: national regulators generally have little or no control over bi-lateral agreements between mobile operators in different countries. Because these terminating rates are harder to regulate down, multi-country operators have an opportunity to generate 'club effects'. For example, in 2006 Celtel (Zain) introduced 'borderless roaming' across its customers in Kenya, Tanzania and Uganda so they did not have to pay roaming charges to make or receive calls and they had the ability to top up their calling credit in any country.

International roaming is an important issue for the European Community which is creating a borderless market. It wants to create a stand-alone market for **international roaming (section 6.5)** with wholesale terminating prices regulated to the average of mobile terminating rates across the EU. Mobile customers would then have the right to opt for independent roaming services without having to change their number. From July 2012, the prices of voice, SMS and data have been capped at the retail and wholesale level *.

Practice Notes

- **Mobile International Roaming among Arab Countries**
- **National Roaming**

Reference Documents

- **ARCEP, Annual Report 2010**
- **BEREC - Analysis of the European Commission's Proposal for a Regulation on Roaming, August 2011**
- **European Commission, Regulation of the European Parliament and of the Council on roaming on public mobile communications networks within the Union, COM(2011) 402 final**
- **O2 (Germany) v. Commission**

2.6.6 INFRASTRUCTURE SHARING

There are some benefits that apply to almost all forms of mobile network sharing *. Network-sharing agreements generally benefit operators and the general public from a cost perspective. Network sharing helps operators to attain more efficient coverage, since operators may choose to use only those sites that provide deeper and better coverage, decommissioning sites with poor coverage possibilities. Operators can then reinvest those savings in upgrading their networks and providing better coverage and services to end users.

Passive infrastructure * sharing is usually encouraged. Wireless communication masts and antennas can be unsightly and local communities may object to the construction of new sites because of the visual impact or because of the fear of public exposure to electromagnetic fields around masts and antennas. Site sharing can limit such concerns * and potential negative effects. Another beneficial aspect of site sharing is the amount of energy that can be saved when operators share electrical power, which is often in limited supply in developing countries.

Site sharing can also speed up network deployment and make it less expensive. In the European Union, for example, 2G networks were deployed in the 900 megahertz (MHz) spectrum band, while 3G licenses were assigned in the 1900-2100 MHz band. Because spectrum generally has a shorter range at higher frequencies, 3G networks require more base stations (and therefore more sites) – a significant transition expense for 2G operators. However, if those 2G operators can co-locate 3G equipment on each other's existing 2G towers, they can enjoy significant savings as a result.

Active mobile infrastructure * sharing may not be permitted under the licensing regimes of some countries. This is the case in India, for example, where the licensing regime for mobile telecommunications does not permit active sharing. Other regulatory agencies may allow active sharing only with strict conditions, in the belief that competing operators should utilize their own infrastructure independently.

"Network sharing could also have undesirable consequences for competition. For example, [mobile network operators] *could collaborate on network development and gain information about each other's costs and plans, which may have a chilling effect on competition in the retail market. Dynamic efficiency may also be lower with fewer networks able to provide high quality mobile broadband services. End-to-end competition, i.e. at both the network and service level, could lead to greater innovation, which could bring significant benefits for consumers. We note that the competition concerns would be amplified if the 900 MHz operators were themselves to decide to share a single UMTS 900 network in response to the actions of their competitors. While it is difficult to quantify the potential impact of these effects, Ofcom's initial view is that there is a significant risk that both competitive intensity and innovation in mobile broadband services would be weakened, with potentially serious impacts on consumer welfare."*

With the merger of **Orange and T-Mobile** (Box 2.10) as Everything Everywhere, the number of national mobile operators dropped from 5 to 4 (the others are Telefónica, Vodafone and H3G). To ensure that this number does not drop any further, Ofcom is proposing to structure spectrum auctions to guarantee 4 competing national networks.

Ofcom's second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues, 12 January 2012

◂ Box 6.9: Ofcom's concerns with infrastructure sharing

Sources: Ofcom, Application of spectrum liberalization and trading to the mobile sector, 20 September, 2007 and

Generally speaking, network sharing is a useful tool for regulators and policy makers who want to encourage network deployment in unserved or under-served areas. Several instruments can be used to promote network sharing. National roaming arrangements are probably the most simple and effective arrangements. While roaming leads to a certain level of uniformity among operators' offerings, this does not necessarily restrict competition significantly. National regulatory authorities that have anti-competitive concerns may allow network sharing for a limited period (for example, one or two years) in order to promote roll-out of initial phases of network deployment. After that, operators could be required to provide coverage using their own networks.

A more complex form of sharing is the mobile virtual network operator (MVNO). The types of MVNO range from resale to bulk buying:

- The resale end of the market buys the existing suite of products and services off the provider at a small discount and resells them under their own name. It is little more than a rebadging exercise and does nothing beyond raising the MVNO's profile in the mobile market segment.
- The true MVNOs buy minutes, texts and data in bulk and provides its own SIM card to its customers. The level of investment required by the true MVNO is much higher - they need to hire a product team and have billing capability for instance - but the rewards are also much greater. They get more control and they should get a better margin.

MVNOs first appeared in Denmark, Hong Kong, Finland and the UK and today exist in over 50 countries, including most of Europe, United States, Canada, Australia and parts of Asia, and account for approximately 10% of all mobile phone subscribers around the world.

Practice Notes

- **Infrastructure Sharing in India – An Imperative for Sustained Growth**
- **Mobile Sharing in the European Union**
- **MVNOs Classification and Marketing strategies**
- **Sharing Mobile Network Infrastructure in India**

Reference Documents

- **BEREC report on infrastructure and spectrum sharing in mobile/wireless networks, June 2011**
- **Botswana: Guidelines on Sharing Communications Infrastructure, January 2010**
- **GSR 2008 - Mobile Network Sharing,**
- **India -- TRAI's Recommendation on Infrastructure Sharing**
- **Malaysia: Guidelines on Regulatory Framework for 3G Mobile Virtual Network Operators, February 2005**
- **Ofcom, Application of spectrum liberalization and trading to the mobile sector (20 September, 2007)**
- **Ofcom, Second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues, 12 January 2012**

2.6.7 ENHANCING COMPETITION

While many markets can support mobile competition, regulation may be necessary to support the competitive process. Apart from stopping **anti-competitive conduct**, there are some regulatory initiatives which could support a more competitive mobiles market.

With digitisation regulators will come under pressure to protect mobile operators from **'over-the-top'** applications that reduce the voice and text revenues that are significant for mobiles. However, mobile operators should be encouraged to adapt their business models to accommodate competition (see **Box 2.10**). These applications will make regulatory initiatives like mandated call selection redundant [*].

A regulatory instrument that has been used extensively to promote competition in mobiles is mobile number portability (MNP). European Law treats number portability as a human right under the EU Universal Service Directive that has applied since July 2003. But in other countries, especially smaller developing countries, the benefits and costs of implementing number portability should be considered carefully. The technical options employed in large markets for MNP may be too costly for small countries and they will be overtaken by technological changes which will change how we think about numbering and customer switching.

Box 6.10: Bahrain and MNP

Source: http://www.tra.org.bh/en/pdf/NP_LaunchPressReleaseEnglish.pdf

The Telecommunications Regulatory Authority (TRA) got interested in mobile number portability in 2003 and decided to proceed in 2008 and implemented MNP in July 2011 (and fixed number portability in October 2011).

Mobile porting takes place within1-3 days for mobile with subscribers given a new SIM card. The maximum porting charges will be BHD 4 (about US$10).

The TRA, which is bearing the costs of the centralised system, is hoping that up to 20 per cent of mobile customers will exercise the MNP option.

The SIM card that links each customer to a mobile operator can also present a barrier to switching [*]. On some networks, the mobile phone is 'locked' so that specific carrier's SIM cards will work. This is more common in markets where mobile phones are heavily subsidised by the carriers, and the business model depends on the customer staying with the service provider for a minimum term (typically 12 or 24 months). Common examples are the GSM networks in the United States, Canada, Australia, the UK and Poland [*].

In countries where the phones are not subsidised (e.g. Italy, India and Belgium), all phones are unlocked. Where the phone is not locked to its SIM card, the users can easily switch networks by simply replacing the SIM card of one network with that of another while using only one phone. Customers may swap SIM cards to change an off-net call into an on-net call; or to access better international call rates on another operator.

Practice Notes

- **Mobiles: Customer Lock-In**

Reference Documents

- **Bahrain, A Cost-Benefit Analysis of Implementing Mobile Number Portability in Bahrain, February 2008**
- **Bahrain, Number Portability Specifications Consultation Report, March 2011**

2.7 REGULATING RETAIL PRICES

Before competition, price regulation was needed to correct monopolistic tendencies (i.e. restricting output and holding up prices) by the incumbent. This was usually done with rate of return regulation or with **price cap regulation** [*].

In the transition to competition, many countries kept some retail price controls to manage the price rebalancing that comes with the transition from monopoly to competition.

With competition, the regulatory focus shifts from regulating retail prices to access prices and maybe neither (e.g. if there is effective infrastructure competition); but not both. To protect competition, the regulator may still need to act to prevent anti-competitive conduct [*]. And, there may be cases where access price regulation alone is not effective (e.g. **mobile termination** in CPNP countries).

This section reviews,

- **Policy Issues**
- **Key Concepts**
- **Price Caps**

2.7.1 POLICY ISSUES

Before the development of effective competition (e.g. state owned monopoly operators) the regulatory concern is that prices will be set substantially above cost so that the operator earns a monopoly level of profit. Wholesale prices are not relevant because there is no competition. With monopoly, the regulatory focus is on regulating retail prices to get the outcome one would expect if the market was competitive.

When regulating either access or retail prices (or both), regulators observe the principles of **economic efficiency** because that leads to the outcomes we expect in a competitive market.

But regulators are expected to target not only economic efficiency objectives but also politically determined social equity objectives which may include:

- Managing **tariff rebalancing:** An important outcome in the transition from monopoly to competition is the elimination of **cross-subsidies** through tariff rebalancing. Competition erodes cross-subsidies and incumbents would like to expedite this process by increasing unprofitable (subsidised) retail access prices in order to lower profitable long-distance call prices. But sudden tariff rebalancing is politically unacceptable. So, price caps, geographical averaging or other similar schemes may be introduced to manage the impact of the necessary rebalancing and to ensure that rebalancing does not undermine the affordability of telephone services.

Whatever the benefits from subsidizing access prices, economists agree that rebalancing tariffs can produce significant economic gains. Tariff rebalancing meets economic efficiency objectives and can improve social welfare by stimulating demand for services such as long distance calling. Rebalanced prices provide improved signals to actual and potential service providers to invest in network access technologies and improve incentives for competitors to compete for a broad range of customers.

- Maintaining geographically uniform prices: It costs more to provide services in rural areas than in urban areas but for political reasons it may be necessary to insist that customers pay the same in any area. This social policy presents a clear conflict with economic efficiency principles. Retail price regulations may require this policy to be observed by the incumbent. Regulators setting cost-based prices may be tempted to set de-average wholesale prices which would pose problems for the incumbent (see **Box 4.1**);
- Affordability: the traditional monopoly policy of cross-subsidising access from calls helped increase take-up of fixed services *. The fear that fixed services might become less affordable after tariff rebalancing has been mitigated by the rapid adoption of mobile services. Now the fear is that fixed broadband services may not be affordable after spending millions of dollars replacing copper with fibre.

Since cross-subsidy is no longer viable, policy-makers need to find other instruments to ensure affordability. These could include direct subsidies to disadvantaged users or to operators (after competitive tenders) to fund roll-out *.

Where there is competition, the regulatory focus is on **access pricing** leaving to market forces driving retail prices – with two exceptions.

- First, there may be some politically mandated pricing constraints, for the reasons just mentioned. The regulator should be given directions by policy-makers for pricing that supports social objectives. Otherwise, the regulator should be guided by economic efficiency principles.
- Second, the incumbent may seek to use its market position to frustrate competition. The ways in which this may occur and how the regulator can remedy such behaviour are discussed in the section on controlling anti-competitive conduct *.

Any other interventions to regulate retail specific prices are likely to distort markets.

◂ Box 7.1: Australia Forbears Regulating Pass-Through

Source: ACCC Inquiry to make a final access determination for the Domestic Mobile Terminating Access Service (MTAS) - Access Determination Explanatory Statement, 7 December 2011

In markets with large fixed networks, there is sometime pressure on regulators to ensure that reductions in mobile termination rates are passed through to reductions in the retail prices paid by fixed customers to call mobile networks. This pressure is resisted.

For example, the Australian regulator was asked to mandate such pass-through in its 'access determination' for mobile termination. It has refused because it limits how fixed operators use the savings to pass on benefits.

Worse, in the Australian context where the 'access determination' is only used to avoid disputes, the existence of a mandatory pass-through requirement may incent fixed and mobile operators to settle on mobile termination rates that are higher than the access determination because a commercial agreement means the pass-through mechanism is not triggered.

And, even if there is a pass-through requirement is triggered, it could be circumvented by fixed line operators raising the pricing of other fixed line bundled services.

Practice Notes

- **European Union: International Roaming in Member Countries**
- **Hong Kong: Price Regulation**
- **Tariff Structures and Rebalancing: ITU-D Study Group 1**

Reference Documents

- **ACCC Inquiry to make a final access determination for the Domestic Mobile Terminating Access Service (MTAS), 7 December 2011**

2.7.2 KEY CONCEPTS

Key concepts include:

Rate of return regulation: this involves the regulator agreeing an allowed rate of return on capital. This allowed profit is then added to agreed operating and capital cost projections to establish the revenue needs of the regulated business. Given a forecast for the volume of sales in the regulated period, it is then possible to establish the permitted prices. *

Price cap regulation: the regulated business is given a price cap regime (with or without consideration of the rate of return), which provides some level of incentives for operators to function efficiently and reduce costs.

Sliding-scale regulation: Commonly under this method a price cap is set but if a firm's profits exceed a given level then the firm is expected to cut prices to consumers with immediate effect.

Tariff rebalancing seeks to increase access prices, and reduce prices for services that have traditionally subsidized low access prices. The objective is to ensure that the price for each service reflects the underlying cost of providing that service.

2.7.3 PRICE CAPS

Many approaches have been developed to regulate prices. Price cap is one of the most widely accepted ways of price regulation. It was designed as an answer to weaknesses in the rate of return regulation.

The UK was the first country to introduce price-cap retail price regulation and the first country to remove them. In narrowband (voice telephony), the introduction of suitable wholesale products, such as wholesale line rental (WLR), allowed Ofcom to abolish retail price controls in 2006 and remove ex ante retail price regulation altogether in 2009.

Price cap regulation is sometimes called RPI-x regulation. It allows the operator to change its weighted average price level by the change in the retail price index (RPI) less a productivity factor (x). Sometimes, a price cap regime allows for exogenous price shocks (z) to be passed-on so the formula for the change in the price of the basket (P) is then,

$P = RPI - x + z$ where these are all per cent changes

This is also known as incentive regulation because if the operator achieves greater efficiencies than required by x, it can retain the difference as increased profits. If it makes greater price cuts than are necessary to meet the formula in any year, it may be allowed to credit the surplus against changes required in the next period. This has been the case in Australia where retail price controls were first introduced in 1989.

The details of the price cap change have changed between the many price control periods in Australia. But, the basic system with its control over the level of tariffs and the amount of tariff rebalancing is still intact until June 2012.

There is no overall basket but four separate baskets of services. The first basket of services consists of local calls, trunk (national long-distance and fixed-to-mobile) calls, international calls and line rentals. The second basket consists of Telstra's most basic line rental product offered to residential customers. The third basket consists of Telstra's most basic line rental product supplied to business customers and charity customers. The fourth basket consists of connection services.

The services in the first basket are subject to competitive pressure and x is set at the change in the RPI (CPI in Australia) so the weighted average of all services in the basket must not increase in nominal terms. In fact, in the year to June 2010 they fell 0.9 per cent overall (and just over 10 per cent for international calls). Tother with an unused credit from the previous year of 2.9 the carry forward credit was 3.7 per cent. Carry-forward credits have been abolished but this has been off-set by reducing x from RP to zero.

The remaining three baskets remain subject to a zero x and all saw actual price changes larger than RPI funded by unused credits brought forward from the previous year. However, the remaining carry-out credits have been abolished.

The current regime will expire in June 2012.

◂ Box 7.2: RPI-x in Australia

Sources: ACCC Telstra's compliance with the price control arrangements: 1 July 2009 to 30 June 2010

Price caps can be complicated to administer and simpler variants such as revenue caps are worth considering.

Practice Notes

- Barbados: Price Cap Decision
- Hong Kong: Price Regulation

Reference Documents

- ACCC Methodology for administration of the Telstra carrier charges price control arrangements, October 2010
- ACCC Review of Telstra's price control arrangements, March 2010
- ACCC Telstra's compliance with the price control arrangements: 1 July 2009 to 30 June 2010

Next: 3 Authorization of Services ➡

3 Authorization of Services

Licensing Services to Reap the Benefits of Innovation

In an age of convergence and rapid innovation, a country?s authorization regime plays a critical role in determining whether it will reap the benefits of such advances or be left behind. Module 3 presents an overview of various licensing regimes and is intended to assist regulators and regulated service providers in growing the market.

3.1 OVERVIEW OF ICT AUTHORIZATION

This section is an introduction to the module and provides information and guidance on licensing issues faced by regulators and regulated service providers in the ICT sector.

3.1.1 INTRODUCTION TO LICENSING & AUTHORIZATION

Traditionally, in many parts of the world, a licence was issued to authorize a person to provide telecommunications services or to operate telecommunications facilities. Such licences generally described key rights and obligations of licensees and often defined conditions relating to the provision of services. These licences also tended to be service-specific and technology-specific. A licensee was authorized to provide a particular type of service over a specific type of network. Alternatively, a licensee was authorized to operate specifically defined types of telecommunications facilities. A wide range of different licensing approaches has been adopted around the world.

Today the practice of issuing detailed individual licences to specific telecommunications, or ICT (to use the current terminology), service providers is gradually being replaced by general authorization regimes. However, the issuance of detailed individual licences remains common in developing economies. Moreover, issuing detailed individual authorizations remains the norm for authorizing the use of radio spectrum where the demand for the use of a particular frequency band exceeds availability.

In general authorization regimes in developed economies, few, if any, conditions are included in a licence document issued to a specific service provider. Instead, regulatory conditions are generally established in rules or regulations that apply equally to all service providers of the same class (e.g. cellular mobile providers) or across the whole ICT industry. While general authorization regimes are most prevalent in developed economies, these regimes have also been adopted in a number of developing and transitional economies. In developing or transitional economies, where the regulatory framework governing the ICT sector is still maturing, it is common for general authorizations to contain a fairly detailed set of terms and conditions. There are thus different variants of general authorization regimes.

With increased liberalization, some regulators are removing all authorization requirements for some ICT services. These service markets are then open to entry by any new service providers, without restriction. Open entry regimes are generally found only in countries with a highly developed, competitive ICT sector and a robust set of institutions that can safeguard consumer interests and protect against anti-competitive conduct.

There has also been a movement away from the issuance of service and technology-specific authorizations. In light of rapid technological development and service innovations, countries are increasingly moving towards the adoption of multi-service and neutral or “unified” authorization frameworks. These frameworks feature authorizations that are service and/or technology neutral, allowing licensees to offer a range of services under the umbrella of a single authorization, using any type of communications infrastructure and technology capable of delivering the desired services. There are a range of different approaches to multi-service and unified licensing around the world.

There are significant differences in the authorization practices in force in different countries. At one end of the spectrum are wide-open authorization regimes, where no form of governmental approval is required to start an ICT service business or to operate network facilities. At the other end are individual licensing regimes with lengthy authorization documents customized to the circumstances of a specific service provider. In between are many forms of general authorization or “class licences” that authorize and provide generally applicable regulatory conditions for classes of ICT service providers.

This module uses the term ‘authorization’ to refer to all forms of licensing, permission or approval required from telecommunication or ICT regulatory authorities to carry on business as an ICT service provider. In light of technological advances and the wide range of services now available, this module also uses the term “info-communications technology” or “ICT” rather than “telecommunications” in most cases.

This module discusses authorization issues faced by regulators and regulated service providers. The module focuses on recent trends in authorization. Many of the trends and practices described in this module illustrate reforms and innovations that improve the efficiency of the authorization process and enhance the economic and social benefits of authorizing the provision of new and existing ICT services.

Issues related to authorizing the use of radio spectrum are discussed in Module 5, Radio Spectrum Management. Matters related to the authorization of rural and universal access services will be dealt with in Module 4, Universal Access.

RELATED INFORMATION

Authorization Trends

Advantages of General Authorizations

3.1.1.1 AUTHORIZATION TERMINOLOGY

In some countries, authorization to provide ICT services is established in laws or regulations. In other countries, it is provided in documents variously referred to as licences, authorizations, permits, concessions, franchises, or simply regulatory decisions.

The terms “authorization”, “concession”, “franchise” and “permit” may be defined in different ways in the laws of different countries. For example, some countries maintain an older approach of entering into mutually binding concession or franchise agreements that specify the rights and obligations of the government authority as well as the ICT service provider. However, all these terms relate to the same basic concept of “authorizing” ICT service providers or networks. In the context of ICT regulation, these terms generally refer to a legal document issued by a regulator or other government authority that determines the rights and obligations of an ICT service provider. For the sake of simplicity, in this module, we generally only use the term “authorization”. In most cases, what is said about authorizations applies equally to concessions, franchises, permits, licences, and other forms of authorization.

The process of authorization is sometimes handled by independent ICT regulators and sometimes directly by governments, Ministers or other authorization authorities. In this module, we generally refer to the authorization authority as the “regulator”. This term is usually intended to include other government authorities that grant licences or other forms of ICT authorizations.

RELATED INFORMATION

Public-Private Partnerships, Concessions and Similar Arrangements

3.1.1.2 ITU TRENDS IN TELECOMMUNICATION REFORM

As indicated on this Toolkit web site, the Telecommunications Development Bureau (BDT) of the International Telecommunication Union (ITU) is a partner in the development of the ICT Toolkit. The ITU, headquartered in Geneva, Switzerland, is an international organization within the United Nations System where governments and the private sector coordinate global telecommunications/ICT networks and services. The ITU is also the leading publisher of information about telecommunication/ICT technology, regulation, and standards. Many publications can be purchased through the Electronic Bookshop or the ITU Publications Online subscription service.

This Toolkit module on Authorization of ICT Services was developed in collaboration with the ITU as it prepared its annual publication “Trends in Telecommunications Reform – 2004/05: Licensing in an Era of Convergence”. The issues canvassed in this Trends Report on licensing are very closely related to those dealt with in this module. Accordingly, many of the Reference Documents and Practice Notes in this module are based on that Trends Report. Citations to this Trends Report are indicated in the relevant documents.

The Licensing Trends Report would be very useful to those interested in developing a broader understanding of ICT authorization practices around the world. The report includes the following chapters:

1. Developments in the ICT Sector2. Why Licence?3. Options for Telecommunications Licensing4. Licence Fees Practices: Historical Perspectives and New Trends5. Licensing Approaches in an Era of Convergence6. Convergence and Spectrum Licensing 7. Transitioning Regulation from Old to New8. A New Era in Licensing.

The Report also contains appendices and tables summarizing the ITU’s annual regulatory survey of regulators around the world, a Glossary of Terms, and links to licensing resources and examples.

A full copy of the Report can be obtained at **http://www.itu.int/ITU-D/treg/** under the link "Publications".

3.1.2 AUTHORIZATION TRENDS

3.1.2.1 MORE ON AUTHORIZATION TRENDS

This section provides further information on a subject introduced earlier in the module, namely trends in authorization of ICT services.

The concept of licensing telecommunications services is relatively new. In the 1970s and early 1980s, there were relatively few private sector telecommunications service providers outside of North America. A number of other countries had private sector service providers during the early years of the telephone era, but subsequently nationalized them, sometimes during the period following independence from colonial rule. Consequently, there is little history of licensing telecommunications in most countries until the last two decades of the 20th century.

Prior to the 1980s, telecommunications services in most of the world were provided by government departments or agencies, often referred to as PTTs (Post, Telephone and Telegraph Administrations). PTTs generally did not require 'authorizations' to operate. Instead, they were run as branches of government ministries, as autonomous state-owned commercial corporations, or somewhere in between.

By contrast, in North America, telecommunications services have been provided by private sector companies rather than PTTs, since Alexander Graham Bell invented the telephone at the close of the 19th Century, and caused the Bell telephone companies to be incorporated. In North America, however, authorizations were generally not important instruments of regulatory control.

When many North American telecommunications service providers became monopolies early in the 20th Century, government regulators were established to protect the public interest. The main objectives of early North American regulation focused on preventing perceived abuses of the service providers' monopoly position, such as charging excessive tariffs or engaging in practices that were considered to be unjustly discriminatory. Other objectives were aimed at enhancing the public interest in other ways, such as improving the quality of their service or establishing consumer-protection measures. Governments and regulators in North America gradually developed a detailed regulatory framework to achieve these objectives. However, since the service providers were already in business, this framework did not rely much on authorizations to create new rules. Instead, service providers were regulated through laws, regulations, regulatory and judicial decisions, orders and other legal instruments.

The processes of liberalization and privatization that began in the mid-1980s significantly increased the importance of authorization in telecommunications regulation. New entrants in telecommunications markets were usually granted an 'authorization', licence, concession, permit or other form of documentary authorization. In many cases, authorizations were also prepared for incumbent service providers, often as part of their privatization process. By specifying the rights and obligations of such service providers, investors were provided with greater certainty relating to the business in which they were investing. Well drafted authorizations provided all stakeholders, including consumers, competitors, governments and regulators with a clear understanding of the service provider's rights and obligations. Armed with an authorization, the investors of the new entrants could go to their banks or other financial backers, with business plans that provided reasonable projections of revenues, expenses and profitability. Thus, clear authorizations became an essential tool for the financing of new telecommunications services and of privatizations in many telecommunications markets.

When regulators first began to issue authorizations to new private sector entrants and to PTTs, it became the practice in most countries to issue detailed individual authorizations. In many cases, the telecommunications regulatory framework had not yet been fully adapted to the conditions of a privatized or competitive market. Regulators therefore developed authorizations that set out the regulatory terms and conditions governing the conduct of the licensees in order to fill the regulatory gap.

A good example of this approach can be found in the British Telecom (BT) authorization, which was issued at the time of BT's privatization in 1984. At that time, the concept of telecommunications regulation was relatively new in the UK. Unlike North America, there was no existing telecommunications regulatory framework in the UK. Therefore, the BT authorization was prepared as a largely self-contained regulatory code. It was a lengthy document, and it governed most aspects of the regulation and operations of BT. It granted a variety of exclusivity rights, such as a limited monopoly for basic voice services and limitations on simple resale, and dealt with a plethora of other rights, obligations and regulatory conditions. Similarly, the authorization for Mercury, the first fixed-link competitor in the UK, also contained a fairly comprehensive regulatory code.

A similar model was adopted in other European countries and elsewhere as incumbent service providers were privatized and new service providers were authorized. Many other countries issued detailed individual authorizations to both privatized PTT operators and to new private sector entrants. Today, detailed individual authorizations remain in place for service providers in many countries around the world.

Given the different regulatory tradition in North America, Canada and the USA never developed comprehensive authorizations that included detailed regulatory regimes. Instead, regulatory conditions typically continue to be contained in regulations, decisions, orders or tariffs made or approved by the regulator. It is interesting to note that when Canada belatedly implemented its first telecommunications licensing regime in 1998, to license international service providers, the regulator issued very short (2 page) authorizations that did not set out detailed individual conditions. Instead, most of the rules governing these authorizations are set out in regulatory decisions and other documents that apply generally to all service providers of the same type.

The liberalization of telecommunications markets (now commonly referred to as ICT markets) and the growth in competition in the sector have resulted in a move away from the issuance of detailed individual authorizations in developed economies. A new type of licensing framework has emerged: the general authorization regime. Moreover, technological innovation and fixed-mobile convergence have highlighted the need for flexibility and neutrality in licensing approaches. Several regulators have thus moved towards service- and technology-neutral forms of authorizations. To learn more above these more recent trends in authorization, please see section 1.2.2, “More on Authorization Trends: Recent Developments”. A link to this section is set out below.

RELATED INFORMATION

General Authorizations

Advantages of General Authorizations

Services Often Subject to General Authorizations or Open Entry

Practice Notes

- **Summary of EU Authorisation Directive**
- **Summary of the EU Framework Directive**

3.1.2.2 MORE ON AUTHORIZATION TRENDS: RECENT DEVELOPMENTS

Liberalization of the ICT sector and increased competition have led to new trends in authorization practices. In developed economies, as ICT markets were liberalized and as market participants proliferated, the appropriateness of individual authorizations was increasingly called into question. Policy makers and regulators started to move towards sector-wide regulatory tools to replace the customized regulatory provisions of individual authorizations.

Again, the British, who had perfected the art of drafting comprehensive ‘individual authorizations,’ took the lead. The British popularized the concept of a ‘class licence’ (or general authorization) which would apply to more than one service provider – in fact to all who provided the same type or ‘class’ of services.

The move away from the individual authorization approach and toward sector-wide regulation accelerated when the European Union established its new electronic communications regulatory framework, through the series of Directives and other documents that came into force 25 July 2003. This framework generally requires member countries (now 27) to discontinue individual authorization in favour of general authorizations. (See links below to the EU Framework Directive and the EU Authorization Directive).

Under the EU’s regulatory framework, regulators no longer grant individual authorizations. Instead, regulators issue general authorizations that permit anyone to run ‘electronic communications’ networks and to offer ‘electronic communications’ services, subject only to general conditions that are applicable to all similar service providers. More onerous conditions may only be imposed on service providers designated as having significant market power (SMP). In addition, the EU framework only permits regulators to limit the number of service providers in a market due to the limited availability of scarce resources, notably radio spectrum or telecommunications numbers.

The EU framework brings the EU closer in line with the traditional North American approach. As a result, there is a move towards less reliance on individual authorizations in the EU. Indeed, a number of EU member countries no longer require that service providers obtain any form of authorization to provide electronic communications services or to operate networks. Service providers are required only to provide the regulator with notification of the start and termination of the provision of services or the operation of a network. Exceptions to these open entry approaches to authorization exist, however, where service provider use the radio spectrum or numbering resources. All service providers are subject to similar regulatory conditions prescribed in sector-wide regulations (such as those required by the package of Directives and regulations that comprise the new EU framework).

A summary of how EU member countries are performing in implementing the electronic communications regulatory framework, including the Authorization Directive, and other information on EU members' regulatory performance and key market indicators can be found at:
http://ec.europa.eu/information_society/policy/ecomm/implementation_enforcement/index_en.htm.

A similar trend to sector-wide regulation is evident in other developed countries outside the EU and in some developing and transitional economies. There are a number of good reasons for the move to general authorizations and away from individual authorizations (see the link below to Advantages of General Authorizations). However, in countries where the ICT regulatory framework is still maturing and where competition in the sector is still developing, there is often good reason to continue to issue detailed individual authorizations or to attach detailed terms and conditions to general authorizations. Many regulators and policy makers in developing and transitional economies thus continue to employ individual authorizations or, where a general authorization regime has been adopted, to impose detailed terms and conditions on licensees.

Detailed individual authorizations also continue to be issued in many countries where the use of scarce resources is necessary to provide the licensed services (e.g. cellular telecommunications services). Individual authorizations remain quite common for major facilities-based service providers, particularly incumbent service providers that provide basic voice telecommunications services. Finally, individual authorizations remain the norm for authorizations to use the radio spectrum where the demand for the use of a particular radio frequency band exceeds availability.

Another recent trend that has shaped the nature of authorizations in the ICT sector relates to the range of new services available to consumers. Twenty years ago, consumers in developed economies were beginning to enjoy cellular mobile services. Today, services extend far beyond basic mobile and fixed voice telephony. The range of services available to consumers now includes or will soon include mobile data services, Internet services, mobile Internet services, and even IPTV. The emergence of "triple play" (voice, Internet access, and video) and "quadruple play" (voice, Internet access, and video services available over broadband mobile networks) service packages illustrates the breadth of new services available to consumers, as well as the erosion of traditional distinctions between carriage and content service providers.

A need for greater flexibility and neutrality in licensing has arisen in light of the speed of technological innovation, consumer demand, the blurring of content and carriage services, and fixed-mobile convergence. The emergence of Next Generation Networks (NGNs) has underlined the importance of flexibility and neutrality in licensing. These trends have led to an important new development in licensing: the adoption of multi-service and unified authorization regimes.

Traditionally, authorizations permitted the provision of specific types of services, using a specific type of network and technological infrastructure. For example, until recently, regulators typically issued separate authorizations for data services, public fixed voice services, public mobile voice services, and private line services. A service provider active in all of these markets was required to obtain a separate authorization for each type of service. However, in light of the aforementioned recent trends and the need for flexibility and neutrality in licensing, regulators have increasingly begun to revisit service-specific and technology-specific approaches to licensing. Multi-service and unified authorization regimes have arisen as a result.

Multi-service and unified authorization regimes feature authorizations that are service and/or technology neutral, allowing licensees to offer a range of services under the umbrella of a single authorization, using any type of communications infrastructure and technology capable of delivering the desired services. Multi-service and unified authorizations offer licensees significant flexibility to develop the most efficient and valuable forms of service offerings. Multi-service and unified authorization regimes are currently in place or are being implemented in a range of developed, developing, and transitional economies. There are a range of different approaches to multi-service and unified authorizations around the world. These approaches are discussed in greater detail in Part 8 of this Module.

In countries that have liberalized their ICT market and adopted a unified licensing approach, administrative procedures to enter the market have also been simplified and made more flexible. Unified and multi-service licensing regimes often feature general authorizations and do not require applicants to go through a competitive selection process in order to obtain an authorization. In many cases, applicants may obtain an authorization if they demonstrate that they meet certain criteria for licensing. These criteria frequently resemble criteria used in competitive selection processes (e.g., financial stability; viable business plan; and technical competence), however. Thus, the review of applications for unified and multi-service authorizations often involves close regulatory scrutiny, particularly in developing and transitional economies. Moreover, unified and multi-service authorizations sometimes include a detailed set of terms and conditions, even when they are issued within a general authorization framework. This is especially true in developing and transitional economies, where competition is still growing and where the regulatory regime may still be maturing.

3.1.3 AUTHORIZATION OBJECTIVES AND POLICIES

The development and implementation of authorization policies is one of the most important steps in reforming the ICT sector. Authorization policies determine the structure and level of competition in ICT markets and, ultimately, the efficiency of the supply of ICT services to the public.

Historically, many countries developed authorization policies on an *ad hoc* basis. Frequently, policies were only developed when specific decisions were made to authorize additional service providers. However, as the global regulatory experience evolved, an increasing number of countries adopted explicit authorization policies. Many countries developed policies based on the experience of regulatory reform and telecom market liberalization in other countries. In developing and transitional markets, authorization policies often provide for (1) immediate opening of peripheral telecom markets to competition, and (2) phased opening of voice telephony and related 'core' markets.

Clearly stated telecom policies remove uncertainty and regulatory risk for service providers and their investors. However, regulation is an art, not a mathematical science, and it is neither possible nor desirable to attempt to prescribe detailed policies for all situations that may arise. ICT markets and technologies are too dynamic to permit that. An ideal ICT policy should establish the main objectives and approaches of government policy and deal with major issues of national concern to service providers and investors. However, the more detailed provisions are better left to subsidiary legislation or regulatory rules which can be amended to meet evolving market conditions.

Practice Notes

- Authorization Policies

Reference Documents

- Pakistan- Authorization Policy

3.1.3.1 COMMON AUTHORIZATION OBJECTIVES

This section provides further information on authorization objectives, a subject that was introduced earlier in the module. Governments and regulators have normally had a range of reasons or objectives for authorization ICT service providers. Some common authorization objectives are set out below:

(i) Privatization or Commercialization – An authorization is usually necessary where a state-owned incumbent (a PTT) is privatized. It is a key document in the privatization process. The authorization specifies the rights and obligations of the service provider. It also specifies what the investor is buying and what the government expects from the service provider and the investor.

(ii) Expansion of Networks and Services and Other Universal Service Objectives – Authorizations are an important tool for expanding infrastructure investment and promoting universal service and universal access objectives in developing countries. Network roll-out and service coverage obligations are often included in authorizations. This is particularly the case where a PTT is privatized, or where some degree of exclusivity is granted (e.g. to a duopoly cellular licensee, with a right to use scarce spectrum). Universal service objectives are discussed in detail in Module 4, "Universal Access" in this Toolkit and in Module 6 (Universal Service) of the Telecommunications Regulation Handbook.

(iii) Regulating Provision of an Essential Public Service – Basic telephony is viewed as an essential public service in most countries. While there has been an irreversible trend toward privatization and reliance on market forces, most governments continue to impose some controls to ensure that basic voice services are provided in the public interest. Authorizations are an important tool for exercising such control in many countries.

(iv) Regulating Market Structure – A key element of authorization policy is the determination of the market structure of the ICT sector, and in particular, the number of service providers authorized to provide ICT services. In many countries a prime reason for authorizing new ICT service providers is to increase competition. Authorization of new service providers has made competition the dominant mode of supply in most ICT markets (e.g., cellular, ISP), though competition has not yet fully matured in some market segments, such as fixed voice telephone services. A major objective of the authorization process in many markets is to ensure the viability and benefits of new competitive entries. On the other hand, authorization requirements are also used to limit market access. This is the objective of authorization authorities in some countries where monopoly, duopoly or other exclusive rights have been granted for political or financial reasons. For example, governments in many countries have increased privatization proceeds to the government treasury by granting a newly privatized service provider monopoly rights for a fixed term of years. Monopoly supply arrangements generally reduce efficiency in ICT markets, and dampen economic growth in services that are dependent on ICT. However, many governments traditionally accepted these disadvantages in order to generate cash for purposes like national debt reduction. Today, however, it is becoming less common to grant monopoly rights, even to newly privatized service providers.

(v) Establishing a Competition Framework – In countries that do not have a well developed regulatory framework, authorizations may include conditions to establish a "level playing field" for competition, and to limit the prospect that incumbent service providers will abuse their dominant position in ICT markets. Such conditions are generally referred to in authorizations as "anti-competitive safeguards" or "fair trading conditions". (Examples of such conditions are discussed in greater detail in Module 2, Competition and Price Regulation of this Toolkit.

(vi) Allocation of Scarce Resources – Finite resources required in the operation of an ICT service (such as radio spectrum, numbers and rights of way) should be allocated between service providers fairly, efficiently and in the public interest. This allocation often requires a balancing of competing interests and priorities. Radio spectrum, for instance, may be auctioned to the highest bidder or allocated at low cost to reduce prices or to encourage the rollout of new services. Issues related to the authorization of spectrum are dealt with in greater detail in Module 5, Radio Spectrum Management of this Toolkit.

(vii) Generating Government Revenues – In many countries, the authorization of ICT service providers and of radio spectrum has provided significant revenues to governments. An auction for new authorizations can generate high one-time revenues. In addition, annual authorization fees often provide a continuing source of revenue to fund the operations of the regulator, or for other purposes. Issues related to authorization fees are dealt with later in this module. In addition, authorization of new service providers can increase the size of ICT markets and generate higher tax revenues for governments.

(viii) Consumer Protection – In some countries, conditions relating to consumer protection are included in ICT authorizations. This is particularly true in countries that did not have a well-developed regulatory framework to deal with such issues. However, the better practice is to have consumer protection provisions included in rules of general application to the industry or to certain classes of service providers.

(ix) Regulatory Certainty – Regulatory certainty is a critical element of the authorization processes where the aim is to attract new service providers and investment. This is particularly true in cases where foreign investment is sought in developing or transitional economies struggling with political and/or financial instability. By clearly defining the rights and obligations of the service provider and the regulator, an authorization can significantly increase confidence in the regulatory regime.

(x) Facilitating the Development of Next Generation Networks – Facilitating the emergence of Next Generation Networks (NGNs) has become an increasingly important authorization objective. In order to reap the full economic and social benefits of technological innovations, regulators and policy makers have become highly attuned to structuring a regulatory environment conducive to the development of NGNs. Measures taken in regards to this objective include, for example, the adoption of technology-neutral and service-neutral authorizations, permitting infrastructure sharing, and allocating spectrum to service providers without restricting the services for which such allocations may be used. Thus, this objective has required regulators and policy makers to reconsider the very nature of authorizations and their terms and conditions. NGNs and authorization practices and trends related to the emergence of NGNs are discussed in greater detail in section 8 of this Module.

Practice Notes

- **Authorization Policies**

Reference Documents

- **Pakistan- Authorization Policy**

3.1.4 INTERNATIONAL TRADE RULES

In recent years, ICT services have played a larger role in international trade agreements, both at the multilateral and regional level. The World Trade Organization (WTO) and its predecessors have promoted liberalization of trade in ICT services. The General Agreement on Trade in Services (GATS) and the 1997 WTO Agreement on Basic Telecommunications (ABT) both include specific rules that apply to telecommunication and ICT regulation and authorization. As a result, new signatories to the ABT, as well as countries wishing to join the WTO, must bring their regulatory and authorization practices into compliance with WTO trade rules.

The trade rules most relevant to the authorization process are summarized in sections 1.4.1, 1.4.2, and 1.4.3. Links to these sections are set out below. Other WTO rules relating to telecommunications services are dealt with in other modules of this Toolkit. See, for example, Module 2, Competition and Price Regulation and Module 4, Universal Access. Links to these modules are set out below. The central theme of these rules is the evolution towards more open competitive markets and transparent authorization processes.

Reference Documents

- World Trade Organization - Reference Paper

3.1.4.1 KEY GATS AUTHORIZATION OBLIGATIONS

This section provides further information on a subject introduced earlier in the module, namely the WTO approach to authorization of telecommunications services. All WTO member states are bound by the "general obligations and disciplines" of the *General Agreement on Trade in Services* (GATS). There are three Articles of the GATS are directly applicable to the authorization process:

- **Most Favoured Nation (MFN) Treatment** *(GATS Article II)* – An authorization regime must grant market access to service providers from a WTO member country on terms "no less favourable" than the terms applicable to service providers from "any other country".
- **Transparency** *(GATS Article III)* – All laws and rules affecting trade in services must be published. The Telecommunications Annex to the GATS specifically requires publication of, among other things, all notification, registration or authorization requirements, if any, as well as any other forms of recognition and approval (e.g. type approval of terminal equipment) needed before foreign service suppliers can lawfully do business in a member country.
- **Barriers to Trade** *(GATS Article VI)* – Authorization requirements must not "constitute unnecessary barriers to trade".

RELATED INFORMATION

Specific WTO Telecom Sector Commitments

Reference Documents

- World Trade Organization - Reference Paper

3.1.4.2 SPECIFIC WTO TELECOM SECTOR COMMITMENTS

This section provides further information about the WTO rules applicable to the authorization of telecommunication services, a subject introduced earlier in this module.

In addition to the general Articles of the *General Agreement on Trade in Services* (GATS), the schedules to the GATS contain additional trade commitments by individual member countries concerning specific services, including basic telecommunications services. As part of the 1997 *Agreement on Basic Telecommunications*, 69 developed and developing countries, representing more than 90 percent of the global telecommunications markets, filed national schedules of commitments to liberalize or maintain open telecommunications markets. As part of their schedules of commitments, most of these countries agreed to adhere to certain telecommunications regulatory practices set out in the *WTO Regulation Reference Paper* (the "Reference Paper"). Since then, other WTO signatories have filed schedules of commitments governing trade in the telecommunications sector, which generally included a commitment to adhere to the Reference Paper. As of February 2008, 107 WTO members have made commitments to open some or all segments of their telecommunications markets to foreign suppliers, and 80 members have committed themselves to the Reference Paper. The Reference Paper has had a major impact on the reform of telecommunications regulation, including authorization practice reform, in many countries.

RELATED INFORMATION

WTO Regulation Reference Paper: Key Authorization Rules

Reference Documents

- World Trade Organization - Reference Paper

3.1.4.3 WTO REGULATION REFERENCE PAPER: KEY AUTHORIZATION RULES

This section provides further information on a subject introduced earlier in this module, namely the WTO approach to the authorization of telecommunications services. The *WTO Regulation Reference Paper* contains two rules that specifically relate to the authorization process:

- **Article 4** sets out commitments relating to the public availability of authorization criteria. It provides that where an authorization is required, the following must be made publicly available: all of the authorization criteria and the period of time normally required to reach a decision concerning an application for authorization, and the terms and conditions of individual authorizations. The article also provides that the reasons for the denial of an authorization must be made known to the applicant upon request.
- **Article 6** outlines the requirements governing the allocation and use of scarce resources. It provides that "[a]ny procedures for the allocation and use of scarce resources, including frequencies, numbers and rights of way, will be carried out in an objective, timely, transparent and non-discriminatory manner." The article further provides that the current state of allocated frequency bands must be made publicly available, although detailed identification of frequencies allocated for specific government uses is not required.

3.1.5 WHO AUTHORIZES TELECOMMUNICATIONS SERVICES?

Today, authorizations are usually issued and administered by telecommunication or ICT regulatory authorities. However, until recently, Ministers or Ministries responsible for the ICT sector played a much more prominent role in licensing. They continue to do so in quite a few countries. However, the trend is clearly toward separation of licensing from the political process. ICT authorization responsibilities are increasingly carried out by independent professional regulators, who are expected to use objective criteria and transparent processes for the authorization of ICT services.

As part of the ITU's 2007 regulatory survey, information was gathered on the allocation of authorization responsibility in 140 countries. In over three-quarters of those countries (110), it was reported that the national telecommunications regulatory authority (NRA) was responsible in whole or in part for licensing. In 25 countries, the NRA shared authorization responsibility with the Ministry. This occurs, for example, in countries like St. Lucia, where the NRA reviews applications and advises the Minister, who then issues authorizations. Another example is Canada where the few authorization functions are split between the NRA (international authorizations) and the Minister (radio spectrum authorizations).

According to the 2007 ITU survey, the Ministry alone was responsible for authorization in 23 countries of the 140 countries. A total of 31 other agencies from various countries also had responsibility, in whole or in part, for issuing authorizations. These entities included the President (Suriname), the Congress (Costa Rica) and multi-sector authorization authorities (Seychelles).

3.1.5.1 WHO AUTHORIZES TELECOM SERVICES?

Notes:

1. There is some duplication due to overlapping responsibilities.
2. Includes general authorization agencies, President, Congress, etc.
3. "NRA & Minister" implies that both the NRA and the Minister have some responsibilities for ICT authorizations, but does not exclude the possibility that another agency may share this responsibility.
4. Data are based on responses to the ITU's 2007 Telecommunication Regulatory Survey.

Region	Countries Reporting	NRA Alone or Shared	NRA & Ministry	Ministry Alone	Other Authority
Africa	34	29	9	4	4
Americas	26	19	7	5	11
Asia Pacific	24	16	4	6	2
Arab States	15	11	2	4	2
Europe & CIS	41	35	3	4	12
Total World	140	110	25	23	31

◂ **Table Who Authorizes ICT Services? / Who is Responsible for ICT Authorization?**

Source: ITU World Telecommunication Regulatory Database, 2007

3.1.6 TYPES OF AUTHORIZATION REGIMES

Just as there are different types of authorization authorities in different countries, different types of authorization regimes have been adopted. Again, with the sharing of global experience, there has been a convergence in the types of authorization regimes adopted in various countries. Today, the approaches to authorizing ICT service providers and services can be divided into three main categories:

1. Individual authorizations;

2. General authorizations; and

3. Open entry – i.e. no authorization requirement.

As discussed throughout this module, there is a clear trend toward the use of general authorizations and open entry regimes in developed economies, consistent with the general liberalization and convergence of ICT markets. However, individual authorizations continue to be in place in a large number of countries, particularly in developing and transitional economies. Moreover, individual authorizations are used to license the use of radio spectrum when the demand for use of a particular band of radio frequency exceeds availability. Accordingly, issues related to individual licences are also discussed in detail in this module.

RELATED INFORMATION

General Authorizations

Individual Licences

3.1.6.1 MAIN TYPES OF AUTHORIZATION REGIMES

Types of Authorization Requirement	Main Features	Examples
		Frequently used for:
Individual Authorizations	issued to a single named service provider	basic PSTN services
	usually a customized authorization document	in a monopoly market
	often contains detailed conditions	in countries where the regulatory regime is still maturing
	frequently granted through some from of competitive selection process	mobile wireless services
	Useful where:	services using scarce spectrum resources
	a scarce resource or exclusive right is to be authorized (e.g. spectrum), and/or	
	the regulator has a significant interest in ensuring that the service is provided in a particular manner (e.g. where the service provider has significant market power)	
		Have been used for:
General Authorizations	useful where individual authorizations are not justified, and where significant regulatory objectives can be achieved by establishing general conditions	data transmission services
(Class Licenses)	normally set out basic rights and obligations, and regulatory provisions of general application to the class of services authorized	resale services
	normally issued without a competitive selection process; all qualified entities are usually authorized to provide service or operate facilities	international services
		VSATs
		private networks
		All data and voice services in markets with robust competition, except services requiring the use of scarce resources such as radio spectrum and numbering resources
		Have been used for:
Open Entry	no authorization process or qualification	Internet service providers (ISPs)
(Services may be provided without an authorization)	no requirements, beyond rules generally applicable to the ICT sector	Value-added services
	registration requirements or other rules of general application are sometimes imposed by regulation	All data and voice services in markets with robust competition, except services requiring the use of scarce resources such as radio spectrum and numbering resources

Table 3.1 Main Types of Authorization Regimes
Source: ITU

These three types of authorization regimes provide a useful reference point for considering different authorization requirements around the world. However, national authorization approaches do vary considerably. For example, as previously noted, the North American situation is quite different from the rest of the world. There have generally been no authorization requirements for ICT service providers or services in

North America. The exceptions to this rule are spectrum authorizations, FCC Section 214 facilities certifications, CRTC basic international telecommunications service authorizations, and public convenience and necessity certificates which were required to construct ICT facilities in some US states and Canadian provinces.

Examples of various types of authorization regimes are discussed in this module. The practice notes linked below provide a good range of examples of different approaches. The reference documents attached to these practice notes are also useful resources in reviewing different types of authorization regimes. .

RELATED INFORMATION

General Authorizations

Individual Licences

Practice Notes

- Greece: The General Authorization Licensing Process
- Japan- Registration or Notification
- The Australian Licensing Process
- The Botswana Licensing Process
- The Jamaican Licensing Process
- The New UK Licensing Process

3.1.7 THE LEGAL FRAMEWORK FOR AUTHORIZATION

The form of an authorization depends on the national legal regime. In most countries, authorizations comprise only one element of the regulatory framework. Other rules that govern service providers are included in ICT sector policies, laws, regulations, decrees, orders, decisions, guidelines, directions and other regulatory documents. The authorization trends section of this module described the trend in developed economies away from detailed individual authorizations and towards the development of regulations of general application to the ICT sector.

Two factors generally determine whether a service provider's rights and obligations are set out in an authorization or in other regulatory documents: requirements of local law and the level of development of the local regulatory framework. Due to differences in these requirements, the same rights and obligations that are dealt with in authorizations in some countries are addressed through general regulations in others.

Reference Documents

- Canada -- Telecom Circular 2003-1
- Canada -- Telecom Circular CRTC 2005-8
- Canada- Telecom Decision CRTC 98-17 "Regulatory Regime for the Provision of International Telecommunications Services"
- Canada- Telecommunications Act , 1993
- Singapore- Telecom (Class Licences) Regulations
- South Africa -- Electronic Communications Act Regulations
- South Africa -- Electronic Communications Act Regulations
- South Africa -- Electronic Communications Act Regulations on Processes and Procedures
- South Africa -- Electronic Communications Act, 2006
- Sri Lanka- Licensing Policy
- Tanzania -- The Communications (Licensing) Regulations, 2005

3.1.7.1 ADMINISTRATIVE AUTHORIZATIONS, AGREEMENTS AND CONCESSIONS

This section provides further information on a subject introduced earlier in this module, namely the legal framework for authorization.

The act of granting an authorization is treated in some countries as a unilateral administrative act of a government authority and in other countries as a form of mutually-negotiated agreement, concession or public-private partnership.

In most countries today, the grant of an ICT authorization is a unilateral act of the regulatory authority. The authorization is issued to one or more authorized service providers subject to the terms and conditions specified in the authorization or in the general ICT regulatory framework. In such a case, the grant of the authorization is a purely administrative act.

In other countries, an authorization can be included in a contract between the regulator and the service provider or network operator. This approach has been used where authorizations form part of a concession agreement or part of a public-private partnership (PPP) between a government organization and a private investor. Authorizations in this form generally set out the rights and obligations of both the government authority granting the authorization and the service provider. In the ICT sector, this "contractual" form of authorization is most common and useful in countries where the legal and regulatory framework is less developed. It is particularly useful in cases where there is a perception of high regulatory risk or political country risk which may, in the absence of a contract, deter ICT investment.

Whether authorizations are issued as a unilateral act of the regulator or as part of a contract or PPP, it is essential that the regulator or other governmental organization involved have the authority to issue the authorization or to enter into the related contract. In some countries, this authority is established in the legislation that created and empowered the regulator. In other countries, the legislation that governs the ICT sector may impose an obligation on the regulator to administer the authorization regime or, alternatively, may give the regulator the discretionary power to issue authorizations.

RELATED INFORMATION

Concessions and Licence AgreementsPublic-Private Partnerships

3.1.8 DEVELOPING MARKET ENTRY POLICIES

This section considers different approaches used to open markets through the authorization of new ICT services and networks. The authorization approach and process adopted by a country depends on national and regional sector policies, laws and market structure. Increasingly, the approach taken to licensing also depends on international trade rules, such as those established by the WTO.

Depending on the level of development of general ICT policies, the typical steps in designing a new authorization process might include:

- a review of market performance, including: measuring performance of existing service providers, considering existing legal exclusivity rights, studying demand for new services, benchmarking local market performance with similar economies and considering international authorization experience and trade commitments;
- development of a policy for authorization of new service providers, with options such as:
    - public-private partnerships (generally not advisable unless there are important policy, constitutional or legal restrictions on authorization of private sector service providers)
    - open market policies, with unrestricted market entry for all networks and services
    - phased market opening policies, which limit entry to some key markets (e.g. fixed voice, international gateways, etc.) in the early years, to increase authorization fees or network rollout obligations; and
    - open entry for other services to maximize economic benefits;
- development of a process for licensing new service providers (e.g. competitive auction, comparative evaluation, general authorization process);
- a public consultation on proposed new authorization policy and process, setting out considerations for existing service providers, new entrants, consumers and the national economy;
- development and approval of any necessary legal and regulatory amendments to implement a new authorization policy; and
- commencement of the authorization process (see sections in this module on general authorization regimes and competitive authorization processes, in addition to Module 5, Radio Spectrum Management).

This module includes authorization policies and other authorization documents that illustrate a range of approaches to implementing market entry policies. Some good examples are accessible through the links set out below.

RELATED INFORMATION

Public -Private Partnerships

Practice Notes

- **Hong Kong, China- Liberalization of Fixed Networks Consultation Document- 2001**

Reference Documents

- **Bahamas -- Electronic Communications Sector Policy, 2009**
- **Pakistan General Telecommunications Policy**
- **Pakistan- Authorization Policy**

3.1.8.1 DEFINING SERVICE AREAS

One important issue that is normally considered in designing a market entry policy relates to the definition of geographic service areas to be covered by new authorizations.

A variety of approaches have been taken to defining the service area for a new authorization. In some cases, national authorizations are issued. In others, separate authorizations are issued in different regions or for rural and urban markets. In some cases, national authorizations have been issued in parallel with competing regional authorizations for the same service. This is the case, for example, in Tanzania's Converged Licensing Framework, where authorizations are issued for the International, National, Regional, and District market segments.

There is no one right approach to designating service areas. However, some approaches are likely to be less successful than others. One approach that has experienced limited success in a number of countries is to preserve the profitable urban markets for a state-owned PTT, and to invite private sector service providers to serve only rural areas that are financially less viable. In some cases, the failure of the private sector service providers to perform well in such areas has been used as evidence to argue against further sector liberalization.

The following points are relevant in defining the geographic service area of a new authorization:

- Financial viability must be a key factor. If financially non-viable rural or high cost areas are authorized, a universality fund, or similar mechanism should be established. A preferred approach in such cases is to select a licensee from among competing applicants, based on the lowest requested subsidy. Universality funding mechanisms and approaches for measuring financial viability are discussed in Module 4, Universal Access in this Toolkit.
- Experience shows that regional licensees often merge with, or are acquired by, other regional licensees to serve larger regions or form national service providers. Examples range from the Colombian cellular service providers to the U.S. Regional Bell Operating Companies. These moves are often driven by economies of scale. Regulators may want to keep this trend in mind, and authorize several competing national service providers at the outset, rather than numerous financially weaker regional service providers. The result will be lower transaction costs for the sector, and less disruption due to integration of different operating systems.
- Licensing service providers to serve larger areas will permit them to cross subsidize from more profitable areas to less profitable ones. This approach can be used to extend service to less profitable areas. However, it can lead to anti-competitive conduct where an incumbent service provider retains exclusive rights to serve profitable urban markets as well as less profitable rural ones, while new entrants can serve only the rural markets. Problems of anti-competitive cross-subsidy are discussed in detail in Module 2, Competition and Price Regulation in this Toolkit.
- National authorizations and large service areas are consistent with the consumer interests in obtaining seamless "one stop shopping" service from a single service provider. This is particularly true where technical or other barriers to efficient interconnection or roaming are present.
- Finally, it is good practice to hold public consultations during the design and implementation of an authorization process. Such consultations may be initiated in a number of ways, from issuance of a detailed public consultation paper (sometimes called a green or white paper) to publication of a simple invitation for public comments on a proposed authorization action. Any input from members of the public, including existing industry stakeholders, can provide valuable input in designing an approach for new market opening and other authorization initiatives.

RELATED INFORMATION

Public Consultation

Practice Notes

- **India- Regional Authorization**

3.2 GENERAL AUTHORIZATIONS AND OPEN ENTRY POLICIES

Many different approaches have been applied to authorizing ICT services around the world. However, there is an increasing convergence of approaches as the experience of liberalizing the ICT sector is shared among regulators and policy-makers. This experience is also producing generally accepted 'best practices', which are increasingly being adopted as countries continue efforts to reform their ICT sectors.

Both general authorization and open entry regimes have gained acceptance in developed economies as 'best practices' for permitting the provision of a wide range of ICT services. This section will review practices and procedures that have been adopted in these regimes.

General authorization regimes also exist in some developing and transitional economies, although individual authorization frameworks are far more common. Where general authorization regimes do exist, they have been adapted to meet the particular conditions in these countries (e.g., low levels of competition). This section will also review practices and procedures in general authorization regimes that have been adopted in developing and transitional economies.

3.2.1 INTRODUCTION

The first section of this module described the difference between individual authorization approaches, general authorizations (or class licences as they are sometimes called) and open entry regimes. There is a clear trend in developed economies away from issuing detailed individual authorizations and towards issuing general authorizations that apply a consistent approach towards all service providers that provide the same class of service. Some developed countries have gone a step further and adopted open entry regimes, where service providers are not required to obtain any form of authorization to provide services, though they may be required to register with the regulator.

The trend towards the adoption of general authorization regimes and open entry policies has accelerated with the adoption of the EU's Authorization Directive. In developed economies, widespread adoption of market liberalization policies and an increased recognition of industry convergence are also accelerating the trend toward the use of general authorizations and in some cases, the elimination of all authorization requirements or other restrictions on market entry.

However, many developed countries issue individual authorizations for some services or facilities, such as those that use scarce resources like radio spectrum or numbering resources, and issue general authorizations for other types of services. As markets become more competitive and as regulators seek to streamline and to lighten regulatory intervention in the ICT sector, it is likely that more regulators in developed countries will begin to rely primarily, or even exclusively, on general authorizations and open entry. General authorization regimes are generally considered the best practice today in most markets where some form of authorization regime is still deemed necessary. Where competition is sufficiently robust to protect consumer interests and where any necessary regulation of service providers can effectively be achieved through general, sector-wide rules and policies, open entry is considered the best practice in most developed countries.

Individual authorization regimes remain common in most developing and transitional economies. Since there are often low levels of competition in these countries and because the regulatory regimes are often still maturing, issuing individual authorizations remains a prudent approach to licensing in developing and transitional economies. Nevertheless, some developing and transitional economies have also adopted general authorization regimes for some services. For example, Malaysia, Botswana, Uganda, and Jordan have all adopted general authorization regimes for some services.

Where general authorization regimes have been adopted in developing and transitional economies, the practices and procedures used in these regimes have been adapted to respond to their national particular competitive and regulatory conditions. See section 2.3 for more information. A link to this section is set out below.

RELATED INFORMATION

Authorization TrendsTypes of Authorization RegimesAdvantages of General AuthorizationsServices Often Subject to General Authorizations or Open EntryIssuing General AuthorizationsITU Trends Report: Licensing in an Era of Convergence

3.2.2 ADVANTAGES OF GENERAL AUTHORIZATIONS AND OPEN ENTRY POLICIES

Regulators have increasingly adopted the practice of using general authorizations or establishing an open entry authorization regime for a number of good reasons. Most important, general authorizations and open entry regimes:

- eliminate individual differences in the treatment of service providers and create a level playing field;
- are more consistent with technological neutrality principles;
- are more consistent with open market entry policies;
- simplify the regulatory process;
- reduce regulatory and administrative costs;
- provide the regulator with greater flexibility to introduce changes to the licensing regime since the regulator does not need to negotiate the amendments of individual authorizations; and
- facilitate the introduction of industry-wide regulatory changes to reflect changing technologies and sector conditions (i.e. no need to amend individual authorizations).

3.2.2.1 SERVICES OFTEN SUBJECT TO GENERAL AUTHORIZATIONS OR OPEN ENTRY POLICIES

The following types of services, among others, are frequently subject to general authorization or open entry policies in many developed countries around the world and in some developing and transitional economies. (In more liberalized jurisdictions, such as in the EU, most other types of services, such as electronic communications, are also subject to general authorizations):

- Internet Service Provider (ISP) services;
- other value-added services, including information content services, intelligent digital network features (e.g. voice-mail, call-forwarding, call-waiting, audio-conferencing, etc.);
- Internet content and transmission services, including e-mail;
- Cyber/Internet cafés;
- resale-based services, such as calling card services, call-back services, pay phone and public call office services and, sometimes resale-based IP voice services;
- fax services;
- private networks, including private virtual networks and private facilities-based networks (except for radio spectrum authorizations, which are usually granted on an individual basis, except for shared bands); and
- customer terminal equipment, including VSAT terminals, PBXs, routers and all data processing equipment.

Some multi-service and unified authorizations are also subject to a general authorization regime. In Singapore, for example, the multi-service authorization regime includes service-based operator licences that are categorized as “class licences”. Moreover, the framework governing individual service-based operator licences and facilities-based operator licences has characteristics that are similar to general authorization regimes.

3.2.3 ISSUING GENERAL AUTHORIZATIONS

This section provides further information on a subject introduced earlier in this module, namely issuing general authorizations.

While individual licences are granted to a single service provider at a time, general authorizations provide authority for a whole class of service providers to provide service or operate facilities. A general authorization normally prescribes any eligibility conditions and ongoing regulatory conditions for provision of the service.

For example, a general authorization might approve the operations of all VSAT service providers that meet certain conditions, such as: (1) registration with the regulator, (2) use of ITU-co-ordinated satellite service providers authorized in an ITU member country, (3) approval of earth station equipment under national spectrum regulations, and (4) compliance with any consumer protection or spectrum management regulations established by the regulator. Most general authorizations would contain more conditions; however, all would apply equally to all VSAT service providers. In this example, any entity that meets these four conditions would be entitled to start providing VSAT services, without the need to obtain a specific authorization or to go through any other authorization procedure.

With general authorizations, the regulator normally has no discretion to grant or withhold an authorization to a particular person. If a person meets the eligibility criteria for obtaining the general authorization and complies with the conditions of the general authorization, that person is automatically authorized.

A few countries have introduced variations on the theme of general authorizations. For example a general authorization may only permit a specified number of service providers of a specific class. These may be authorized on a first-come-first-served basis or using some other form of selection process. Nevertheless, all authorized service providers of the same class are subject to the same conditions, leaving intact one of the key principles of general authorizations. The Saudi Arabian Telecommunications Bylaw establishes several types of class authorizations, which include some of the features described above.

Another variation that is common in developing and transitional economies relates to the eligibility criteria for obtaining a general authorization. It is not uncommon for applicants in developing and transitional economies to be required to establish that they meet a wide range of eligibility criteria, including criteria related to financial viability, operational experience, and technical expertise. The licensing process for issuing general authorizations in such countries thus involves the submission of a detailed application and supporting materials and careful regulatory scrutiny. However, the licensing process is not competitive *per se* and all successful applicants of the same class are issued a standard authorization. Thus, while the licensing process may involve a more detailed evaluation of applicants and more onerous eligibility criteria, the process still bears the hallmarks of a general authorization regime. To see an example of this type of general authorization framework, review the materials on “Type A Class Licences” in the St. Lucian Procedures Manual for Licence Applications. A link to this document is set out below.

See also Box 3.1, which sets out the regulatory provisions governing the grant of Class Licences by the Pakistan Telecommunications Authority. Notably, although the Pakistan Telecommunications Authority (PTA) has more discretion to reject an application than many other regulators, there are clear criteria that the PTA must take into account when making its determination. Furthermore, applicants have the procedural right to be heard before the PTA rejects an application. The PTA also is required to provide detailed reasons for any refusal to grant an application. These provisions help to offset the risk of arbitrary or unfair licence application determinations.

◂ **Box 3.1 Regulatory provisions governing the grant of Class Licences and Registrations by the Pakistan Regulatory Authority**

Source: Class Licensing and Registration Regulations 2007, available on the website of the Pakistan Telecommunications Authority: http://www.pta.gov.pk/index.php?option=com_content&task=view&id=184&Itemid=347

Class Licensing and Registration Regulations 2007, Pakistan

Section 6 **Grant of Licence** – (1) The Authority may grant license or Registration Certificate to any applicant, who fulfills the open, transparent and non-discriminatory eligibility criteria given by the Authority from time to time.

2) The Authority shall consider all applications on merits and in determining whether or not to grant a licence or registration certificate, the Authority shall take into account the following factors, namely:

(a) financial and economic viability of the applicant;

(b) applicant’s experience in telecommunications and relevant past history;

(c) technical competence and experience of applicant’s management and key members of staff and local participation in the business; and

(d) nature of services proposed and the viability of the applicant’s business plan including its contribution to the development of the telecommunications sector.

(3) The Authority may reject an application; if it appears that the grant of the License or Registration Certificate shall threaten or potentially threaten national security.

Section 7 **Procedure for grant of a License** – (1) On receipt of an application for grant of License or Registration Certificate, the Authority shall examine the application and suitability of grant of Licence or Registration Certificate.

(2) The Authority shall not reject any application without giving a reasonable opportunity of being heard. In case the application is incomplete, the Authority may return the application without rejecting it or may require the applicant to make up the deficiency within given time.

(3) In case the Authority decides to reject the application, it shall give detailed reasons of rejection.

The Canadian basic international telecommunications services (BITS) authorization regime represents yet another variation on the theme of general authorizations. Until 1999, telecommunications services were not subject to any authorization requirements in Canada, other than spectrum authorizations. When a new authorization regime was established for the provision of basic international telecommunications services, the Canadian regulator, the CRTC, adopted a general authorization model. The same standard conditions of authorization apply to all authorized service providers. However, instead of merely filing a registration to obtain an authorization, an application must be filed, and applications are processed individually. As long as an application contains the necessary information, the authorization will typically be granted within 30 days.

RELATED INFORMATION

The New EU Authorization Framework

Practice Notes

- Conditions of General Authorizations
- Greece: The General Authorization Licensing Process
- Information Required in Open Entry Notifications and General Authorization Licensing Procedures
- Licensing International Services in Canada
- Lithuania- Notification and General Authorizations
- Process for Issuing General Authorizations
- Registration Forms for General Authorizations
- Saudi Arabia -- General Authorization Framework
- Saudi Arabia- Telecommunications Bylaw
- The Regulatory Framework for General Authorizations

Reference Documents

- Canada -- Instructions for obtaining a basic international telecommunications services class licence
- Finland- Background Information About the General Authorization Regime and the Process of Notification
- Finland- Guidelines for the General Authorisation Regime
- Greece -- Regulation on General Authorizations
- Greece: Registration Declaration for Engaging in Electronic Communications Activities under a General Authorisation Regime
- Jordan -- Instructions Regarding the Application Procedures and Criteria for the Award of Public Telecommunications Individual and Class Licenses
- Malaysia -- Form "D", Registration Notice for Class Licence
- Malaysia -- Ministerial Guidelines on Class Licences for Network Facilities
- Malaysia- Ministerial Guidelines on Class Licences for Network Services
- Malaysia- Registration Notice and Checklist
- Netherlands -- Modification or Termination of the Provision of Public Electronic Communications Activities
- Netherlands -- Notification of the provision of public electronic communications activities
- Saudi Arabia- Telecommunications Bylaw
- Singapore- SBO Class licence application
- South Africa -- Electronic Communications Act Regulations
- St. Lucia -- Application and Licensing Processing
- St. Lucia -- Application form for Class Licence, Type A
- St. Lucia -- Guidance Notes for Application Processes
- Switzerland -- Guide to the "Registration Form for Providing Telecommunications Services"
- Switzerland -- Registration form for the provision of telecommunications services

3.2.3.1 TRANSITIONING TO GENERAL AUTHORIZATION REGIMES

This section outlines some considerations that are directly relevant to the implementation of a general authorization regime. Other sections of this module provide a broader discussion of the issues related to transitioning to a new authorization regime and the related matter of re-authorizing incumbents under a new licensing regime. Links to these sections are set out below.

Introduction of a general authorization regime can be complicated where existing individual authorizations authorize the same services as those covered by the general authorization. For example, general authorizations are frequently used to establish conditions for the provision of value added services. However, incumbent service providers may already be authorized to offer value added services under their individual authorizations.

To promote competitive neutrality, regulators should ensure that differences between general authorizations and individual authorization conditions do not significantly favour one competitor over another. A good solution is to indicate that individual authorizations do not authorize the offering of any service that can be offered under a general authorization. In this way, regulators can ensure that all providers of the services provided under the general authorization are subject to the same conditions.

In some cases, individual authorizations may have to be amended in order to harmonize the conditions under which existing services are offered with the terms of new general authorizations. This may be achieved with the full co-operation of existing licensees, particularly where the conditions of general authorizations are less onerous than those of existing individual licences.

Practice Notes

- Ireland – Transition to the General Authorisation Regime
- Managing the Transition to a General Authorization or Open Entry Regime

Reference Documents

- Ireland- Consultation Paper – Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- Ireland- Future Regulation of Electronic Communications Networks and Services: Guidelines Relating to General Authorisations
- Ireland- Guidelines on the New General Authorisation Regime

3.2.3.2 CONDITIONS OF GENERAL AUTHORIZATIONS

There is no standard set of conditions for general authorisations or class licences. The conditions attached to general authorisations in different countries are products of the individual circumstances and regulatory framework in each country.

In Canada, the conditions for the basic international telecommunications services (BITS) class licence are relatively short and concise. The conditions include a requirement to keep information on file with the Canadian Radio-Television and Telecommunications Commission (CRTC) current; a prohibition on anti-competitive conduct; obligations relating to the contribution (universal service) regime; and a requirement to file any information required by the CRTC to be filed.

The conditions of general authorizations issued in EU Member States must comply with the terms of the EU Authorisation Directive. This Directive stipulates that general authorisations may only be subject to certain conditions listed in the Annex to the Directive. Box 1 outlines the permissible scope of conditions imposed on general authorizations.

Pursuant to the EU Authorisation, general authorizations issued by Member States may only be subject to the following conditions:

- financial contributions to funding of the universal service;
- interoperability of services and interconnection of networks;
- accessibility and portability of numbers- portability means that users have the option to keep their telephone number when they change operators;
- rules on privacy protection and, more specifically, the protection of minors;
- the obligation to transmit certain television and radio programmes ("must carry");
- environmental and town and country planning requirements;
- the possible imposition of administrative charges on undertakings; and
- restrictions concerning the broadcast of illegal content.

Box 3.2 Conditions permitted to be imposed on general authorizations pursuant to the EU Authorisation Directive

The conditions that have been imposed by the Irish regulator and by Ofcom, the UK regulator, on general authorizations are examples of how these requirements of the Authorisation Directive have been put into practice in an EU Member State.

In Singapore, the conditions of class licences are contained in the Telecommunications (Class Licences) Regulations. There are two sets of conditions. The first set is outlined in Part III of the Regulation and applies generally to all class licences issued in Singapore. The second set of conditions consists of the specific conditions that apply to each particular type of class licence. Class licences in Singapore are issued for specific services. There is a schedule to the Telecommunications (Class Licences) Regulations for each specific type of class licence. Each schedule contains the particular conditions that are applicable to the class licence described in that schedule. The general and specific conditions imposed on class licences are set out in the guidelines on Service-Based Operator Licensing published by Infocommunications Development Agency (IDA), the regulator in Singapore. A link to these guidelines is set out below.

The conditions of class licences in Malaysia can be found in the class licences issued by the Minister for Applications Services, Network Facilities, and Network Services. The conditions for each type of class licence are essentially the same.

Some general authorizations contain detailed terms and conditions. In countries where the regulatory framework is still maturing, it may be necessary to include fairly detailed terms and conditions in order to protect the public interest. In Jordan, for example, the provisions of the Public Telecommunications Class Licence cover a range of matters, including (but not limited to): eligibility; ownership and control; use of Jordanian resources; licence fees; universal service obligations; interconnection; emergency services; directory services; general service obligations and quality of service obligations; confidentiality of information; pricing; modification of Licence; and renewal and termination of Licence. Some of these terms and conditions are set out in the actual Licence, while others are included in the schedules to the Licence.

Practice Notes

- Conditions of General Authorizations

Reference Documents

- Canada -- Telecom Circular 2003-1
- Canada -- Telecom Circular CRTC 2005-8
- Canada -- Terms and Conditions of Basic International Telecommunications Services Class Licences
- Ireland- Conditions of General Authorisation
- South Africa -- Electronic Communications Act Regulations

3.2.4 OPEN ENTRY NOTIFICATION PROCEDURES

The adoption of an open entry policy does not necessarily mean that ICT service providers are not required to file information with the regulator. In many countries, service providers are required to file some form of notification with the regulator prior to or shortly after commencing the provision of ICT services or network operations.

In some countries (e.g. Estonia, Ireland, and Sweden), regulators will provide confirmation of the receipt of notification, though in other cases (e.g. Germany), such confirmation is provided only upon request. In some countries (e.g., Canada), the regulator typically does not provide formal confirmation, however, service providers may check a list of registered entities that is posted on the regulator's website to verify that they have been registered.

Service providers and operators usually have an ongoing duty to keep information filed with the regulator current and to notify the regulator upon terminating the provision of ICT services and network operations.

Filing a notification of the commencement of services and network operations is frequently tied to the enjoyment of certain rights established in the legislative framework governing the sector. For example, legislation or regulations may stipulate that a service provider obtains the right to negotiate interconnection and access arrangements once it has filed a notification of the commencement of services and network operations. Prior to filing such a notification, a service provider does not enjoy such rights. Tying the enjoyment of various rights such as the right to negotiate interconnection and access arrangements creates a positive incentive for service providers to comply with notification requirements.

Practice Notes

- **Information Required in Open Entry Notifications and General Authorization Licensing Procedures**

3.2.5 THE EU AUTHORIZATION FRAMEWORK

The European Union has recently adopted a new regulatory framework for its ICT sector (renamed the 'electronic communications sector' in the framework documents). The new framework was adopted in 2002 and has been effective since July 2003.

The authorization procedures adopted by EU members must comply with the new regulatory framework, and particularly the provisions of two parts of the framework: the Authorisation Directive and the Framework Directive.

The Framework Directive contains general principles and guidelines that are applicable to ICT regulation as a whole. The Authorization Directive contains specific rules applicable to the authorization of ICT networks and services in the European Union.

Due to the speed of technological change and service innovation in the ICT sector, the European Commission has already initiated a review of its electronic communications regulatory framework. In November 2007, the Commission issued a number of proposals for reform. These proposals focus on four main areas: cultivating more competition, fostering better regulation, strengthening the internal market, and protecting consumers better. The proposals include consideration of how best to use the spectrum that will become available as a result of the introduction of digital television and the resultant "switch-off' of analogue services (the digital dividend). The digital dividend is discussed in Module 5, Radio Spectrum Management.

Although the directives are binding only on European Union members, other countries have found the EU approach useful in developing their own approach to regulation of the ICT sector. In particular, countries that plan to join the European Union, or to harmonize their economic approach with that of the EU, have adopted many of the features of the new framework.

Practice Notes

- **General Authorizations in the EU Regulatory Framework**
- **Greece: The General Authorization Licensing Process**
- **Select Examples of the Implementation of the EU Authorization Directive**
- **Summary of EU Authorisation Directive**
- **Summary of the EU Framework Directive**

Reference Documents

- **EU Authorisation Directive**
- **EU Framework Directive**
- **Greece -- Regulation on General Authorizations**
- **Greece: Registration Declaration for Engaging in Electronic Communications Activities under a General Authorisation Regime**

3.2.5.1 THE EU REGULATORY FRAMEWORK

This section provides further information on a subject introduced earlier in this module, namely the European regulatory framework for ICT services or 'electronic communications services' as they are referred to in the framework documents.

Regulation of the ICT sector in Europe, including authorization, is subject to a set of directives and other legal instruments that together comprise the regulatory framework. These directives were adopted in 2002 and have been effective since July 2003.

The EU has enacted seven directives and related documents in connection with ICT regulation, including: the Framework Directive; the Access Directive; the Authorization Directive; the Universal Services Directive; the Privacy and Electronic Communications Directive; the Radio Spectrum Directive; and the Commission Competition Directive. These directives have a broad implication for regulation of the ICT sector, and they are discussed in greater detail in Module 2, Competition and Price Regulation, Module 4, Universal Access, and Module 5, Radio Spectrum Management. Links to these Modules are set out below. In this module, we will focus on the Authorization Directive and the Framework Directive, which are most relevant to authorization.

The electronic communications directives were developed in response to a dynamic and increasingly unpredictable market in which a growing number of competitors are participating. A key objective of the directives is to create a flexible regulatory framework that is capable of responding to new technologies, convergence, and an increasingly competitive market.

The fast pace of technological change and service innovation in the ICT sector has prompted the European Commission to undertake a review of the current regulatory framework. This review was deemed necessary in order to ensure that the regulatory framework continues to serve the best interests of consumers and the ICT industry. In November 2007, the Commission issued a number of proposals for reform. These proposals focus on four main areas: cultivating more competition, fostering better regulation, strengthening the internal market, and protecting consumers better.

The review of the current regulatory framework encompasses consideration of how to ensure that the ICT sector makes better use of radio spectrum. This dimension of the review includes an exploration of how best to use the spectrum that will become available as a result of the introduction of digital television and the resultant 'switch-off' of analogue services (the digital dividend). The Commission's proposals in this regard advocate flexible and market-oriented management of the radio spectrum so that service providers have the freedom to use the spectrum to offer the services that have the highest value attached to them. The Commission's support for a flexible and market-oriented approach to radio spectrum management is consistent with its commitment to neutrality in authorizations since this approach does not dictate the services for which radio frequency authorizations must be used.

Practice Notes

- **General Authorizations in the EU Regulatory Framework**
- **Ireland – Transition to the General Authorisation Regime**
- **Select Examples of the Implementation of the EU Authorization Directive**
- **The Greek Licensing Process**
- **The U.K. Licensing Process**

Reference Documents

- **Finland- Background Information About the General Authorization Regime and the Process of Notification**
- **Finland- Guidelines for the General Authorisation Regime**
- **Finland- Instructions for Completing On-line Telecommunications Notification**
- **Finland- On-line General Authorization Registration**
- **Iceland- Notification Form for General Authorizations**
- **Ireland- Guidance Note on Completion of the Notification Related to General Authorisations**
- **Ireland- Registration Form for General Authorisations**
- **Netherlands -- Modification or Termination of the Provision of Public Electronic Communications Activities**
- **Netherlands -- Notification of the provision of public electronic communications activities**

- **Sweden- Legislation Implementing the EU Authorisation Directive**
- **Switzerland -- Guide to the "Registration Form for Providing Telecommunications Services"**
- **Switzerland -- Registration form for the provision of telecommunications services**

3.2.5.2 EU AUTHORISATION AND FRAMEWORK DIRECTIVES: AUTHORIZATION REQUIREMENTS

This section provides further information on a subject introduced earlier in this module, namely the European regulatory framework for ICT services or 'electronic communications services' as they are referred to in the framework documents. This section focuses on one of the key framework documents, the Authorization Directive.

The EU's Authorization Directive sets out the regulatory framework for issuing ICT authorizations in member states of the European Union. The Authorization Directive applies to authorizations for all electronic communications networks and services, regardless of whether the networks and services are provided to the public. The Directive does not apply to authorizations for the use of radio frequency, unless the use of the frequency involves the provision of an electronic communications network or service.

The Authorization Directive requires the replacement of individual authorizations with general authorizations. In general, electronic communications networks or services may only be subject to a general authorization requirement. As a result, an ICT service provider may be required to submit a notification that it is providing services, but it may not be required to obtain a decision or be dependent on any other administrative act by the national regulatory authority before commencing operations under the authorization.

The Authorization Directive also dictates certain rights and obligations of authorized service providers. For example, at a minimum, general authorizations must give undertakings the right to provide electronic communications networks and services and to negotiate interconnection with other providers in the EU. The Authorization Directive also specifies when a holder of a general authorization will be subject to universal service obligations, including the right to provide certain universal service functions.

The Authorization Directive sets out conditions that may be attached to general authorizations. It also specifies the types of measures that countries may take in order to verify and enforce compliance with these conditions. Subject to certain conditions, the Authorization Directive permits the imposition of administrative charges on undertakings providing a service or a network.

The requirements related to general authorizations do not apply to use of scarce resources such as radio frequency and numbering resources. The Authorization Directive sets out different requirements for authorization of these scarce resources.

The Authorization Directive has been developed to conform to the more general regulatory requirements of the EU Framework Directive. While the Framework Directive does not establish specific rules for the authorization process, several general provisions are relevant, including:

- A requirement that national regulatory authorities exercise their powers (including the power to issue authorizations) impartially and transparently.
- The adoption of a technology-neutral framework for regulation. Thus, technology-specific authorizations are not permitted.
- The adoption of a broad framework for regulation. In light of evolving technologies and convergence, the Framework Directive and all other telecommunications directives apply to a broad range of networks and services, which are generally referred to as "electronic communications networks" and "electronic communications services". These terms are given wide definitions.
- The requirement that national regulatory authorities promote the development of an internal EU market by ensuring that there is no discrimination in the treatment of undertakings providing electronic communications networks and services.
- The requirement that national regulatory authorities manage the allocation of radio frequency for electronic communications services. The Framework Directive specifies that radio frequency must be allocated and assigned on a basis that is objective, transparent, non-discriminatory, and proportional.

Practice Notes

- General Authorizations in the EU Regulatory Framework
- Greece: The General Authorization Licensing Process
- Select Examples of the Implementation of the EU Authorization Directive
- Summary of EU Authorisation Directive
- Summary of the EU Framework Directive

Reference Documents

- EU Authorisation Directive
- EU Framework Directive
- Greece -- Regulation on General Authorizations
- Greece: Registration Declaration for Engaging in Electronic Communications Activities under a General Authorisation Regime

3.3 INDIVIDUAL LICENCES

While many developed countries have adopted general authorization regimes or open entry policies, individual licences continue to have relevance in many emerging and transitional economies. Individual licences are also typically used to authorize the use of spectrum where the demand for access to radio frequency bands exceeds availability. Individual authorizations have been standard for 3G spectrum licences, for example.

This section reviews common licensing practices related to individual licences. The next section addresses the competitive licensing processes that are used to issue individual licences.

3.3.1 INDIVIDUAL LICENCES AND REGULATORY CERTAINTY

Detailed individual licences have particular importance in emerging and transitional economies that have not yet developed a comprehensive or stable regulatory framework. In such a context, licences provide certainty for investors and lenders. This certainty is often required before investors will provide the millions or billions of dollars required to install or upgrade telecommunications infrastructure.

RELATED INFORMATION

Contents of a Detailed Individual Licence

Sample Contents of a Detailed PSTN Licence

3.3.1.1 LICENSING CERTAINTY IN DEVELOPING MARKETS

It is often difficult to attract investment in ICT markets in developing and transitional economies. Different circumstances prevail in these economies, due to a perception of high country risk and economic, national security or governance problems. Most countries with such economies do not have clear or consistent policies or frameworks for the regulation of the ICT sector. Where it is not possible to develop a stable and credible regulatory framework quickly, it is important to develop authorizations that are clear and detailed in order to facilitate privatization and liberalization initiatives. Such authorizations may be subject to replacement by a more comprehensive regulatory framework once it is developed. However, in such circumstances, the basic economic rights of ICT investors should be protected.

There are two key objectives in preparing such individual licences:

Regulatory Certainty-Where privatization and licensing transactions are implemented before a clear regulatory framework has been developed, the rights and obligations of service providers should be clearly defined in authorizations. Regulatory certainty on key business issues, such as interconnection, price regulation and competitive safeguards, promotes the success of privatization and market liberalization initiatives. Uncertainty reduces investor confidence. As a result, it usually also reduces the potential proceeds to governments from privatization sales or licence fees.

Defining Exclusivity Rights-Sector policy may call for the authorization of multiple service providers. It may also grant exclusive monopoly (or duopoly) rights for specified periods of time. The granting of exclusivity rights generally increases government revenues from privatization and licensing transactions. However, as noted in Modules 1 (Overview of Telecommunications Regulation), 4 (Price Regulation) and 6 (Universal Service) of the Telecommunications Regulation

Handbook, maintaining monopolies will generally limit sector and economic growth, and reduce service provider efficiency to the detriment of consumers. Whatever policy is adopted on exclusivity, it should be clearly reflected in the authorizations of new service providers in order to provide certainty to them, their investors and lenders.

To implement these objectives, regulators that intend to authorize new service providers or attract investment in incumbents, but that do not yet have a comprehensive regulatory framework, often develop fairly detailed individual authorizations.

Countries that have initiated privatization and liberalization without clear and detailed authorizations or a detailed regulatory framework have experienced serious problems related to regulatory uncertainty. In other more successful cases, countries without a clear regulatory framework have achieved certainty in their early authorization initiatives through the use of detailed individual authorizations. Examples include Hungary, Uganda, Morocco, and Jordan. The provision of such detailed authorizations removed ambiguity on important matters such as exclusivity rights, authorization fees, network roll-out obligations, tariffs, and interconnection requirements. The success of privatization and new competitive entry in these countries was based, in part, on authorizations that provided a degree of certainty regarding the rights and obligations of investors and service providers.

RELATED INFORMATION

Sample Contents of a Detailed PSTN Licence

3.3.2 CONTENTS OF A DETAILED INDIVIDUAL LICENCE

Section 3.2.1 describes an example of the contents of a detailed PSTN (Public Switched Telephone Network) service provider's licence in an emerging economy without a well-developed regulatory framework. This type of licence has been chosen as an example since it is fairly comprehensive. It covers many of the conditions often dealt with in authorizations for non-PSTN services, such as mobile services. Some additional and different conditions will be required in authorizations for particular services.

Not all of the matters included in the authorization example set out in section 3.2.1 will be necessary in all authorizations for PSTN services. In many countries, some matters in the list are already covered in laws, regulations or other documents that form part of the regulatory framework. Examples include general regulations on universal service or authorization fees, a competition law or general rules of practice and procedure governing authorized service providers, information reporting or authorization termination and renewal. It generally does not matter which type of legal document is used to deal with these issues, as long as the regulatory framework is stated clearly and is enforceable under local law.

3.3.2.1 SAMPLE CONTENTS OF A DETAILED PSTN LICENCE

Sample Contents of a Detailed PSTN Licence

Notes

Part 1 – Background and Identification of Parties

- Provides background, governing law, authorization circumstances, etc.
- Important for posterity, and for courts and governments interpreting the authorization
- Ensure authorized entity has legal and financial substance
- Key to clarity of authorization conditions
- May repeat relevant definitions from laws, regulations, etc., and deal with what happens if these definitions change

Part 2 – Grant of Authorization

- Approaches may differ (e.g. authorization of services common today; however, some authorizations authorize operation of facilities)
- Radio Spectrum usually authorized separately – refer to separate authorization – ensure that there are not excessive 'double authorization' delays or charges.
- For precision, it is sometimes useful to define exceptions – i.e. list what licensee is not entitled to do, and/or list specify services licensee is not authorized to provide (e.g. to implement competition policy)
- It is a good practice to issue separate authorizations for each major type of services provided, e.g. an

incumbent operator may obtain a PSTN authorization and separate mobile cellular and ISP authorizations. This assists in ensuring that existing and future authorizations for the same services (e.g. mobile cellular) contain similar conditions.

- The general presumption today should be against granting any monopoly or exclusivity rights. Where such rights are granted, they should be strictly limited.
- Define scope (i.e. services covered) and timing of any exclusivity rights precisely, including time limits, possible extensions and any pre-conditions for extensions
- Establish effective date of authorization. Note that an authorization may be issued several months (or even years) before the service provider is entitled to commence services. This approach may be useful when an authorization is granted in advance of the expiry of exclusive rights granted to a previous licensee.
- Specify duration of authorization term, and conditions and duration of any renewal terms

Part 3 – Authorization Fees

- Usually based on competitive bid process (auction) or fixed in advance
- Any one-time fee should be clearly differentiated from other fees (e.g. royalties, taxes, annual authorization fees, etc.)
- May be payable in installments, with revocation penalty
- Annual fee (may be paid quarterly or on another periodic basis)
- Best practice is to recover administrative costs of regulation only (see Module 1 of the Telecommunications Regulation Handbook and the section of this module on authorization fees for a calculation of authorization fees). Administrative costs should be based on a transparent and duly approved regulatory budget process
- Should be a competitively-neutral assessment of fees across the industry
- Usually provided for separately in spectrum authorization
- Best practice: Limit fees to cost recovery for spectrum management
- Higher fees may be warranted to auction scarce spectrum and generate government revenues (should not duplicate authorization acquisition fees)

Part 4 – General Conditions of Authorization

- Cite requirements to retain eligibility to hold authorization (if any)
- Cite any restrictions on ownership and control of licensee (e.g. cross-ownership with major competitors, foreign ownership restrictions, etc.)
- Rules on equipment that may be used (e.g. type approval rules, or compliance with mutual recognition agreements 'MRAs')
- Any applicable rules (e.g. to verify price cap regulation regime or service quality rules)
- Specify reporting requirements and rules on provision of information to the regulator
- Specific obligations to provide access by regulator to information or premises, and to co-operate with regulator for specific regulatory purposes
- Specify obligations to co-operate with other authorities (e.g. police and national security forces regarding interception of communications, environmental protection, health and safety rules if not covered by law of general application)
- Rights of service provider to access streets, sidewalks, road allowances and other public property and rights of way for the purpose of constructing, operating and maintaining facilities
- Cite legal authority for any such rights
- Include rules for access, if not stated elsewhere (e.g. payment, if any, public safety and convenience, aesthetics, compliance with applicable law)
- Any rights of service provider to access private property (e.g. rights of way for cable or microwave routes) including expropriation rights, if applicable
- Cite legal authority for any such rights

Part 5 – Specific Conditions of Authorization

- Normally dealt with in separate spectrum authorization – may be referenced in spectrum authorization
- Should be subject to national and ITU spectrum management rules, including rules for efficient spectrum use
- Assignment of numbers, if applicable
- Refer to national numbering plan, if applicable
- Rights and obligations regarding implementation of number portability arrangements
- Obligations to provide such services, and co-operate with other service providers in providing them jointly
- See Module 6 of the Telecommunications Regulation Handbook
- Specific obligations (usually set out in Appendix, including maps, number of access lines, etc.)
- See Module 6 of the Telecommunications Regulation Handbook
- Specific obligations (usually set out in Appendix, including specific indicators, standards to be met by specified dates, reporting procedures, etc.)
- May be covered or supplemented in other regulatory documents
- Reference details of performance bond or other method used to secure performance of authorization obligations
- Bond or security document(s) may be annexed to authorization

Part 6 – Relations with Customers

- Terms and conditions usually set out in other regulatory documents, but may initially be included in authorization
- May include mandatory contents of customer contracts
- May include consumer "code of rights"
- Rules on handling and recording complaints
- Usually set out in other regulatory documents
- Provisions may be set out in regulatory documents or approved customer contracts (to provide notice to customers)
- Include protection of privacy
- Rules often published in telephone directories
- Price regulation (tariff) regime usually specified (e.g. price caps)
- Specify services to which price regulation regime applies
- Review period and rules for review often specified
- Key to financial viability of authorization
- Details in appendices or referenced regulatory documents
- See Module 4 of the Telecommunications Regulation Handbook
- Method to resolve disputes over application of authorization conditions

Part 7 – Relations with Other Service providers

- See Module 3 of the Telecommunications Regulation Handbook
- May include rights and obligations to interconnect, if these are not yet set out in the general regulatory framework. May include collocation obligations.
- See Module 5 of the Telecommunications Regulation Handbook
- Include remedies and sanctions, if not specified elsewhere
- Rights and obligations regarding collocation and access to poles, towers, conduit, etc.
- See Module 3 of the Telecommunications Regulation Handbook

- Rights and obligations regarding resale by licensee and by other service providers (e.g. for payphones, Internet services, value added and simple resale)
- Method to resolve disputes with other service providers and network operators, e.g. regarding interconnection
- See Module 3 of the Telecommunications Regulation Handbook

Part 8 – Amendment, Renewal and Termination

- Unilateral modifications should only apply to certain regulatory matters, not key commercial terms of authorization
- Procedural safeguards
- Competitive neutrality should be maintained
- Provides certainty, where needed
- To provide investor certainty, key commercial terms may only be subject to amendment by agreement between licensee and regulator
- Competitive neutrality should be maintained
- Specify sanctions and penalties for failure to comply with various terms of authorization (e.g. fines, forfeiture of performance bonds, revocation)
- Include renewal rights (e.g. if certain performance targets met)
- Termination, revocation and/or suspension may be included
- Grounds (usually certain major, unresolved breaches only)
- Procedure (include due process)
- Include lesser penalties (e.g. fines) which will not disrupt service
- Clarify surviving rights of licensee, property rights, treatment of as¬sets, and other effects of non-renewal

Part 9 – General

- Excuses performance in case of specified events beyond control of licensee
- Assignment may require consent of regulator, particularly in early days of PSTN authorization. Later, restrictions on assignment are generally removed or made subject to general regulatory framework.
- Cite any rules and restrictions on assignment of authorization
- Rules and timetable for coming into full compliance with authorization (important in authorization of PTT or other incumbent service provider)

The actual terms and conditions of telecommunications licences vary considerably, from country to country, depending on the local legal, regulatory and industry environment, among other things. For specific examples of licence conditions in a range of different telecommunications licences please follow the link, below:

RELATED INFORMATION

Sample Licences and Related Documents

3.4 THE COMPETITIVE LICENSING PROCESS

This section discusses competitive licensing processes, the purposes for which they are used, and the methods for carrying them. While competitive licensing processes vary from country to country, these processes frequently have common features. The following sections review practices that are commonly employed to improve the effectiveness, efficiency and transparency of licensing processes.

3.4.1 COMPETITIVE LICENSING PROCESS

Competitive licensing processes are generally used to issue an individual licence to a single service provider or a limited number of them. In a competitive licensing process, the regulator (or other licensing authority) typically describes the business opportunity and invites interested parties to submit applications for the licence to enter the business. The successful applicant is normally selected through a form of competitive evaluation, such as a comparative evaluation process (sometimes called a “beauty contest”), an auction, or some combination of the two.

A competition for the award of an individual licence is frequently referred to as a “licensing” or “tender” process or a “request for applications” process. In this module, we use the term “competitive licensing process” to refer generally to a competitive selection process, by which a number of applicants compete for the right to hold a limited number of licences.

3.4.1.1 FEATURES OF A MULTIPLE ROUND AUCTION: THE CANADIAN EXAMPLE

1. **Bidder Eligibility Points:** Each licence in an auction is assigned a number of points proportionate to the bandwidth and population covered by that licence. Each bidder must indicate which licences, and the number of “points-worth” of licences, it may wish to bid on.

2. **Activity Rule:** A bidder is considered active on a particular licence if it has the current high bid from the previous round or if it submits on acceptable bid in that current round. In each stage of bidding, a bidder must be active on licences whose corresponding points add up to a certain percentage of the bidder’s eligibility point level.

3. **Bid Withdrawals/Penalties:** If a bidder makes a bid and later wishes to change it, it may do so subject to paying a penalty which corresponds to the potential loss of revenue caused by the withdrawn bid.

4. **Bid Increments:** Bid increments are used to expedite the auction. They are set in percentage and/or absolute dollar terms and are changed during the course of the auction.

5. **Waivers:** Waivers protect bidders against mistakes they may make or in the case of technical or communication problems. They prevent a bidder from losing bidder eligibility points when it does not satisfy the activity requirements in a given stage.

6. **Stopping rule:** The auction generally stops when a round finishes with no acceptable bids or waivers having been submitted on any licences.

7. **Forfeiture:** A bidder who submits the high bid on a licence but fails to pay will forfeit its right to the licence and must pay a penalty.

Source: Department of Industry Canada

Reference Documents

- **Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range**

3.4.2 PHASES OF A COMPETITIVE LICENSING PROCESS

Competitive licensing processes generally have a number of phases. After determining the basic objectives of a licensing process, the regulator will establish the schedule for the process and prepare some form of guide to be used by applicants in the licensing process. Typically, the licensing process begins when the regulator issues some form of notice of invitation to apply for the licence. Some form of guide to the licensing process is often made available at the same time as this notice, or shortly thereafter.

In some cases, the licensing process includes a pre-qualification phase, in which potential applicants are screened in order to limit the competition to qualified applicants. The pre-qualification phase is followed by the qualification phase and the selection phase, where the regulator uses a competitive mechanism (or combination of mechanisms) to select the successful applicant. In other cases, however, the licensing process does not feature a pre-qualification phase and instead proceeds directly to the selection phase.

The licensing process culminates with the selection of the successful applicant and the award of licence or licences. More information about each of the phases mentioned above can be found by following the links below.

RELATED INFORMATION

Scheduling the Licensing Process

The Guide to the Licensing Process

The Request for Applications

The Pre-Qualification Phase

The Selection Phase

3.4.3 SCHEDULING THE LICENSING PROCESS

A licensing process schedule normally lists the steps in the licensing process and the date and time for such steps. The schedule sets out the framework for how the licensing process will unfold, and is thus of major interest to both the regulator and potential applicants for the licence.

Publishing a schedule for the licensing process aids in compliance with one of the requirements set out in the *WTO Regulation Reference Paper*. The Paper requires that certain information about licensing, including the "period of time normally required to reach a decision concerning an application for a licence", be made publicly available. In most cases, the schedule is published as part of the guide to the licensing process.

Reference Documents

- India -- 3G and BWA Auction Timelines

3.4.3.1 STEPS IN THE LICENSING SCHEDULE

This section provides further information on a subject introduced earlier in this module, namely the steps outlined in the licensing schedule.

The steps included in a schedule will depend on the nature of the licensing process. Generally speaking, schedules include the dates of all significant steps in the licensing process, especially any deadlines governing tasks that applicants are required to complete. Many schedules also include the timelines for the review of the applications and the date on which the decision concerning the award of the licence will be announced. Other important steps may be included in the schedule, for example, the effective date of the licence.

In setting a schedule, the regulator should balance its own interests, the interests of the public, and the interests of potential applicants. For example, the interest in moving the licensing process ahead as quickly as possible after issuing the request for applications must be balanced against the need to provide potential applicants with sufficient time to conduct due diligence and to prepare the required materials for the application.

The regulator should also consider how the scheduling of events affects the transparency of the licensing process. For example, lengthy review periods for the evaluation of applications may undermine the appearance of transparency. Generally speaking, the selection of the highest bidder in an auction process should take little or no time. However, the evaluation of applications to determine compliance with technical or financial qualification criteria can take longer. Comparative evaluations processes will normally also take longer.

Dates and deadlines included in licensing schedules are usually specific. In addition to noting the day, month and year of a particular event, it is often advisable to include a fixed time (*i.e.*, the hour) for certain steps. If a fixed time is indicated for a particular event, it is important to designate the relevant time zone.

In some cases, it may be appropriate to indicate in a schedule that a particular step will occur after a certain number of days or weeks have passed since a preceding event. Where this is done, it is important to clearly define what the initiating event is. It is also important to define what a "day" means for the purposes of the licensing process so that it is clear whether a day includes weekends and holidays.

In some cases, the regulator may wish to retain the power to make changes to the schedule. This power gives the regulator flexibility to adapt the schedule as the need arises and as circumstances change. The regulator should notify all participants in the licensing process of any changes to the schedule as promptly as possible. It is also advisable to post notification of all changes to the schedule on the regulator's website.

While it may be necessary on occasion to amend a licensing schedule, regulators should bear in mind that excessive changes or delays in a licensing process will undermine confidence in the process.

Practice Notes

- Bahrain -Second Mobile Operator Licensing Schedule -2003
- Belgium –3G Licensing Process Schedule
- Nepal – Rural Telecommunications Services Licensing Schedule
- Saudi Arabia – Schedule for Data Services Licensing Process
- Switzerland- GSM Telecom Services Licensing Schedule

Reference Documents

- India -- 3G and BWA Auction Timelines
- Saudi Arabia -- Request for Pre-Qualification of Candidates to Participate in the Licensing Process of Data Transmission Services in the Kingdom of Saudi Arabia
- Saudi Arabia- Revision of the Deadlines for RFPQ Submissions

3.4.4 THE GUIDE TO THE LICENSING PROCESS

A regulator will typically issue some form of guide to the licensing process. Such a guide is sometimes referred to as a "Request for Applications for a Licence", "Invitation to Tender", "Licensing Guidelines", or even "Licensing Tender". We will refer to these documents collectively as the guide to the licensing process.

The guide to the licensing process sets out a range of important information about the licensing competition. Such information may include background to the competition, market conditions, the scope of the licence, the procedures that will be followed in the competition, qualification criteria, selection criteria, fees, and the schedule for the licensing process. This guide is typically made available to the public or to qualified bidders as soon as a form of notice of invitation to apply for the licence is released.

In some cases, additional documentation is issued in order to provide potential participants in the licensing process with more information about the licence, the licensing process, the local economy and regulatory framework, and other relevant matters. For example, in Singapore, the ICT regulator, Info-Communications Development Authority, published an Information Memorandum to provide interested parties with information about the proposed grant of Public Cellular Mobile Telecommunications Services Spectrum Rights. This Information Memorandum clearly states that its publication was for informational purposes only and is not an offer or invitation to participate in the auction process.

Practice Notes

- Estonia- 3G Tender Information Document-2004
- Nepal -- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Norway- 3G Licensing Document- 2000
- Switzerland - Invitation to Tender for GSM Licences - 2003

Reference Documents

- Estonia- Information Document of the Public Tender for Technical Authorisation of 3G Mobile Telephone Network
- Iceland -- Tender for the Issuance of Frequency Authorizations for GSM 1800 Mobile Phone Networks
- India -- Auction of 3G and BWA Spectrum
- Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction

- Nigeria -- Information Memorandum: 800 MHz Spectrum Auction
- Norway- Invitation to Tender for Licences for the Development and Operation of a Third Generation Mobile Telecommunications System
- Poland -- Tender for two exclusive nationwide frequency licences in the band of 880-990 MHz and 925-935 MHz to be used in a public telecommunication network
- Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights
- Singapore- Announcement of 3G Licensing Framework and Auction Rules
- South Africa- Invitation to Apply for a Public Switched Telephone Service Licence
- Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard

3.4.4.1 CONTENTS OF THE GUIDE TO THE LICENSING PROCESS

This section provides further information on a subject introduced earlier in this module, namely the contents of a notice, information memorandum, request for tenders or similar "guide" to applying for an individual licence or other authorization to provide an ICT service.

Guides to the licensing process usually contain information that allows applicants to analyze the prospective opportunity and to submit responsive applications. Guides to the licensing process often include:

- **An Introduction**, including a brief overview of the purpose of the licensing process and the address for correspondence with the regulator.
- **A Schedule** of the various steps in the licensing process.
- **Background Information on the ICT Sector in the Country**, including information related to the current structure of the ICT sector, major stakeholders, current network capabilities, ICT policy, ICT legislation and other licences or authorizations in place.
- **Rights and Obligations of the Licensee**, including information related to exclusivity, network roll-out requirements, scheduling, service quality, interconnection, access to public and private lands, the term of the licence and spectrum allocation.
- Instruction to the Applicants, including information related to the selection process, eligibility and qualification, content and format of the application, communications and requests for clarification, the cost of the application and bidding, the modification of the terms of the licence and other legal and formal requirements.
- **A Draft Licence** may be included. This approach adds considerable certainty and transparency to the process.
- **Information** may also be provided, including relevant investment legislation and policies, interconnection guidelines, an application for spectrum, the existing tariff, the national numbering plan and a tariff guideline.

Practice Notes

- Estonia- 3G Tender Information Document-2004
- Nepal -- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Norway- 3G Licensing Document- 2000
- Switzerland - Invitation to Tender for GSM Licences - 2003

Reference Documents

- Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range
- Estonia- Information Document of the Public Tender for Technical Authorisation of 3G Mobile Telephone Network
- Iceland -- Tender for the Issuance of Frequency Authorizations for GSM 1800 Mobile Phone Networks

- Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction
- Nigeria -- Information Memorandum: 800 MHz Spectrum Auction
- Norway -- Invitation to Tender for Licences for the Development and Operation of a Third-Generation Mobile Telecommunications System in Norway
- Poland -- Tender for two exclusive nationwide frequency licences in the band of 880-990 MHz and 925-935 MHz to be used in a public telecommunication network
- Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights
- South Africa- Invitation to Apply for a Public Switched Telephone Service Licence
- Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard

3.4.5 THE PUBLIC NOTICE OF THE REQUEST FOR APPLICATIONS

The licensing process generally begins with a public notice of the licence competition. One of the purposes of issuing a public notice is to alert potential applicants about the opportunity to obtain the licence. Accordingly, the public notice usually states the regulator's intention to issue a licence and provides a high level summary of the licence and the licensing process. The public notice also provides information on where to obtain more information about the licensing process. In the past, notices of invitation to apply for a licence were sometimes sent to only a few qualified bidders that were pre-selected by an investment bank or other advisor to the regulator. However, with the increasing emphasis on regulatory transparency, most authorities will issue some form of public notice of their licensing process, often at a preliminary or pre-qualification phase of the process.

3.4.5.1 LICENSING PROCESS PUBLIC NOTICE

A public notice that one or more individual licences will be issued generally includes a brief summary of the opportunity and the proposed licensing process. Information commonly included in a public notice is:

- a description of the services or facilities to be authorized;
- the geographic area of the licence;
- the competitive process that will be used to award the licence; and
- key dates in the licensing process, especially the deadline for submitting applications.

Some longer notices include information about pre-qualification and selection criteria; information about application and licence fees; and other information that is usually left to the licensing guide.

Some licensing authorities charge a sizable fee for the purchase of the guide to the licensing process. In such cases, it is necessary to provide enough information in the public announcement for interested persons to determine whether it is worth purchasing the full licensing package.

Public notices may be in print or electronic format, or both. Notices typically appear on the web site of the regulator, in the trade press, magazines, newspapers, journals and other media where industry participants can be expected to learn of the notice.

Reference Documents

- Algeria -- Notice of Invitation to the expression of interest related to third generation (3G) mobile communications licenses assignment
- Kenya- Invitation to Prequalify for the International Tender of a License to Construct and Operate a Nationwide GSM Cellular System
- Macedonia -- Tender for granting authorizations for radio frequencies utilization for the provision of 3G services according to the IMT-2000/UMTS standard
- Singapore- Announcement of 3G Licensing Framework and Auction Rules

- Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard

3.4.6 THE PRE-QUALIFICATION PHASE

It is sometimes desirable to limit the field of applicants to parties that have demonstrable financial and technical qualifications to achieve the objectives of the regulator. In these cases, the licensing process includes a pre-qualification phase. During the pre-qualification phase, potential applicants must demonstrate or confirm that they meet the pre-qualification criteria in order to be eligible to participate in the licensing competition.

The pre-qualification criteria are usually minimum requirements that establish a baseline of financial capability and technical competence. In some cases, applicants must demonstrate past experience in providing certain types of services or running a specified type and size of network. In other cases (typically spectrum auctions), applicants must confirm that they already hold a particular kind of telecommunications or ICT licence. The fact that an applicant holds the designated licence serves as evidence of its financial capability and technical competence since the applicant would have had to meet such criteria in order to obtain the designated licence. This approach was used in the 2007 Nigerian 800 MHz spectrum auction and in the 2007 10.5 GHz spectrum auction in Singapore, for example.

In some cases, legislation or regulations require regulators to include a pre-qualification phase in a competitive licensing process. In Saudi Arabia, for example, the Telecommunications By-law requires that the Communications Information and Technology Commission (CITC) include a pre-qualification phase in any auction or comparative evaluation process. The By-law broadly identifies financial capability and technical capability as the two pre-qualification criteria that applicants must meet to participate in a competitive licensing process. The CITC is authorized to determine the specific form and substance that is used as measures of whether an applicant has meet these two pre-qualification criteria.

Practice Notes

- Jordan- Pre-qualification Notice for 3rd Mobile Licence- 2003
- Kenya- Prequalification Notice for a SNO Licences- 2003
- Licensing Pre-Qualification Criteria
- Saudi Arabia – Pre-Qualification for Data Services Licensing
- Saudi Arabia- Pre-qualification for Cellular Mobile Services Licensing

Reference Documents

- Jordan- Pre-qualification Requirements for the Application for a Licence to Build, Own and Operate a Public Mobile Telecommunications Network and to Provide Public Mobile Telecommunications Services
- Kenya- Invitation to Pre-qualify for the International Tender for a Second National Operator (SNO)
- Kenya- Invitation to Prequalify for the International Tender of a License to Construct and Operate a Nationwide GSM Cellular System
- Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction
- Nigeria -- Information Memorandum: 800 MHz Spectrum Auction
- Saudi Arabia -- Request for Pre-Qualification of Candidates in the Licensing Process of Cellular Mobile Services in the Kingdom of Saudi Arabia
- Saudi Arabia -- Request for Pre-Qualification of Candidates to Participate in the Licensing Process of Data Transmission Services in the Kingdom of Saudi Arabia
- Saudi Arabia -- RFPQ Questions and Answers
- Saudi Arabia -- RFPQ Questions and Answers
- Saudi Arabia- Cellular Mobile Licensing RFPQ Questions and Answers

3.4.6.1 WHETHER TO INCLUDE A PRE-QUALIFICATION PHASE

This section provides further information on a subject introduced earlier in this module, namely whether to run a pre-qualification process as part of a licensing process.

As was noted in **section 4.6**, in some cases, regulators are obligated to include a pre-qualification phase in any competitive licensing process by the terms of applicable telecommunications legislation or regulations. The Saudi Arabian regulator, for example, must include a pre-qualification phase in any auction or comparative evaluation phase. However, in many other cases, regulators are not obligated to include a pre-qualification phase. In these latter cases, regulators must determine whether a competitive licensing process ought to include a pre-qualification stage. The decision about whether to require applicants to pre-qualify generally takes into account a number of factors.

The nature of the ICT market and the circumstances of the licence competition are relevant to determining whether a pre-qualification phase would be beneficial. The level of competition in the market for which the licence is being issued is also an important consideration.

For example, in the case of individual licensees that will enjoy monopoly or other exclusive rights, there is an imperative to ensure that the licensed service provider is financially and technically able to meet obligations contained in the licence related to network rollout, service coverage and quality. The process of enforcing compliance with the terms and conditions of the licence or revoking and administering a new licensing process in the case of default is time consuming, costly and disruptive for consumers.

In the case of highly competitive services, consumers can switch away from a service provider that fails to provide adequate service to another. A pre-qualification process to establish financial viability and technical competence is therefore less important.

However, even in relatively competitive markets, such as mobile cellular services, it is important to establish some minimum qualification requirements. These requirements will ensure that valuable spectrum and other scarce resources are awarded to applicants who are financially and technically capable of providing the service.

The type of selection mechanism that will be applied to award the licence is also relevant. Comparative evaluation processes are often structured to include an evaluation of the financial and technical merits of applicants. The selection mechanism for an auction, however, often does not focus on financial and technical considerations. Thus, pre-qualification phases often have more relevance in auctions than in comparative evaluation processes.

One potential disadvantage of requiring pre-qualification is that the pre-qualification round extends the licensing process and delays the actual issuance of the licence. One way to minimize the delay caused by the pre-qualification round is to adopt criteria that are relatively easy to adjudicate and that require little subjective analysis.

In any event, the regulator may ultimately save time by requiring that applicants pre-qualify since the regulator will then have fewer applications to review during the selection process. Receiving applications from large numbers of clearly unqualified applicants does not advance the licensing process. On the contrary, it complicates the task of the regulator since the regulator must expend time and money to review these applications. It is often preferable to exclude persons who are not likely to be issued the licence from participating in the process at an early phase. Thus, while the licensing process is lengthened by the pre-qualification phase, time is gained during the selection phase.

Regulators sometimes impose a significant application fee instead of or in addition to relying on a formal pre-qualification. Such an application fee will discourage frivolous bidders. The fee may be tied to the submission of an application or may be charged for the purchase of the guide to the licensing process.

Because the purpose of a pre-qualification phase is to limit the field of applicants, this phase occurs early on in the licensing competition. It is advisable to inform potential applicants at an early phase that they will be required to pre-qualify to participate in the selection phase of the licensing competition.

The public notice of the invitation to participate in the licensing process often makes reference to pre-qualification requirements. The guide to the licensing process may also contain information about the pre-qualification phase. Some regulators, however, prepare a separate document that addresses only the pre-qualification phase. Applicants that successfully qualify for the licensing competition are then provided with the guide to the licensing process, which outlines the selection process, among other things.

Related Materials

For a discussion on the specific considerations relevant to deciding whether to include a pre-qualification requirement in universal access and services (UAS) bidding processes, see **Module 4, "Universal Access and Service", section 7.1.3, "Design of Bidding Process".**

3.4.6.2 PRE-QUALIFICATION CRITERIA

This section provides further information on a subject introduced earlier in this module, namely a pre-qualification process for applicants for individual licences.

Pre-qualification criteria are minimum requirements that must be met in order to participate in a competitive process an award of licence. Generally, pre-qualification criteria are aimed at ensuring that applicants have the financial and technical resources and experience to successfully provide the authorized service. In order to enhance transparency and certainty in the licensing process, it is preferable that the pre-qualification criteria be objective rather than subjective measurements of financial viability and technical competence. An objective pre-qualification criterion that is often used requires applicants to demonstrate that they, or an affiliated entity, have actually operated a network of a certain size. For example, applicants might have to demonstrate that they have run a mobile cellular telephone network with 100,000 subscribers in order to pre-qualify for a mobile cellular licensing process. While such a criterion is objective and effective in ensuring experience, it would preclude financially capable new entrants from participating. This can be counter-productive, since adequately financed new entrants can usually 'buy' good cellular operating experience by hiring some of the thousands of engineers and business people who have worked in the global cellular business.

In some cases (typically licensing processes for spectrum allocations), the pre-qualification criteria include the requirement that applicants already hold a particular kind of telecommunications or ICT licence. In these cases, the pre-existing licence acts as a proxy for financial capability and technical competence: presumably, the applicant had to satisfy such criteria when it obtained the first licence. Thus, the fact that the applicant holds the specified licence is evidence of its ability to meet financial capability and technical competence requirements. Nigeria used this approach in its 2007 800 MHz spectrum auction. One of the pre-qualification criteria for participating in the auction was a requirement to hold a national network operating licence or a Unified Access Services (UAS) Licence. In order to acquire either of these licences, applicants would have had to satisfy a number of criteria relating to financial capability, operating experience, and technical expertise. See Box 1 to review the pre-qualification criteria featured in the 800 MHz spectrum auction.

Singapore also used this approach in its 10.5 GHz spectrum auction in 2007. Participation in this auction process was restricted to holders of Facilities-Based Operator (FBO) Licences and the Singapore Armed Forces, the Singapore Police Force, and the Civil Defence Force. The criteria for obtaining an FBO Licence in Singapore include, among other things, evidence of the applicant's financial capability and strength; the applicant's technical plan and capability; and the technical soundness of the applicant's plans. Thus, FBO licensees would have already satisfied an evaluation of their financial capabilities and technical competence prior to participating in the 10.5 GHz auction.

◂ Box 1 Pre-Qualification Criteria for the 2007 Nigerian 800 MHz Spectrum Auction

Source: Nigerian Communications Commission, Information Memorandum: 800 MHz Spectrum Auction

Applicants were required to confirm that they met the following pre-qualification criteria in order to be eligible to participate in the auction: The Applicant must:

- be a company operating in Nigeria;
- possess a subsisting national network operating licence or a Unified Access Services (UAS) Licence;
- must not already have a cumulative spectrum size equal to or more than 5MHz on any or combination of spectrum band(s), except for point-to-point microwave frequency band;
- not have any outstanding obligations, including any obligations relating to administration, licence, and operating fees owed to the Nigerian Communications Commission and interconnection debts, due at the time of the deadline for submitting applications;
- not have a relationship with any other Applicant, where a relationship is defined as a situation where an Applicant owns directly or indirectly an ownership stake of ten percent or more in another Applicant; and
- pay the Intention-to-Bid Deposit (Niara 40 million) into a specified account.

Applicants were further required to submit confirmation that they met the above criteria using the templates provided in the Information Memorandum issued with respect to the auction. Applications were required to be accompanied by proof that the Intention-to-Bid Deposit had been paid into the designated account and that the funds had cleared. The Information Memorandum specifically stated that bank guarantees were not acceptable substitutes.

Some countries impose foreign ownership restrictions that establish minimum levels of local ownership for authorized service providers. Foreign ownership restrictions are generally contrary to the spirit, if not the letter of international trade agreements, including the GATS. However, various WTO signatories have registered exemptions permitting them to continue to apply foreign ownership restrictions. Over time, such restrictions are expected to be phased out in most countries. Until they are, the restrictions should be noted in any pre-qualification criteria.

RELATED INFORMATION

Qualification Criteria and Selection Criteria

Practice Notes

- Jordan- Pre-qualification Notice for 3rd Mobile Licence- 2003
- Kenya- Prequalification Notice for a SNO Licences- 2003
- Licensing Pre-Qualification Criteria
- Saudi Arabia – Pre-Qualification for Data Services Licensing
- Saudi Arabia- Pre-qualification for Cellular Mobile Services Licensing

Reference Documents

- India -- Auction of 3G and BWA Spectrum
- Jordan- Pre-qualification Requirements for the Application for a Licence to Build, Own and Operate a Public Mobile Telecommunications Network and to Provide Public Mobile Telecommunications Services
- Kenya- Invitation to Pre-qualify for the International Tender for a Second National Operator (SNO)
- Kenya- Invitation to Prequalify for the International Tender of a License to Construct and Operate a Nationwide GSM Cellular System
- Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction
- Nigeria -- Information Memorandum: 800 MHz Spectrum Auction
- Saudi Arabia -- Request for Pre-Qualification of Candidates in the Licensing Process of Cellular Mobile Services in the Kingdom of Saudi Arabia
- Saudi Arabia- Request for Pre-qualification of Candidates to Participate in the Licensing Process of Data Telecommunications Services
- Saudi Arabia- Telecommunications Bylaw

3.4.7 QUALIFICATION CRITERIA AND SELECTION CRITERIA

It is important to distinguish between criteria relating to the qualification of an applicant to participate in the selection phase of a licensing process and criteria for the actual selection of a successful licensee from among the qualified applicants.

Qualification criteria serve to determine which parties will have the right to advance to the selection phase of the licensing process. Selection criteria are used to determine which applicant will be awarded the licence or licences.

In the case of a general authorization, only the qualification criteria are relevant because no competitive selection is made. In the case of a selection process for an individual licence, both qualification and selection criteria are normally developed. It is generally advisable to conduct a licensing process in at least two phases. The qualification phase is completed first. For less complex licensing processes, the pre-qualification and qualification phases are sometimes combined as one. Only qualified applicants participate in the second phase – the licensee selection process.

Related Materials

For a discussion about the specific considerations relevant to the eligibility criteria for universal access and services (UAS) bidding processes, see Module 4, "Universal Access and Service", section 7.1.3, "Design of Bidding Process".

Practice Notes

- Licensing Qualification Criteria
- Licensing Qualification Criteria: Selected Country Examples
- Licensing Selection Criteria

Reference Documents

- **Estonia- Information Document of the Public Tender for Technical Authorisation of 3G Mobile Telephone Network**
- **Iceland -- Tender for the Issuance of Frequency Authorizations for GSM 1800 Mobile Phone Networks**
- **Macedonia -- Tender for granting authorizations for radio frequencies utilization for the provision of 3G services according to the IMT-2000/UMTS standard**
- **Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region**
- **Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction**
- **Nigeria -- Information Memorandum: 800 MHz Spectrum Auction**
- **Poland -- Tender for two exclusive nationwide frequency licences in the band of 880-990 MHz and 925-935 MHz to be used in a public telecommunication network**
- **Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights**
- **Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard**

3.4.7.1 THE QUALIFICATION PHASE

This section provides further information on a subject introduced earlier in this module, namely the qualification process for applicants for individual licences.

In some licensing processes, the qualification phase and selection phase are dealt with separately, such as in the classic “two envelope” approach. Under this approach, the qualification phase occurs first. The first envelope is opened and the submissions of applicants are reviewed to determine which ones are technically, financially or otherwise qualified to proceed to the selection phase.

The second envelopes of non-qualified applicants are usually returned un-opened. Sometimes an explanation is given as to which qualification criteria the applicant failed to meet. Such an explanation is consistent with the requirement of the *WTO Regulation Reference Paper* to make reasons for denial of a licence known to the applicant upon request.

Where the qualification and selection processes are run separately, such as under the two envelope approach, an applicant’s second envelope contains information related to the selection criteria. The most common and objective selection criterion is the financial amount of a bid. This may be based on the highest bid, for example, for a 3G licence. It may also be to the lowest bid, for example, in the case of a least-cost subsidy auction. Such auctions are discussed in Module 4, Universal Access. Selection criteria are discussed further below.

In some cases, the qualification and selection processes are held simultaneously, such as in a comparative evaluation process.

Qualification criteria should be published in advance of the commencement of the qualification phase. This is consistent with the provisions of the *WTO Regulation Reference Paper*, which stipulate that “all licensing criteria” must be made publicly available.

In order to maximize the transparency of the process, direction may be provided on how potential applicants can demonstrate that they have met qualification criteria, such as technical competence or financial backing. As previously indicated, one of the most common type of evidence involves prior experience in operating a network with a specific number of subscribers.

There are potentially negative consequences to adopting very specific qualification criteria and to specifying the type of evidence that will suffice to demonstrate that these criteria have been met. This specificity makes the process more rigid and constrains the regulator’s flexibility to address novel situations or unexpected but useful qualifications. Maintaining some degree of regulatory discretion in the qualification process may be appropriate.

Transparency in the qualification phase is maintained by communicating clearly with potential applicants about how their submissions will be evaluated. In particular, it is advisable to inform potential applicants whether minimum compliance with pre-qualification criteria is sufficient to advance them to the selection phase of the competition. There has been litigation against regulators in some countries where qualification criteria were specified but some otherwise qualified applicants were subsequently rejected on the basis that they were less qualified than others.

In order to increase certainty of the licensing process, as well as its transparency, regulators usually state the date for a decision on which applicants have successfully qualified to advance to the selection phase. This date, as well as other significant dates in the qualification process, is frequently included in a schedule provided in the qualification process materials issued to potential applicants.

Practice Notes

- Licensing Qualification Criteria
- Licensing Qualification Criteria: Selected Country Examples

Reference Documents

- Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range
- Estonia- Information Document of the Public Tender for Technical Authorisation of 3G Mobile Telephone Network
- Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights
- Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard

3.4.8 THE SELECTION PHASE

The heart of the licensing process is the selection phase. During this phase, the competition for the licence occurs and the successful applicant is selected. There are two main types of competitive selection processes: a comparative evaluation approach (or “beauty contest”) and auctions. Other approaches include lotteries and a variety of hybrid approaches that use elements of pre-qualification, comparative evaluation and auctions or lottery approaches. A guide to a licensing process should provide details about the selection mechanism to be used in the licensing competition, as well as information about selection criteria and the process that will be followed.

Practice Notes

- Estonia- 3G Tender Information Document-2004
- Licensing Selection Criteria
- Nepal -- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Norway- 3G Licensing Document- 2000
- Selection Mechanisms in Comparative Perspective
- Switzerland - Invitation to Tender for GSM Licences - 2003

Reference Documents

- India-Rural Services Licensing Document
- South Africa- Invitation to Apply for a Public Switched Telephone Service Licence

3.4.8.1 COMPETITIVE SELECTION MECHANISMS

This section provides further information on a subject introduced earlier in this module, namely the selection process for applicants for individual licences.

Two main approaches are used in competitive selection processes:

- Comparative Evaluation Approaches, and
- Auctions

In addition, there are many hybrid approaches that combine elements of these main approaches. Less common approaches include lotteries, first come-first served processes, and selections based on the best performance under previously held licences.

***Comparative Evaluation Approach* —** In a comparative evaluation, or "beauty contest", the award of licence is determined using a merit-based assessment of competitive applications. Each application is evaluated on the basis of a pre-set list of selection criteria or on the basis of the applicant's ability to fulfil certain, more general, requirements. This approach allows regulators to award the licence to the service provider that is best placed to meet the specific objectives of the licensing process.

If more than one licence is being issued at the same time, the applicant with the most points is deemed the winner and is permitted to choose which licence it wants. The applicant with the second-highest amount of points has the right to choose next, and so on. This approach was used in the 2007 GSM spectrum auction in Iceland, where two licences were issued using a beauty contest.

There are many forms of comparative evaluation schemes. In some cases, licences are awarded to applicants expected to make the best use of the limited resources associated with the licence to serve the public. For example, in the 2007 Icelandic GSM spectrum auction, the evaluation centred on which applicant would be able to roll out its network and services in the shortest amount of time, to the greatest number of people. In other cases, the evaluation is based on criteria related to technical competence, experience, and cost efficiency. Some comparative evaluations rely in part on quantitative measures, such as the number of years of operational experience. Others rely on more qualitative (and thus subjective) criteria, such as the quality of management.

Specific selection criteria, should be clearly described in the guide to the licensing process. It is also useful to pre-determine and to publish the weighting for each criterion. This promotes transparency in the licensing process. This also helps applicants to prepare more responsive applications to ensure that the regulator selects the best qualified applicant for the award of the licence.

***Auctions* —** While the comparative evaluation approach involves the selection of an applicant based on merit, auctions involve little or no qualitative analysis of the merits of the applicant. Instead, selection is based on a single evaluative criterion, namely the amount bid by qualified applicants.

Many different types of auctions are possible. The most common involves selection of the qualified applicant who submits the highest bid for the right to hold the licence. In least-cost subsidy auctions, which are described in Module 4, Universal Access, a selection is made based on which qualified applicant requires the lowest subsidy to provide a non-economic service. The services authorized using a least-cost subsidy auction are generally subsidized as part of a country's universal access program. In a least-cost subsidy auction, applicants make offers of the subsidies they would require to provide the authorized services. The applicant that bids the lowest subsidy is awarded the licence, along with the right to the subsidy it has proposed. Such auctions have been used successfully on a number of occasions to license subsidized rural telecommunications services in Latin America, and more recently in other regions. For example, the Nepalese regulator used this mechanism to issue a rural telecommunications services licence in its country.

Auctions can also be based on any other measurable indicator that is financial or based on financial considerations. These might include the lowest consumer tariff to be charged, the highest quality of service, or the greatest level of service to non-economic areas.

In many auctions, bidders are pre-qualified or qualified using criteria similar to those used in comparative evaluation processes. As a result, participation in these auctions is limited to bidders with proven financial and technical capabilities.

While some auctions feature only a single round of bidding, many auctions include multiple bidding rounds. There are frequently rules governing how often a bidder must bid to avoid disqualification, minimum bid increments, the start-of-round price, the duration of each round, and so on. In many cases, all bidders participate in the auction until a winner has been determined or they have been disqualified. In some cases, however, the auction itself has two stages. During the first stage, all bidders participate and typically must provide a sealed bid. Only a certain number of bidders, however, are permitted to advance to the second stage, where the winner of the auction is actually determined through one or several rounds of bidding. This approach was used in the 2007 Nigerian 800 MHz auction. All Approved Bidders were required to submit a sealed bid during the first round of bidding. Only the two Approved Bidders who had submitted the top bids advanced to the second round of bidding. The winner of the auction was determined in the second round of the auction.

Regulators have frequently relied on auctions to issue spectrum licences. A discussion of various auction procedures in the context of spectrum licences will be included in the spectrum licensing module of this Toolkit.

Hybrid Approaches – There are many variations of the two main selection approaches. In some cases, hybrid approaches blend elements of a comparative evaluation with elements of an auction. For example, applicants may be scored on a number of quality-based criteria and market-based criteria, such as the amount of their bid for the licence, financial security, technical competence, and operational experience. In this case, the applicant with the highest combined score may be awarded the licence.

RELATED INFORMATION

The Pre-Qualification Phase

Selection Criteria

The Selection Process

Choosing Selection Mechanisms and Criteria

For a discussion on the specific considerations relevant to the design of the selection mechanism in universal access and services (UAS) bidding processes, see Module 4, "Universal Access and Service", section 7.1.3, "Design of Bidding Process".

Practice Notes

- Nepal -- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Selection Mechanisms in Comparative Perspective

Reference Documents

- Bahrain- Invitation to Apply for a Licence for the Second Mobile Telecommunications Licence and Frequency Licence
- Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range
- Iceland -- Tender for the Issuance of Frequency Authorizations for GSM 1800 Mobile Phone Networks
- India -- Auction of 3G and BWA Spectrum
- Macedonia -- Tender for granting authorizations for radio frequencies utilization for the provision of 3G services according to the IMT-2000/UMTS standard
- Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region
- Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction
- Nigeria -- Information Memorandum: 800 MHz Spectrum Auction
- Poland -- Tender for two exclusive nationwide frequency licences in the band of 880-990 MHz and 925-935 MHz to be used in a public telecommunication network
- Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights
- Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard

3.4.8.2 SELECTION CRITERIA

This section provides further information on a subject introduced earlier in this module, namely selection criteria used in the selection process for applicants for individual licences.

Selection criteria are used to determine which qualified applicant will be awarded the licence during a licensing process. A wide range of criteria can be used in the selection process. The choice of criteria is related to the objectives of the licensing process.

For example, if an important objective is to license a competent operator to provide adequate services to the public on a long-term basis, then criteria that measure technical competence, operational abilities, and financial viability will be important. Alternatively, if the prime objective is to raise money for a government treasury, price may be the best selection criterion. However, in such a case, applicants should normally be pre-qualified to ensure some minimum level of capability to implement the service.

Selection criteria may be quantitative or qualitative. A comparative evaluation procedure may involve one or the other or both types of criteria. Which type of criteria should be used in a licensing process depends on the objectives of the licensing process and the advantages and disadvantages of each type of criteria in the particular licence and ICT market circumstances.

Regulators may attribute different weight to different selection criteria. In such a case, information should be provided about the weighting of selection criteria, in order to promote transparency in the licensing process.

RELATED INFORMATION

The Selection Process

For a discussion on the specific considerations relevant to eligibility and selection criteria in universal access and services (UAS) bidding processes, see **Module 4, "Universal Access and Service", section 7.1.3, "Design of Bidding Process".**

Practice Notes

- **Licensing Selection Criteria**

Reference Documents

- **Bahrain- Invitation to Apply for a Licence for the Second Mobile Telecommunications Licence and Frequency Licence**
- **Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range**
- **Estonia- Information Document of the Public Tender for Technical Authorisation of 3G Mobile Telephone Network**
- **Iceland -- Tender for the Issuance of Frequency Authorizations for GSM 1800 Mobile Phone Networks**
- **Macedonia -- Tender for granting authorizations for radio frequencies utilization for the provision of 3G services according to the IMT-2000/UMTS standard**
- **Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region**
- **Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction**
- **Nigeria -- Information Memorandum: 800 MHz Spectrum Auction**
- **Poland -- Tender for two exclusive nationwide frequency licences in the band of 880-990 MHz and 925-935 MHz to be used in a public telecommunication network**
- **Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights**
- **Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard**

3.4.8.3 THE SELECTION PROCESS

This section provides further information on a subject introduced earlier in this module, namely the selection process for applicants for individual licences.

To increase confidence in the licensing process, it is important to build as much transparency and certainty as possible into the selection process. There are a number of ways that regulators can enhance transparency and certainty.

To build transparency and certainty, the guide to the licensing process should describe the selection mechanism that will be used. It should also outline the selection criteria and the weight given to each criterion. The guide should include a coherent and complete set of selection procedures that will be followed in the selection process. All steps of the process should be outlined and any required action of applicants at each step should be noted.

The guide to the licensing process should also address various contingencies that are frequently encountered. For example, it is helpful if the guide specifies the procedures that will be followed if there is a tie in the selection process. Understandably, not all contingencies can be addressed. If the selection process takes an unexpected turn, transparency and certainty can be maintained by consulting openly with applicants about the unanticipated circumstances and communicating clearly the proposed course of action.

The major steps in the selection process should be clearly identified. These may include: if there is a qualification phase, the announcement of the decision on which applicants have successfully qualified to advance to the selection phase of the process; the deadline for submitting questions about the licensing process; the date on which the regulator's questions of clarification regarding submitted applications will be issued; the deadline for replying to questions of clarification; the date on which the successful applicant will be announced; the deadline for the successful applicant to confirm acceptance of the licence; and date on which the licence will be issued. A Practice Note in this module discusses the steps of selection processes in a comparative perspective.

Transparency and certainty may also be fostered by specifying to applicants all the materials that must be submitted for review during the selection process, as well as the acceptable form for submission of these materials. It is helpful to provide applicants with a "compliance list" that summarizes all the required materials to be submitted, cross-referenced to the relevant portion of the guide to the licensing process. The regulator may require that the applicant submit this list with its application in a form that identifies where each of the required materials may be found in the application package.

The selection process concludes with the award of licence. It is a good practice to specify when and where the award of licence will be announced. It is also good practice to require the successful applicant to confirm its acceptance of the award of licence in writing within a prescribed amount of time. If the successful applicant is required to comply with any conditions before the licence is issued (e.g., the payment of a licence fee), such requirements should be clearly identified.

RELATED INFORMATION

Scheduling the Licensing Process

Choosing Selection Mechanisms and Criteria

For a discussion on the specific considerations relevant to the design of the selection mechanism in universal access and services (UAS) bidding processes, see **Module 4, "Universal Access and Service", section 7.1.3, "Design of Bidding Process".**

Practice Notes

- **Licensing Selection Criteria**
- **Selection Mechanisms in Comparative Perspective**

Reference Documents

- **Bahrain- Invitation to Apply for a Licence for the Second Mobile Telecommunications Licence and Frequency Licence**
- **Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range**
- **Estonia- Information Document of the Public Tender for Technical Authorisation of 3G Mobile Telephone Network**
- **Iceland -- Tender for the Issuance of Frequency Authorizations for GSM 1800 Mobile Phone Networks**
- **India -- Auction of 3G and BWA Spectrum**
- **Macedonia -- Tender for granting authorizations for radio frequencies utilization for the provision of 3G services according to the IMT-2000/UMTS standard**
- **Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region**
- **Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction**
- **Nigeria -- Information Memorandum: 800 MHz Spectrum Auction**
- **Poland -- Tender for two exclusive nationwide frequency licences in the band of 880-990 MHz and 925-935 MHz**

to be used in a public telecommunication network

- Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights
- Switzerland- Public Invitation to Tender for Radio Licences for the Provision of Telecommunications Services Based on the GSM Standard

3.4.8.4 CHOOSING SELECTION MECHANISMS AND CRITERIA

This section provides further information on a subject introduced earlier in this module, namely selection mechanisms and criteria used in the selection process for applicants for individual licences.

Choosing appropriate selection criteria and processes can be very challenging. Consideration must be given to such factors as: local market conditions, policy objectives, compliance with WTO rules or other transparency requirements, the underlying legislative framework, the nature of the licence being issued, the capacity of the regulator, and the time frame for the issuance of licence, in addition to a number of other factors.

Several observations can be made about the choice of selection criteria and selection process. First, qualified applicants are motivated to devote financial and other resources to those aspects of their applications that will form the basis of the selection decision. Licensing criteria can be seen as part of a zero-sum game. Each applicant has a finite amount of cash and other resources to devote to the proposed service. Other things being equal, resources which are allocated to one selection criterion (e.g. the highest licence fee or aggressive network roll-out commitments) are not available to fund other aspects of the operation which are not related to selection criteria (i.e. lower prices, introduction of enhanced networks or services).

Second, transparency is increased by use of simple quantitative selection criteria. A comparative evaluation process that is based on subjective or qualitative criteria will be less transparent. The same is true of multiple criteria that cannot easily be compared. A lack of transparency undermines the credibility of the process and of the regulator. It also opens the door for complaints of bias, corruption or incompetence. To maximize transparency, it has often been argued that a single financial or other quantitative selection criterion should be used. This can be derived by use of a formula which combines a number of selection criteria into a single numeric factor if desired.

On the other hand, depending on market conditions, use of a quantitative auction process can lead to excessively high bids. Frequently cited examples of excessive bidding are the 3G auction process held in the UK, Germany and elsewhere in Western Europe around the year 2000. These auctions are described in Module 5, Radio Frequency Management.

Use of a single financial criterion does not mean other service factors or licensing objectives are irrelevant. Important factors and objectives not used as selection criteria can be included in the qualification process or incorporated into the conditions of licence. For example, network coverage, rollout and universal service commitments can be specifically incorporated as licence conditions that any successful applicant must comply with. All applicants must then incorporate these minimum requirements into the calculation of their financial bid.

Related Materials

For a discussion on the specific considerations relevant to the design of the selection mechanism and selection criteria in universal access and services (UAS) bidding processes, see **Module 4, "Universal Access and Service", section 7.1.3, "Design of Bidding Process".**

Practice Notes

- Licensing Selection Criteria
- Selection Mechanisms in Comparative Perspective

3.5 FEES

Authorization regimes around the world feature a variety of different fees that are imposed on licensees. This section reviews the different types of authorization fees that exist and outlines common trends and practices related to the imposition of these fees.

3.5.1 AUTHORIZATION AND OTHER FEES

Many different kinds of authorization fees have been imposed on the telecommunications industry. Transparency in the authorization process is enhanced by differentiating between different kinds of authorization fees and by clearly identifying which authorization fees apply in each authorization situation. The main types of authorization fees include:

- administrative fees, based on cost-recovery for regulators;
- cost-based spectrum management fees;
- discretionary administrative or spectrum fees (i.e. not cost-based); established on a one time or periodic basis (e.g. annually);
- royalties or highest bid 'auction fees' paid to a government or regulatory authority for a authorization, and unrelated to the administrative costs of regulation; and
- other special fees bundled with authorization fees, such as access deficit charges, universal service fees, industry taxes etc.; such fees should be separated from authorization fees.

Practice Notes

- **Canada – Licence Fees Regulations**
- **One-time Fees and Recurring Fees**
- **One-Time Initial Authorization Fees in Selected Countries, 2007**
- **Trends in One-time Initial Authorization Fees**
- **Trends in Recurring Authorization Fees**

Reference Documents

- **Malawi- Application Fees**
- **Tanzania -- Schedule of Licence Categories and Fees**

3.5.1.1 MORE ON AUTHORIZATION FEES

This section provides further information on a subject introduced earlier in this module, namely authorization fees.

In the ICT industry, the term "licence fee" (or "authorization fee") is used to describe different things. It may include one or more of the following:

- administrative fees that compensate a regulator for its costs of regulation; such fees are increasingly common, and are often seen as the 'best practice';
- spectrum management fees, which are based on similar cost-based principles to the aforementioned administrative fees; these are usually charged separately from "operating authorization fees";
- discretionary administrative or spectrum fees established on a one time or periodic basis (e.g. annually), but not cost-based; these fees may be established on an arbitrary 'value of authorization' basis or based on some type of benchmarking of other rates;
- revenue-sharing fees, that is, royalties, premium or "rent" paid to a government or regulator for the right to operate a network, provide a service or use a limited resource, such as radio spectrum or numbers; these fees may be set based on arbitrary numbers, benchmarking or market-based 'auction fees'; and
- in some cases, other special-purpose fees have been bundled with authorization fees such as access deficit charges, universal service fees, industry taxes etc. Transparency and good authorization practice requires such fees to be separated from authorization fees. Special-purpose fees are discussed further in Module 4, Universal Access.

Where more than one type of authorization fee is charged, it is good practice to unbundle them – that is to calculate them separately. This improves transparency and makes it easier to determine that the administrative charges related to cost recovery are indeed cost-based. Separating administrative authorization fees related to spectrum management from other administrative fees improves transparency and accountability. Spectrum management is usually handled by a separate branch, and sometimes a wholly separate ministry or agency from the ICT regulator.

Authorization fees paid for the right to operate a network, to provide certain services, or for the right to use a scarce resource are generally set before or during the process of awarding the relevant authorization. These fees may include a one-time initial charge for the authorization, recurring charges payable on a regular basis over the term of the authorization or, in some cases, both a one-time initial charge and a recurring fee. Most regulators provide details in tender documents about what charges, if any, will be levied on licensees and how such charges will be calculated in order to promote greater transparency and certainty.

One-time initial authorization fees may be fixed fees determined by the regulator, Minister, or government or the market value of the authorization, as determined through an auction. The nature of one-time initial authorization fees reflects the mechanism used to select the successful applicant. For example, in an auction, the fee is generally determined by the bids made by applicants. By contrast, authorizations awarded through a beauty contest may be subject to a fixed fee that is determined by the regulator or by the Minister or to no fee at all.

Fixed fees may be set at an arbitrary amount determined by the regulator or Minister. However, in order to promote transparency in the authorization process, it is prudent to adopt a market-set fee. Market-set fees are developed by using common telecommunications valuation methodologies. The ITU "Trends in Telecommunications Regulation – 2004/05, Licensing in an Era of Convergence" offers the following examples of measurements that may be used to determine a market-set fee:

- A measurement of discounted cash flow;
- A measurement of net present value;
- Benchmarking against regional or international results for comparable authorizations and markets;
- Previously applied authorization fees (in the case of multiple authorizations issued at different time periods); and
- A specific amount set to address government revenue objectives.

There are a number of different payment schedules for one-time initial authorization fees. The ITU Trends Report notes that the two most common payment schemes are "split payments", where unequal portions of the fee are payable over the term of the authorization, and the payment of equal, periodic instalments over a set number of years. (See the Practice Note on One-Time Fees and Recurrent Fees, which is excerpted from the ITU Trends Report. A link to this Practice Note is set out below.)

Authorization fees paid for the right to operate a network, to provide certain services, or for the right to use a scarce resource have evolved considerably over the past five to seven years. The advent of mobile technology is responsible in part for this evolution. Although authorization fees had remained stable for several years, the development of wireless technology triggered significant changes in fees structures. Over the past five to seven years, most individual authorizations have been awarded to wireless operators, while fixed line operators are increasingly operating pursuant to general authorizations or class licences.

The ITU Trends Report on Licensing includes further information about the fluctuation of one-time initial authorization charges levied on wireless operators. Relevant portions of the Trends Report in this regard are excerpted in a Practice Note, a link for which is set out below.

In addition to one-time initial authorization fees, some authorizations are also subject to recurring fees such as revenue sharing fees (royalties) and annual authorization fees. In some cases, the recurring fee is paid as compensation or as royalties to the government for the right to operate a network, to provide a service, or to use a scarce resource. Other recurring charges include administrative charges levied to compensate the regulator for the cost of regulation and fees levied to promote certain public policy objectives such as universal access.

The ITU Trends Report on Licensing notes that the annual recurring revenue charges (revenues sharing fees) that were first introduced in the ICT sector were quite high. Regulators have recognized, however, that a reduction in the level of revenue-percentage payable to the government is prudent in order to avoid imposing barriers to entry. Both India and Venezuela have taken measures directed to reducing the level of revenue-sharing with the government imposed on telecommunications operators. (See Box 1.)

"India's Department of Telecommunications recently asked the Ministry of Finance for approval to lower the revenue-sharing amount, which stood at 6-10 per cent, to a level designed solely to cover administrative costs. Meanwhile, in contrast to many countries, Venezuela was able to reduce revenue sharing when it introduced its new Telecommunications Law in 2000. It implemented a gradual reduction from 10 per cent to the current rate of 5.3 per cent. Recently implemented revenue-sharing schemes usually impose lower rates, ranging from 0.2 per cent to 2 per cent, but significant exceptions still remain."

◀ **Box 3.5 Reduction of Revenue-Percentage Charges in India and Venezuela**

Source: ITU Trends Report 2004, Chapter 4, "Licence Fee Practices: Historical Perspectives and New Trends".

Policy considerations sometimes play a central role in determining what type of fees will be levied on ICT services providers and how such fees should be calculated. The ITU Trends Report on Licensing notes that regulators can advance a number of policy objectives by setting authorization fees at reasonable levels during the first years of market development. This Report identifies in particular the objective of promoting economic or social goals such as universal access or service affordability and the objective of stimulating competition in the sector by lowering barriers to market entry. With respect to this latter objective, the Report also advocates maintaining the stability of authorization fees during the initial years of market development since increases to authorization fees are disruptive and may threaten the financial viability of operators. Further discussion of the socio-economic benefits of establishing low authorization fees is set out in a Practice Note, a link for which is set out below.

It is generally accepted that administrative fees should not impose unnecessary costs on the ICT sector. The most transparent manner by which to achieve this objective is an explicit cost-recovery scheme. Cost recovery schemes involve establishment of authorization fees based on the projected or actual costs of the regulator.

Once that overall level of cost-recovery has been set, it is necessary to allocate the costs among licensees or market participants. This allocation can be based on different factors, including ICT revenues, authorized coverage areas or types of services. The most common allocation base is gross revenues from the provision of ICT services.

Given the high degree of interconnection among ICT service providers, and correspondingly high interconnection and access charges among them, it is a good practice to use the following base amount for calculating authorization fees: gross ICT service revenues **minus** interconnection and access charges paid to other ICT service providers. Use of this base amount prevents double counting. For example, an ICT service provider that depends heavily on resale, may pay 50% or more of its gross revenues to other service providers by way of interconnection and access charges. The other service providers will be paying authorization fees based on those revenues. In order to avoid levying authorization fees twice on these revenues, the reseller should not be required to pay authorization fees on the revenues that are paid to the other service providers.

The EU Authorization Directive provides a good example of how authorization fees may be imposed in a transparent and fair manner. The Authorization Directive mandates that, in the case of issuing general authorisations, regulators may only charge fees to recover the costs of administering the authorization regime. Thus, fees must be set on a cost recovery basis.

Practice Notes

- Authorization Fees and the EU Authorisation Directive
- Canada – Licence Fees Regulations
- One-time Fees and Recurring Fees
- One-Time Initial Authorization Fees in Selected Countries, 2007
- Socio-Economic Benefits of Lower Authorization Fees
- Trends in One-time Initial Authorization Fees
- Trends in Recurring Authorization Fees

3.6 AUTHORIZATION PRACTICES & PROCEDURES

While ICT authorization practices vary from country to country, there are frequently common features in licensing regimes. The following sections review practices and procedural approaches that are commonly employed to improve the effectiveness, efficiency and transparency of authorization processes.

Reference Documents

- Africa Public Service Charter

3.6.1 TRANSPARENCY

Procedural transparency is one of the hallmarks of a good authorization process. Transparency increases the confidence of service providers, investors and other stakeholders in the authorization process. Accordingly, transparency reduces investment risk and increases the attractiveness of investment in national ICT markets. This in turn stimulates the expansion of the ICT infrastructure and ICT services.

The importance of transparency in the authorization process is emphasized in the WTO Regulation Reference Paper.

Section 4 of this Paper specifically applies to transparency. This section provides that, where an authorization is required, the following information must be made publicly available: all of the licensing criteria; the period of time normally required to reach a decision on an application for an authorization; and the terms and conditions of individual authorizations. Section 4 also states that the reasons for the denial of an application for an authorization must be made known to the unsuccessful applicant upon request.

As suggested by the provisions of the *WTO Regulation Reference Paper*, in transparent authorization processes, ICT authorizations are generally issued, amended or revoked based on criteria published in advance. Specific practices that enhance the transparency of the authorization process are discussed throughout this module and particularly in the section on competitive authorization processes. As discussed in the Practice Note, "Using the Web to Increase Transparency (a link to which is set out below), some of the most common means of increasing transparency used by virtually all regulators today involve effective use of the Internet.

RELATED INFORMATION

Competitive Licensing Processes

Practice Notes

- **Using the Web to Increasing Licensing Transparency**

Reference Documents

- **Finland- Guidelines for the General Authorisation Regime**
- **Jordan -- Instructions Regarding the Application Procedures and Criteria for the Award of Public Telecommunications Individual and Class Licenses**
- **Malaysia- Ministerial Guidelines on Class Licences for Network Services**
- **Norway- Questions and Answers Related to the Licensing Process**
- **Singapore- Guidelines for Submission of Application for Facilities-Based Operator Licence**
- **St. Lucia -- Application and Licensing Processing**
- **St. Lucia -- Guidance Notes for Application Processes**
- **Switzerland -- Guide to the "Registration Form for Providing Telecommunications Services"**
- **Trinidad & Tobago -- Eligibility and Evaluation Criteria for Concessions**
- **Uganda- Licence Process Flow Chart**
- **World Trade Organization - Reference Paper**

3.6.2 PUBLIC CONSULTATION

It is good practice to engage in public consultation before and during an authorization process. Consultation with ICT sector stakeholders reinforces the perception of a transparent process. Consultation also allows the regulator to directly receive the views of consumers, existing service providers and prospective applicants on a proposed authorization initiative. Receiving feedback from these stakeholders assists the regulator to fine-tune the proposed authorization procedures and the proposed authorization terms and conditions in order to maximize the prospects for a successful authorization process. Indeed, consultation is often the least expensive form of 'research' a regulator can use to improve the information base on which its decisions are made.

Even where regulators choose, for commercial or other reasons, to conduct some discussion with potential applicants out of the public eye, it is useful to conduct public consultation early in an authorization process. This improves the design of the authorization process. Consultation can be particularly important where a general authorization is to be issued. Advance publication of proposed conditions of general authorizations provides an important opportunity for public comment –especially comment by interested service providers.

3.6.2.1 THE PUBLIC CONSULTATION PROCESS

This section provides further information on the public consultation process, a subject introduced earlier in this module.

Public consultation may occur both before and during the authorization process. It can be formal or informal. In the context of any major authorization initiative, it is generally advisable for the regulator to establish a formal and transparent consultation process.

A good approach for a more formal consultation process involves publication of a notice or public consultation paper that states the regulator's intention to launch an authorization process and that invites comments on the proposed approach. The notice should set forth reasonable details of the proposed authorization approach and any specific issues on which comments are sought. Where the regulator is unsure of the best approach, comments may be invited on different options.

Notices of this kind should be sent to all interested parties, including prospective applicants, existing licensees, and consumer and industry interest groups. Notices are sometimes also published in official gazettes or the popular business press. Such notices may be in a short form that invites interested parties to request copies of a more detailed notice or consultation paper.

In some cases, the notices may advise interested parties of the regulator's intent to publish a consultation paper on a particular topic in the near future. Informing stakeholders of an upcoming consultation provides them with extra time to conduct their own research into the subject matter of consultation and thus allows stakeholders to participate more meaningfully in the process. This, in turn, improves the quality of the submissions received by the regulator in the consultation.

The Telecommunications Regulatory Commission (TRC) of Jordan published an Advance Notice of its intention to conduct a formal consultation on the transition of non-Class licences to the Integrated Licensing and Regulatory Regime. The stated purpose of the advance notice was "to assist stakeholders to prepare themselves adequately for that process (i.e., the upcoming consultation process)". This notice set out a brief background to the upcoming consultation, a time frame for the consultation, and a summary of the issues that would be considered in the process. A link to a copy of this advance notice is set out below.

In formal consultation processes, most regulators publish a detailed consultation paper at the outset of the process. This paper frames the issues raised for consultation and sets out a list of questions or issues for stakeholders' consideration. In consultation processes involving complex issues or significant changes to the regulatory regime, the process may have several phases. The regulator may publish consultation papers at various stages of the process. In Hong Kong, China, for example, the consultation on unified licensing had several phases. Both the Minister and the regulator published consultation papers at each stage of the consultation.

In some cases, one or more public meetings may be held to obtain input on the issues. These public meetings may occur at different phases of the consultation. For example, the regulator may commence the public consultation with an open meeting to present key issues for consideration and the regulator's proposed response to these issues. The regulator may then host a subsequent public meeting in which the regulator summarizes the submissions received during the consultation and outlines its response to these submissions.

A good example of this approach is the Kenyan consultation on the implementation of a unified licensing regime. In February 2008, the Kenyan regulator, the Communications Commission of Kenya (CCK), invited stakeholders to comment on the proposed framework for the unified licensing regime and the related principles and guidelines. In March 2008, the CCK followed up this initial consultation with stakeholders with a second industry consultation on the proposed unified licensing framework. The CCK held a Unified Licensing Stakeholders Forum to discuss issues related to the proposed unified licensing framework. During this Forum, the CCK delivered presentations on the general framework for the unified licensing regime and on related frequency issues. These presentations highlighted the feedback that the CCK had received earlier in the consultation process and also outlined the CCK's response to this feedback.

Copies of written comments may be published to foster greater transparency. The CCK published a summary of the comments of individual industry participants during its consultation on the implementation of a unified licensing regime, for example. The CCK also has published the submitted responses of participants in various public consultations on its website. Similarly, the TRC summarized the responses received from stakeholders to its Advance Notice of the consultation on the transition of non-Class licences to the Integrated Licensing and Regulatory regime. Some of these responses raised further issues and questions that the stakeholders felt should be addressed during the consultation process.

An opportunity is sometimes provided for a round of reply comments. This keeps parties more honest and accurate in making their initial submissions, and assists the regulator in assessing the merits of positions taken or information supplied in parties' comments. In the Jordanian consultation on the transition of non-Class licences to the Integrated Licensing and Regulatory regime, for example, the TRC advised parties that it would post the comments of all parties on its website once the deadline for making submissions had passed. Parties were then given ten days to provide input on any issues by other parties.

It is good practice to issue a final report at the end of a consultation process. The final report typically summarizes the process itself, the issues raised for consideration, the submissions received, the regulator's response to these submissions, and the regulator's final determinations or recommendations. The final report provides a good record of the process that led up to the regulator's final determinations and the reasons for the regulator's decision. It thus enhances the credibility and perceived fairness of the regulator's determinations. The final report also enhances the transparency of the consultation process and the decision-making process. We have included several good examples of the final reports of public consultation processes in this Module. Links to these documents are set out below.

A pre-authorization consultation process increases the likelihood that the regulator's approach to authorization will be based on a good understanding of all relevant considerations. Consultation also helps to ensure that even those who may disagree with the regulator's approach will believe that their views have been considered. This module contains a number of good pre-licensing consultation documents on the authorization of different types of services. Links to these documents are set out below.

Practice Notes

- Belgium – Public Consultation on Mobile Telephony- 1999
- France- 3G Licensing Consultation Document- 1999
- Greece – 2G and 3G Licensing Consultation
- Hong Kong, China – Consultations on the Licensing Framework for Unified Carrier Licences
- Hong Kong, China- Liberalization of Fixed Networks Consultation Document- 2001
- India – Unified Licensing Regime Consultation Paper
- Jordan – Mobile Operator Licence Consultation
- Kenya -- Consultation on the Implementation of a Unified Licensing Framework
- Public Consultation Processes
- Saudi Arabia – Data Services Licensing Consultation

Reference Documents

- Barbados: Voice over Internet Protocol Policy (Draft Second Circulation for Comments)
- France- Public Consultation on the Introduction of UMTS- February 1999
- Hong Kong, China -- Consultation Paper on Licensing Framework for Unified Carrier Licence
- Hong Kong, China -- Consultation Paper on the Creation of a Unified Carrier Licence under the Telecommunications Ordinance
- Hong Kong, China -- Executive Summary, Consultation Paper on the Licensing Framework for Unified Carrier Licence
- India- Consultation Paper on the Unified Licensing Regime (March 2004)
- India- Consultation Paper on Unified Licensing for Basic and Cellular Services (July 2003)
- India- Preliminary Consultation Paper on Unified Licensing Regime (November 2003)
- Ireland- Consultation Paper – Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- Ireland- Public Consultation Webpage
- Jordan- Mobile Operator Licensing Public Consultation FAQs
- Jordan- Notice Requesting Public Comment on the Licensing of a New Mobile Operator
- Jordan- Notice Requesting Public Comment on the Licensing of a New Mobile Operator
- Jordan- Presentation for the Mobile Operator Licensing Public Consultation Forum
- Jordan- Webpage Concerning Mobile Operator Licensing Public Consultation
- Kenya -- Implementation of a Unified Licensing Framework & New Market Strategy
- Saudi Arabia- Licensing of Data Services Public Consultation Document

- **Saudi Arabia- Licensing of Data Telecommunications Services: A Public Consultation Document**

3.6.3 AUTHORIZATION RENEWAL, AMENDMENT AND RENEGOTIATION

This section deals with a number of issues related to the renewal, amendment and renegotiation of authorization conditions – particularly conditions established in individual licences. The issues discussed in this section involve both renewals and amendment at the end of licence terms and amendment of licence conditions before the end of a licence term

Individual licences have normally been granted for fixed terms, and thus issues arise regarding how to handle renewals at the end of a licence term. Licences may be renewed, renewed with amendments, or simply terminated at the end of a licence term. The latter option is extremely rare, since it would deprive customers of service. It is seldom used except in the case of non-operational licensees or serious and continuous breaches of licence conditions, laws or other regulatory instruments.

The legal framework for licence renewals and amendments is normally prescribed in national ICT laws or regulations. Sometimes it is found in the conditions of the licence itself, or in the terms of privatization-related agreements, such as shareholders agreements between governments and strategic investors.

Many countries have introduced reforms in their authorization regimes, such as the move from individual licensing to general authorizations or the introduction of unified or multi-service authorization regimes. Such reforms raise the issue of how to treat authorizations granted under a previous regime. In some cases, existing or new laws grant regulators the right to amend licences unilaterally under the new regime. In others, incentives are provided to continue authorizations under the new regime or to amend licence conditions to harmonize with the new regime. A variety of approaches have been taken to the continuation of licences to reflect changing authorization regimes. Perhaps the most difficult issues are those involving the termination of monopoly or exclusive rights that have been granted under previous regimes, but that are no longer consistent with market opening policies of the new regimes that have been adopted around the world today.

Reference Documents

- **Mobile License Renewal: What are the Issues? What is at Stake?**

3.6.3.1 TRANSITION TO NEW AUTHORIZATION REGIMES

Over the past five to ten years, a number of countries have introduced large-scale reform of their authorization regimes. In the E.U., for example, the 2003 Authorisation Directive has brought major changes to the authorization practices of member countries. Compliance with the Authorisation Directive required some E.U. member countries to make major changes to their authorization regimes. New legislation or regulations have been enacted to transition the member states' regulatory frameworks to a general authorization regime.

More recently, a number of countries have transitioned from service- and technology-specific licensing regimes to more neutral frameworks that feature unified or multi-service authorizations. Hong Kong China, Jordan, South Africa, Botswana, Uganda, Kenya, Nigeria, Tanzania, India, and Trinidad and Tobago are among the countries that have recently adopted new unified or multi-service authorization regimes. In some cases, the transition to a unified or multi-service authorization regime is accompanied by the introduction of a general authorization framework.

Countries have taken different approaches to introducing changes to the authorization regime. However, one common practice is the use of public consultations. The introduction of new authorization regimes is almost always preceded by a public consultation on issues related to changing the regime. Regulators seek feedback from industry stakeholders on a variety of matters, including:

- the proposed licensing framework;
- the types of authorizations to be issued in the new regime;
- the terms and conditions of the proposed new authorizations;
- the proposed process for issuing authorizations;
- the schedule for implementing the new regime; and
- the transition to the new licensing regime.

In a number of cases, including Hong Kong China, Kenya, and India, for example, the public consultation had more than one phase. Different issues were tackled at different stages of the consultation process. A multi-stage consultation process has several advantages. The introduction of a new authorization regime raises many complex issues; conducting the consultation in several stages allows the regulator to manage the issues better. A multi-stage consultation also avoids overwhelming the regulator and industry stakeholders with information, data, and proposals. Finally, in a multi-stage consultation process, the regulator can better focus the consultation at each stage. For example, once the regulator has received feedback on the basic structure of an integrated licensing regime and has made a determination about the structure, subsequent consultations can focus on how this particular structure should be implemented. Stakeholders do not have to address the implementation of various proposed frameworks; they can focus their comments on the framework that has been tentatively adopted.

Regulators have taken different approaches to transitioning existing licensees to a new authorization regime. In some cases, existing licensees are required to migrate to the new authorization regime. This migration may occur automatically, by deeming that existing licensees have complied with all necessary requirements to obtain a new authorization (e.g., Estonia), through a conversion process led by the regulator (e.g., South Africa), or by requiring existing licensee to apply for a new authorization (e.g., Ireland).

In other cases, existing licensees have the option to continue to operate under the licence procured under the old regime until the end of the term of that licence or to transfer immediately to the new authorization regime. If licensees opt to continue to operate under their existing licence, they must convert to the new authorization regime when their existing licence expires. Botswana has taken this approach to the introduction of its multi-service authorization regime.

Where licensees have the option of migrating to the new authorization regime immediately or at the end of the term of their existing authorization, regulators may provide incentives for early migration. Incentives include the reduction or waiver of initial authorization fees and the grant of the new authorization on the basis of a full term rather than a term adjusted to reflect the years that the licensee has already held the existing authorization. In some cases, the opportunity to obtain a multi-service or unified authorization may be sufficient incentive in and of itself since such an authorization enables the licensee to provide a broader range of services.

Regardless of what approach is ultimately adopted to manage the transition to the new authorization regime, it is common (and advisable) for regulators to provide ample information to industry stakeholders about the transition process. By maintaining open and clear communication about the transition, regulators can ensure that the new regime is implemented in a transparent manner that bolsters the confidence of investors in the ICT sector.

Regulators have provided stakeholders with information in a variety of ways. Many regulators hold public meetings in which they explain the key features of the new authorization regime and outline the process of transition. Regulators also issue media releases to increase awareness of the transition. In addition regulators publish information on their website in order to facilitate the implementation of the new regime. Examples of information that regulators have published include: short summaries of the new authorization framework; guidelines to the new licensing process; instructions for applying for authorizations under the new framework; instructions to existing licensees for how to migrate to the new regime; flow charts that illustrate the application process under the new regime; summaries of the terms and conditions of the new forms of authorization; copies of presentations and speeches about the new regime that were given at public meetings; and answers to commonly asked questions about the new regime and the process of transition.

Practice Notes

- **Approaches to Transitioning to New Authorization Regimes**
- **Hong Kong, China – Transition to the Unified Carrier Licensing Regime**
- **India – Transition to the Unified Authorization Regime Chronology**
- **Ireland – Transition to the General Authorisation Regime**
- **ITU Case Study: India's Unified Authorization Regime**
- **South Africa – Individual Licence Amendment Provisions in the Electronic Communications Act**
- **Summary of EU Authorisation Directive**
- **UK- Continuation of Licence Conditions**

Reference Documents

- **India- Consultation Paper on the Unified Licensing Regime (March 2004)**
- **India- Consultation Paper on Unified Licensing for Basic and Cellular Services (July 2003)**
- **India- DOT Guidelines for the Unified Licensing Regime (Phase I) (November 2003)**

- Ireland- Consultation Paper – Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- Ireland- Guidelines on the New General Authorisation Regime
- South Africa -- Electronic Communications Act, 2006
- UK- Continuation Notice Issued to British Telecommunications plc Under Paragraph 9 of Schedule 18 to Communications Act of 2003
- UK- Director's Statement, "Continuing Licence Conditions after July 25"
- UK- Explanatory Memorandum Related to Continued Conditions in Class Licences
- UK- Information Concerning Continuation Notices

3.6.3.2 TERMINATION OF MONOPOLIES

Renegotiation of Licences

Practice Notes

- Jamaican Agreement to Terminate CWJ Monopoly
- OECS Agreement to Terminate C&W Monopoly

Reference Documents

- Jamaica- Heads of Agreement between Jamaica and Cable & Wireless Jamaica Limited
- OECS- Memorandum of Understanding between Cable & Wireless and OECS Contracting States
- US Telecommunications Act of 1996

3.6.3.3 RENEGOTIATION OF LICENCES

This section provides further information on a subject introduced earlier in this module, namely the renegotiation of licences as regards exclusivity or other licence conditions.

In some cases, governments or regulators have the clear legal authority to make changes to the terms of existing ICT authorizations. Where this is the case, it is best to do so in consultation with the licensees and other stakeholders.

In other cases, licensees have existing rights, such as monopoly rights based on contracts, such as privatization agreements or concessions, that require the government or regulator to enter into negotiations to amend the authorizations. In such cases, it is often wise to base authorization renegotiations on sound, generally accepted principles used in other negotiations. These principles have been widely documented in books and articles on negotiation, including the books and other materials produced by Roger Fisher, William Ury and the Harvard Negotiation Project.

The following basic principles of good negotiation strategy are worth keeping in mind:

- Focus on the parties' long term Interests, not on Positions
- Develop Options for Mutual Gain
- Use Objective Criteria to assess Options

Each of these principles is discussed briefly below.

Focus on the parties long term Interests, not on positions

Many negotiations fail because parties disregard this principle. When parties establish firm positions early on in negotiations, lines are drawn in the sand. Success is then measured by which party 'wins' on most of its positions. In licence renegotiations it is best to avoid firm starting positions, such as: 'the monopoly must end on x date', 'the company must receive a 25% rate of return', 'the company must be 'compensated' for an early end to its licence rights', etc. If parties commence their negotiations by tabling such firm 'positions', success is less likely.

If governments and incumbent operators take a long run perspective, many of their interests can be viewed as being quite close. For example, these might include:

- A healthy, growing ICT sector

- Financial health of the country's main ICT service provider
- Development of a clear and predictable national ICT policy, consistent with international practice, and with fewer disputes and uncertainties

It is often best to develop options to help achieve such common interests. Each party will have to be flexible on some positions to develop such options.

Develop Options for Mutual Gain

It is often possible to develop various 'win-win' options that meet the long run interests of both parties to a licence renegotiation. One example is a reasonable rate-rebalancing program that brings local rates to economic levels and eliminates the need for cross-subsidies from other services. Governments sometimes avoid this option because of perceptions that there will be negative consumer or voter reactions. However, such reactions are often overestimated. Rate rebalancing can improve an incumbent operator's financial prospects while creating an economic environment that make it attractive for the incumbent and competitors to expand investment, particularly in local access networks. Investors will not be attracted to enter a market where they must subsidize services and where there is no prospect for profit. Thus the rate rebalancing option can benefit both the incumbent licensee and the government or regulator.

Early in any negotiations, the parties should develop a list of issues to be resolved. Both parties should then focus on developing options for mutual gain. However, parties may put forward any options they wish to put forward to deal with the issues. But all options should be assessed based on objective criteria. To avoid 'negotiation gridlock,' outside parties and expert advisors may be consulted to help develop options.

Use Objective Criteria to assess Options

Too often, negotiations fail because parties assess options in terms of their personal perspectives or 'will', rather than by objective criteria. It is a basic principle of good negotiations that options to resolve outstanding issues should be assessed based on objective criteria.

Objective criteria are available to assess the options for resolving many of the issues facing the parties. These include:

- Precedents – for example, the settlements reached by the governments and companies that have reached agreements to terminate monopolies and establish new policies in other countries;
- International Practices – regarding the treatment of ICT regulatory and policy issues;
- International Trade Rules – regarding expropriation and termination of concessions; and
- Transparent Financial Analysis – to calculate and assess the impact of licence changes, and value ICT businesses, currently and in the future under a liberalized ICT regime.

The prospect of success of licence renegotiation is often increased by appointing experienced negotiating teams and advisors that are capable of properly assessing objective criteria for resolution of the issues.

Preparation for Licence Renegotiation

Government and regulatory negotiators are often poorly prepared for negotiations to renew licences, particularly where the incumbent operators are well-financed and understand the financial and strategy implications of changes in their monopoly or other licence rights.

From the outset, a government negotiating team should prepare and analyze a complete set of relevant documentation on the issues between the parties, including all licence, contractual and legal conditions at issue, and any relevant materials prepared at the time the licence or contract was first negotiated.

All necessary background research should be conducted. Normally a legal opinion should be prepared on the legal rights of licensee. This work should ideally be done in advance, and not after the negotiations have commenced.

Research and analysis should be conducted to develop and assess both parties' best option if negotiations fail. In the Harvard Negotiation Project, this is referred to as the 'Best Alternative to a Negotiated Agreement' (BATNA). In some cases, the Government's BATNA involves legislation to terminate a monopoly. However, such an alternative should be carefully analyzed so that the government is fully aware of its implications. Such analysis would include assessment of the legal, trade, and political remedies that could be resorted to by the other party, including any relevant foreign investment guarantees or insurance and possible international trade repercussions (e.g. under multilateral agreements, such as the GATS or bilateral and regional investment agreements).

Appropriate professional resources should be retained for the negotiation and related advisory work. In addition to retaining an experienced negotiator, parties should make certain that they have available, on reasonably short notice, other skills or resources that may be required. These resources may include a financial analyst to assess claims regarding the impact of the proposed licence changes, and access to experienced 'insiders' in other licence renegotiations.

The parties should contact each other early on to establish an agreed process and schedule for negotiations. Neither party should impose a negotiation process or schedule on the other. Consistent with good faith negotiations, the parties should consult with each other to develop the process and schedules.

Negotiation Guidelines

Adherence to the following guidelines can increase the prospects for success of the negotiations:

- The parties should negotiate in good faith, and should be seen to be doing so, by adhering to an agreed negotiation process.
- The parties should agree to the process for negotiations at the outset, and both parties should adhere to this agreement, unless changed after mutual consultation.
- Each party should designate one official representative ('negotiator'), who should be fully authorized to negotiate, although not to agree to the settlement of any issues.
- Communications between the parties should flow between the negotiators.
- The negotiators should be selected on the basis of an ability to develop a good working relationship. Efforts should be taken to maintain that relationship.

- Parties should encourage their negotiators to comply with the negotiation guidelines set out in this document (e.g. negotiators should reconcile interests, not positions; they should brainstorm to develop 'win-win' options; and to apply objective criteria for assessing them). Negotiation teams should be given reasonable leeway, and not be undermined by their principals (e.g. the president of the licensee's parent company or the Minister responsible for ICT) providing conflicting or unreasonable demands.

- Negotiations should be conducted face to face or by exchange of correspondence between the authorized negotiators – not in the press. Representatives of the parties can easily 'poison' the atmosphere by gratuitous negative comments to the press or other third parties.
- If possible, the negotiations should be held on "neutral ground" or alternate between locations selected by each of the parties.
- The designated negotiators should present the terms of proposed settlements back to the final decision-making authority of each party.
- Insofar as possible, the parties should try to achieve a comprehensive settlement of outstanding issues. Settlement of some issues may involve delegation of technical implementation tasks to designated persons, committees or organizations, who may have to continue their work after an 'agreement in principle' has been reached.
- Parties should not, directly or through related entities, take steps that materially worsen the position of the other party – at least not without consultation.
- In general, the parties should maintain an open dialogue with each other, and not spring other 'surprises' on each other, that would undermine good faith negotiations.

Materials on Dispute Resolution and Negotiation

There has been a growing interest in the subject of dispute resolution in the ICT industry. The World Bank Group and the International Telecommunications Union have collaborated in holding a workshop and commissioning research and reports on the subject. Those interested in dispute resolution in the telecommunications sector should consult the following resources:

- *Dispute resolution in the telecommunications sector: Current practices and future directions*, which is available in electronic format on the ITU web site at the following URL: **http://www.itu.int/ITU-D/treg/publications/ITU_WB_Dispute_Res-E.pdf**

This document is also available in printed book form from the World Bank.

- ITU Seminar On Enforcing Telecommunication Law, Policy and Regulation materials, which are available on the ITU web site at the following URL: **http://www.itu.int/ITUD/treg/Events/Seminars/2005/Enforcement/index.html**

- ITU's European Workshop on Dispute Resolution materials, which are available on the ITU web site at the following URL:**http://www.itu.int/ITU-D/treg/Events/Seminars/2004/Geneva/index.html**

3.6.4 BALANCING CERTAINTY AND FLEXIBILITY

ICT licensing should balance regulatory certainty with the flexibility necessary to address future changes in technology, market structure and government policy. This balance is never easy to achieve. Regulators in countries with higher ICT sector risks should generally favour regulatory certainty to attract investment. Those with more stable economic and regulatory environments normally have the luxury of increased flexibility to introduce reforms without undue market impacts.

3.6.4.1 MORE ON BALANCING CERTAINTY AND FLEXIBILITY

This section provides further information on a subject introduced earlier in this module, namely balancing regulatory certainty and the flexibility to address future changes in technology, market structure and policy.

There are a number of ways that a regulator can balance certainty and flexibility in the authorization process. In many countries, a balance between regulatory certainty and flexibility is achieved by using instruments other than authorizations as the main elements of the regulatory framework. For example, a country might adopt interconnection regulations rather than impose detailed terms and conditions concerning interconnection in service providers' authorizations. However, where a country's regulatory regime is not well developed, it has often been necessary to include a reasonably comprehensive codification of the basic regulatory regime in an authorization. This is necessary to provide the certainty required to attract new entrants and substantial investment to the sector.

A reasonable balance between certainty and flexibility must also be found in the terms and conditions of an authorization. The conditions must provide a reasonable degree of certainty to service providers in order to attract investors. On the other hand, such conditions should be sufficiently flexible to allow their integration into the general regulatory framework for the sector as it develops. The authorization of a particular service provider should not preclude future regulatory reform.

There are several approaches to providing such flexibility, including:

- permitting unilateral authorization amendment by the regulator;
- establishing short authorization terms;
- permitting authorization amendments with the mutual consent of the licensee and regulator; and
- permitting unilateral amendments by the regulator of specific types of authorization conditions considered key to the general regulatory regime, provided such amendments are made in a procedurally fair and competitively neutral manner.

The first two approaches are not consistent with regulatory certainty. They will generally make it difficult, if not impossible, to attract the investment and financing required for a major authorization, such as a fixed line or cellular authorization. The third approach increases regulatory certainty, but can constrain the introduction of regulatory reforms.

The fourth approach is more attractive as regards regulatory certainty. To implement it, a distinction can be made between authorization conditions that are of a regulatory nature and those which can only be amended with the agreement of the licensee. For example, authorization conditions on industry-wide universal service mechanisms or general terms of interconnection may be subject to amendment by the regulator.

Other conditions of a purely contractual nature or which are fundamental to the economic value of the authorization may be subject to modification only with the consent of the service provider. These would normally include conditions such as the term of the authorization and the authorization acquisition fee payable.

Where the regulator has the right to amend the general regulatory conditions of an authorization, such amendments should be made in a transparent and competitively neutral manner. Any amendments should be preceded by consultation with the licensee and other affected parties. In some cases, a right of appeal or review may be warranted.

The *Electronic Communications Act* of South Africa contains provisions designed to provide certainty to the holders of individual licences while giving the regulator the flexibility to respond to changes in technology, market structure, and policy. Section 10 of the Act allows the Independent Communications Authority of South Africa (ICASA) to make certain kinds of amendments to the terms of an individual licence after consultation with the licensee. Amendments permitted under section 10 relate to general regulatory and policy matters. Licensees are afforded certain procedural rights in the amendment process. The Practice Note entitled "South Africa – Individual Licence Amendment Provisions in the *Electronic Communications Act*" provides more information about the ICASA's authority to amend individual licences. A link to this Practice Note is set out below.

Practice Notes

- **South Africa – Individual Licence Amendment Provisions in the Electronic Communications Act**

Reference Documents

- **South Africa -- Electronic Communications Act Regulations on Processes and Procedures**
- **South Africa -- Electronic Communications Act, 2006**

3.6.5 DISTINGUISHING AUTHORIZATION FROM PROCUREMENT

The act of authorizing an ICT service provider should be distinguished from the government procurement process. In many countries there has been confusion between the two types of processes, sometimes with adverse consequences for the authorization process.

3.6.5.1 MORE ON DISTINGUISHING AUTHORIZATION FROM PROCUREMENT

This section provides further information on a subject introduced earlier in this module, namely distinguishing the act of authorizing an ICT service provider from the procurement process.

There are important differences between the authorization of an ICT service provider by a regulator and the procurement of services by a government entity. Yet the distinction is not sufficiently recognized in some countries. The government procurement process involves the purchase by the government of goods or services using public money. These goods or services are sometimes used internally by the government and sometimes used by the government to fulfil its public duties.

By contrast, a regulator is not buying goods or services using public money when it licenses an ICT service provider. Authorization involves the granting of certain rights and obligations to an authorized service provider. It can be seen as the granting of a business opportunity to qualified investors who agree to comply with certain authorization conditions and regulations. The regulator is more a seller than a buyer.

Two important recommendations for the authorization process flow from the recognition that authorization is, in essence, the offering of a business opportunity. First, the regulator must offer an opportunity that is financially attractive to experienced and competent ICT service providers. While some authorization opportunities sell themselves, others, particularly those in emerging and transitional markets, must be carefully structured and marketed to attract qualified applicants. Experience shows that almost any call for applications for ICT authorizations will attract some bidders. However, many are not financially or technically capable of meeting the regulator's objectives to expand and improve services.

Second, government procurement procedures are generally not suitable for an ICT authorization process. Many countries have bureaucratic, centralized procurement administrations. Detailed government procurement procedures are often developed for good reason - to reduce corruption. However application of these procedures can cause legal and administrative headaches, delay and confusion about the real goals of the authorization process.

The regulator in an authorization process is primarily concerned about results. What matters is whether, not how, authorization conditions are met. Thus, it is more important to ensure that potential licensees are able to meet clear qualification requirements relating to their competency than to micro-manage the business or operational plans of licensees. From this perspective, such issues as technology choices, management structures, and marketing strategies should not be the subject of authorization conditions or selection criteria; they should be left to market forces. Generally, it is best to avoid the application of general government procurement procedures and to use a simple and transparent competitive authorization process, based on internationally accepted ICT authorization procedures.

3.6.6 SPECTRUM AUTHORIZATIONS

The provision of ICT services that make use of radio frequencies generally requires two authorizations: one to provide the ICT service and a second authorization for the use of the radio frequency. It is necessary, for instance, to authorize cellular service providers to use the required spectrum as well as authorizing them to operate the cellular networks. Spectrum authorizations required to provide a service are often granted as part of an individual licensing process.

Authorizations to operate an ICT service and to use the required radio spectrum should be granted at the same time. There should be no delays or risks of inconsistent regulatory requirements as between the two types of authorizations. If two separate authorizations are issued, they should be issued simultaneously. A good approach is to attach a draft spectrum authorization as well as a draft service provider's authorization to a request for applications for authorizations.

One reason for retaining two separate authorizations is administrative convenience in the management of the spectrum. In most countries spectrum management is delegated to a different administrative group from the group that regulates other aspects of telecommunications operations, such as price regulation or anti-competitive conduct. By having a separate, consistent form of spectrum authorization, technical, reporting and compliance requirements can be standardized for all users of the radio spectrum.

There are a number of regulatory considerations that are specific to spectrum authorizations. These issues, along with a range of other matters, are canvassed in **Module 5, Radio Spectrum Management**.

Practice Notes

- **Best Practice Guidelines for Spectrum Auctions**

3.7 SPECIAL AUTHORIZATION SITUATIONS

While ICT authorization practices have some common features, there are frequently particular circumstances that require the use of special authorization practices This section reviews some of these special authorization practices, as well as highlights a number of service-specific authorizations.

3.7.1 PUBLIC-PRIVATE PARTNERSHIPS, CONCESSIONS AND SIMILAR ARRANGEMENTS

In many countries today, authorization of ICT services involves a unilateral grant of licence or general authorization from a regulator (or other licensing authority) to a private sector operator. The authorization authorizes the operator to provide specified ICT services, subject to certain conditions. These conditions may be set out in the authorization document itself or, as is increasingly common, in other regulations or regulatory instruments. The issuance and enforcement of an authorization is therefore generally a matter of public administrative law.

However, there have been many variations on the theme of authorizing ICT operations. In some countries, private sector investors have entered into business arrangements with governments or state-owned service providers that are more in the nature of joint ventures with government entities than simple grants of rights to operate ICT facilities or provide services. These may be referred to as concessions, franchises, Build-Operate-Transfer (BOT) schemes, Build-Transfer-Operate (BTO) schemes, Build-Own-Operate (BOO) schemes, and a number of other variants, limited only by the imagination of project finance lawyers and bankers.

Collectively, many of these arrangements have been referred to as Public-Private Partnerships (PPPs). PPPs are increasingly common vehicles for the financing and operations of large infrastructure projects, such as highways, airports and ports. In the past, PPP arrangements were useful in attracting private investment to markets where privatization or private-sector participation in the ICT sector was legally or constitutionally restricted. However, they have become less common in the ICT sector, as a result of a growing recognition that there is little public benefit to state ownership or operation of ICT service providers. PPP schemes are generally seen to be inconsistent with the promotion of liberalized ICT markets and competitively-neutral regulation and policies.

Practice Notes

- **Public (Municipal) Initiatives**

3.7.1.1 CONCESSIONS AND LICENCE AGREEMENTS

This section provides further information on a subject introduced earlier in this module, namely forms of authorization, including concessions and licence agreements.

In most countries, the term "concession" is used to refer to a commercial agreement between a government and the private builder, owner or service provider of an element of public infrastructure (such as a toll road or power plant) or a business located on public property. Such agreements were once fairly common in the ICT sector in some regions, particularly where there were legal or constitutional restrictions against private sector ownership or operation of ICT facilities. However, such agreements are becoming increasingly less common in the ICT sector. They are generally seen to be inconsistent with the promotion of liberalized ICT markets and competitively-neutral regulation and policies. The reasons for the decline in such agreements are similar to those for the decline in use of Public-Private Partnerships generally (see section 7.1.2, “Public-Private Partnerships).

Nevertheless, some governments continue to play an active role in the provision of ICT services and the operation of ICT networks. An important emerging trend involves the engagement of governments, particularly local and municipal governments, in the deployment of next generation access and core networks through public-private partnerships. This trend is discussed more fully in section 7.1.2, Public-Private Partnerships and in the Practice Note entitled “Public (Municipal) Initiatives”. Links to section 7.1.2. and this Practice Note are set out below.

Concession agreements had several advantages in attracting private sector investment, particularly in markets with high levels of political or regulatory risk. Such agreements sometimes granted governments an ownership stake and revenue-sharing interest, therefore providing governments with an incentive to support the growth of the ICT or telecommunications business in question. Also, the legal remedies available for breach of contract normally applied to concessions, such as money damages and arbitration. Negotiations often fine-tuned concession terms to establish the protections and incentives necessary to attract investors and to guarantee performance by the concession holder in each particular situation.

A related approach adopted in some countries is to grant ‘licence agreements’. In many cases, licence agreements were relatively similar to the detailed individual licences granted in other countries. However, they typically included some obligations – often regulatory rather than commercial – on the part of the government, regulator or other government signatory. For example, a licence agreement might establish the basis of setting tariffs during the licence period, by way of a specific price cap formula. By including such mutual obligations in an agreement, the licensee received additional legal protections against changes in its basic operating environment. A major disadvantage of licence agreements was that many had quite long terms, therefore effectively restricting sector-wide regulatory reforms from being implemented without the consent of the parties to existing licence agreements.

Some licence agreements have both regulatory and commercial concession features. It is often important to distinguish between the two. A good approach is to deal with the concession features in a concession contract between the host government (not the regulator) and the investor. In project finance terms, such an agreement would be called a government support agreement.

It should be noted that the terms concession and licence agreement have different meanings in different countries. In some Latin American countries, concessions contain most of the features and types of conditions contained in individual licences in other countries. They might be called licence agreements elsewhere. Some other countries, particularly in Asia, have granted ‘concessions’ that are in the nature of joint venture agreements rather than granting full authorizations to operate ICT networks independent of the government. These are discussed further under the heading ‘Public-Private Partnerships’.

RELATED INFORMATION

Public-Private Partnerships

3.7.1.2 PUBLIC-PRIVATE PARTNERSHIPS

This section provides further information on a subject introduced earlier in this module, namely public-private partnerships.

Public-Private Partnership (PPP) arrangements are increasingly common vehicles for the financing and operation of large infrastructure projects, such as highways, airports and ports. PPP arrangements were once the only vehicle legally available to introduce private sector participation in telecommunications markets in countries that permitted only state-run telecommunications operations.

It has become generally recognized in most countries in recent years that there is little public benefit to state ownership or operation of ICT service providers. With the liberalization and privatization of the global ICT industry, joint venture arrangements between governments or PTTs and private sector investors have become less common in the ICT sector in recent years. PPPs also raise concerns about whether public policy and regulation will be competitively neutral if the government holds a stake in one or more of the commercial players in the ICT sector. Nevertheless, some PPP arrangements remain in place, and a few new ones have recently been initiated.

One important emerging trend is the involvement of local and municipal governments in the direct deployment of next generation core and access networks through PPPs arrangements. Municipally-sponsored FTTH projects have arisen across Europe and in the United States. Many of these projects (though not all) are designed to grant open access to competitive broadband service providers.

Critical assessment of these municipally-sponsored FTTH projects has been mixed. On the one hand, these arrangements do not raise many concerns that the competitive neutrality of the ICT regulatory framework may be compromised by the fact that a government has a stake in a commercial player active in the ICT sector. Since municipalities rarely have regulatory jurisdiction over ICT law and policy, their involvement in FTTH projects does not threaten the competitive neutrality of the regulation of the ICT sector.

On the other hand, however, there are concerns that public intervention in the provision of ICT networks and services distorts commercial incentives for efficient investment. Furthermore, historically, PPPs in the ICT sector have not enjoyed robust success in fostering a healthy ICT market and in improving access to services for customers.

At present, it is too soon to draw any definitive conclusions about the advisability of municipal involvement in the deployment of next generation network infrastructure. We can observe, however, that governments, particularly at the municipal and regional level, should be careful to ensure that they have the legal authority and right to enter into such arrangements. It was necessary to enact legislation in France, the Netherlands, and the United States, for example, to enable municipalities to enter into PPP arrangements in the ICT sector. Moreover, at present, 14 states in the United States have enacted some form of legislation that restricts municipalities from offering ICT services.

For more information on municipally-sponsored FTTH projects, see the Practice Note entitled “Public (Municipal) Initiatives”.

Traditionally, PPPs were often structured as Build-Operate-Transfer (BOT), Build-Transfer-Operate (BTO), Build-Own-Operate (BOO), or similar arrangements. In general, BOT, BTO and BOO arrangements are all project finance structures aimed at attracting investment and management expertise required to develop ICT infrastructure in countries with state-controlled ICT sectors. A variation on such structures involves contracts where an investor does not build or own any facilities, but shares in revenues from a state-owned service provider in return for providing financing, management or both. Financing contracts of this type have been entered into in China and Indonesia. An example of a management contract with revenue sharing is the Vietnamese “Business Cooperation Contract”.

Some examples of countries where joint venture-type arrangements such as BTOs, BOTs, and BOOs, have been implemented include:

- BTO: Thailand, Philippines
- BOT: Lebanon, India, Indonesia (Joint Operating Schemes or KSOs), East Timor
- BOO: Malaysia, Solomon Islands

Most of these structures experienced initial success in promoting network expansion. In part this was because they were not characterized as authorizations to private service providers but rather as contracts under which private contractors would build and operate telecommunications services “owned” by the government or by a state-owned service provider. This arrangement allowed for private sector participation in telecommunications service providers without breaching laws or policies that prevented private sector ownership of service providers.

However, experience in Lebanon, Indonesia and elsewhere suggests that these models are not viable in the long term. Investors in BOT projects lack the long-term security and equity interests of a full network licensee. They are therefore motivated to maximize short-term profitability at the expense of long term network or service development. A BOT must either terminate, with the resulting withdrawal of the private investor, or it must be converted into a true authorization. If the investor withdraws, the service provider may or may not be able to continue to expand and manage the service on its own. If the concession is converted to an authorization, serious questions may arise regarding the fairness and transparency of the authorization process. In all cases, the conversion of BOT-types schemes into conventional ICT authorizations can be problematic.

Singapore has introduced a variation of a BOO-type PPP as part of its strategy to roll out national next generation network infrastructure (fixed and wireless) capable of providing high-speed “super-connectivity” throughout the country. The government has indicated that it will provide funding to operators that are selected through a competitive process to build, own, and operate Singapore’s wired and wireless next generation networks. At present, it does not appear that the government proposes to acquire an ownership interest in the operators selected to build and operate the next generation networks. However, the successful operators will be expected to build and operate networks that conform to mutually-agreed upon specifications. Operators will also be required to comply with government requirements related to open-access and structural and operational separation of the network operating companies and the retail service providers. See Box 3.7 for more information about this PPP in Singapore.

Singapore has introduced a variation of a BOO-type PPP as part of its strategy to roll out national next generation network infrastructure (fixed and wireless) capable of providing high-speed "super-connectivity" throughout the country. Singapore's strategic plan (the Next Generation National Infocomm Infrastructure or "Next Gen NII") involves the creation of a wired, open access, and carrier-neutral Next Generation National Broadband Network (Next Gen NBN) and an open-access Wireless Broadband Network (WBN). The Next Gen NBN and the WBN are to be built, owned, and operated by the private sector. The government has made clear that the operation of the Next Gen NBN and WBN will involve structural separation of the operator of the passive network infrastructure, the operator of the active network infrastructure, and the retail services provider.

The government of Singapore has indicated that it will provide various amounts of funding to the operators of the passive and active infrastructure of the Next Gen NBN and WBN. The funding is intended to kick-start the project and to ensure that the ultra high-speed broadband service provided over these networks will be viable, affordable and sustainable in the long-term. The government issued a Call-For-Collaboration in 2006 to select the operators for the WBN. It also issued a Request-For-Concept in 2006 to begin the process of selecting operators for the Next Gen NBN.

The funding arrangements are to be negotiated privately between the government and the operators selected to construct and to operate the Next Gen NBN and WBN. At this stage, it does not appear that the government proposes to acquire an ownership interest in the operators involved with building and operating the Next Gen NII. However, operators will be expected to build and operate the infrastructure in accordance with agreed upon specifications and in compliance with government requirements relating to open-access and structural separation.

In October 2006, Singapore selected three operators for the WBN project. These operators launched initial commercial services in January 2007. The roll-out of the WBN is expected to be complete by the end of 2008.

The selection process for the operators of the Next Gen NBN is on-going. As of June 2008, the government was completing the qualification phase of the selection process. The process will move to the selection stage by the end of summer, 2008.

◀ **Box 3.7 Funding the Construction and Roll-out of Next Generation Network Infrastructure for Singapore's Digital Super-Highway**

At present, it is too soon to evaluate the success of the PPP initiated by the government of Singapore to fund the construction of the national next generation network. Given the importance of next generation networks and the expense involved with constructing and rolling out these networks, close observation of this PPP and similar arrangements in other countries is warranted.

Practice Notes

- Public (Municipal) Initiatives

3.7.2 RE-AUTHORIZATION OF INCUMBENT SERVICE PROVIDERS

The ICT reform process in most countries includes privatization of PTTs and the granting of competitive authorizations in various market segments. Many countries have completed this process; others are in the midst of implementing it, and a few have not started.

A major step in the privatization and liberalization process in many countries is the issuance of an authorization to incumbent service providers. This can be a complicated process. Special consideration must be given to the process of authorizing an incumbent and to the definition of the incumbent's rights and obligations under this authorization.

3.7.2.1 RE-AUTHORIZATION OF INCUMBENTS: SOME CONSIDERATIONS

This section provides further information on a subject introduced earlier in this module, namely the re-authorization of incumbents.

In many countries, successful transition to a liberalized ICT market requires that special attention be paid to the authorization of incumbent service providers. Prior to privatization and liberalization, many incumbent service providers are PTTs, which may have operated for half a century or more without a formal authorization.

New ICT laws or amendments often authorize the licensing of the incumbent service provider. The authorization process generally involves the detailed identification of existing and new rights and obligations of the service provider. While there is a trend away from use of individual authorizations in mature competitive markets, there may remain good reasons for individual authorizations for incumbents in less competitive markets with less well-defined regulatory frameworks. For example, an individual authorization can add the regulatory certainty required to implement a successful privatization of a PTT.

In some cases, incumbent service providers may receive a mix of individual authorizations and general authorizations. This approach can be useful in cases where it is considered necessary (for example where a privatization is pending) to issue an individual authorization to establish the basic rights and obligations of a PTT to operate the fixed public switched telecommunications network. In such a case, the rights of the incumbent PTT to provide other services, such as VSAT, data transmission or value added services, may be subject to general authorizations. These general authorizations would apply equally to all other service providers of the same class of service.

The rights and obligations set out in a new authorization for an incumbent operator must generally be adapted to a new and evolving sector policy and regulatory regime. In particular, the rights and obligations must often be adapted to the realities of a market-based economy, especially where the service provider is to be privatized and is to face competition for the first time in some markets.

A concern about fairness may arise if the incumbent service provider is automatically entitled to be authorized to provide services for which other service providers must obtain an authorization through a competitive authorization process. Such a situation may create a perception that the competitive playing field is not level.

In practice, the authorization of incumbents often involves a process of negotiation between the incumbent and the regulator. Additional input generally comes from professional advisors, including investment bankers and lawyers hired by the incumbent, the government, the regulator, or all of them. It is important for the regulator (or other licensing authority) to obtain a good balance of views on the contents of the authorization. In this regard, there are often competing agendas between the incumbent's management, which may want to retain as much exclusivity and market power as possible, and those promoting a competitive ICT policy. Ministries of Finance and investment bankers in the process will often focus on granting exclusivity and market advantages as means of increasing privatization proceeds. Ministries of ICT and regulators are often more focused on promoting competition as a means of increasing efficiency of ICT markets and delivering better services to the public.

In some countries, incumbents are granted authorizations for new services (e.g. cellular, data communications, ISP, value added services) around the same time as authorizations are granted to new service providers for those services. The incumbents sometimes receive the authorization outside the competitive selection process that may be used to choose new entrants. This has been the case for cellular mobile authorizations in both developed and less developed countries.

Such a process raises issues of competitive fairness. Often the new entrant pays a significant amount for the authorization under a competitive selection process, but the incumbent does not. This issue has sometimes been addressed by requiring incumbent service providers to pay a fee equal to the amount of the winning bid or a fixed percentage of that amount. This occurred when Jordan authorized a second GSM service provider in 2000, for example. Similarly, when Colombia authorized second cellular service providers in each of three regional markets, the existing service providers were required to pay 95% of the amount of the winning bid in the applicable region.

In other countries the incumbent service provider has not been required to pay authorization fees, even though new entrants do pay. Some argue that the incumbent was awarded an authorization in accordance with past practice and law, and that it would be unfair to retroactively tax it. Others have pointed out that the incumbent may have taken risks and incurred expense in developing the market. From this perspective the retroactive imposition of a substantial authorization fee may be considered inappropriate.

While there is not always a right answer in these situations, care must be taken to promote a competitively neutral environment. If preferential treatment is given to an incumbent, there should be clear benefits to the public for doing so. These may include maintenance of extraordinary network rollout obligations or other specific universal service objectives.

Practice Notes

- **Jamaican Agreement to Terminate CWJ Monopoly**
- **OECS Agreement to Terminate C&W Monopoly**

Reference Documents

- Jamaica- Heads of Agreement between Jamaica and Cable & Wireless Jamaica Limited
- OECS- Memorandum of Understanding between Cable & Wireless and OECS Contracting States

3.7.3 SERVICE-SPECIFIC AUTHORIZATIONS

The scope of services authorized by an individual licence or a general authorization varies considerably from country to country. Unlike spectrum and technology standards, there have not generally been any standardized authorization classifications. A mobile services authorization in one country may authorize a wide range of mobile voice, data and even video services, including mobile television services and IMT 2000 services. In other countries, mobile service authorizations only authorize the provision of GSM standard voice services and some related GPRS or SMS services.

In the early days of telecommunications licensing, incumbent operators were often granted authorizations with a very broad scope, authorizing provision of many if not all types of telecommunications services. With the introduction of competition, new entrants were often authorized to provide services based on specific technologies, such as those based on the mobile AMPS, GSM, CDMA or TDMA standards. Other new entrants were authorized to provide specific services, such as paging or trunking services, pay telephone services, data and internet access services, and the usually vaguely defined 'value added services'.

Over the last decade there has been a trend towards convergence and harmonization in the regulatory treatment of different technologies and services. As a result, there have been initiatives to standardize the authorization approaches and authorization conditions for different types of technologies and services. These initiatives have included the introduction of unified and multi-service authorization regimes. India, Hong Kong China, Jordan, Tanzania, South Africa, Nigeria, Uganda, Botswana, Singapore, Brazil, and Trinidad and Tobago, for example, have all introduced unified or multi-service authorization regimes.

These initiatives have also included attempts to bring technologies and services that had previously been considered 'broadcasting' or 'media' transmission services under the same authorization rules as telecommunications or 'carrier' services. Examples of such initiatives include the European Union's move to standardize the approach to authorization of all 'electronic communications services' in its Authorization Directive, and Malaysia's 1999 Communications and Multimedia Act.

Despite these initiatives, many countries continue to grant authorizations or general authorizations based on different service classifications, and to a lesser extent today, based on technology classifications. The ITU World Telecommunications Regulatory Database indicates that at least 24 authorization classifications are commonly used today.

This section contains links to documents that describe some of the more common types of service and technology-specific authorizations. The Reference Documents listed below include examples of specific authorizations issued for a variety of different types of services or technologies. Please note that, as with all authorizations and other Reference Documents linked to this module, the conditions of these authorizations are often highly dependent on local market, technical, legal and regulatory conditions. They may therefore be unsuitable for use as precedents in other countries.

Practice Notes

- 3G Licence Results: Asia Pacific and Canada
- 3G Licence Results: Europe
- 3G Licensing Case Studies
- Australia and Singapore-Facilities-Based and Service-Based Licensing
- Japan- Registration or Notification

3.7.3.1 COMMON AUTHORIZATION CLASSIFICATIONS

Fixed local services (sometimes includes VoIP services)	Digital Subscriber Line (DSL)
Fixed domestic long-distance services	Cable Data
Fixed international long-distance	Leased lines
Mobile local services	Very Smal Aperture Terminal (VSAT)

Mobile domestic long-distance	Fixed Satellite Services (FSS)
Mobile international long-distance	Mobile Satellite Services (MSS)
Public Voice Telephony	Global Mobile Personal Communicaton Services (GMPS)
Mobile Cellular Network	Third Generation Mobile (IMT2000)
Cable TV Network	Paging
Cable TV Service	Public Mobile Radio Trunked Services (PMRTS)
Wireless Local Loop	Internet Service Provision (sometimes includes VoIP)
Value Added Services (e.g. email, database access, electronic data exchange, etc.)	Data

◂ **TableCommon Authorization Classifications**

Source: ITU Trends Report, 2007. Adapted from ITU World Telecommunication Regulatory Database.

3.7.3.2 SAMPLE LICENCES AND RELATED DOCUMENTS

This section contains links to examples of authorizations issued for specific types of services or technologies in different countries. In reviewing these examples, please note that the authorization conditions and procedures are dependent on local market, technical, legal and regulatory conditions. These documents may therefore be unsuitable for use as precedents in other countries.

Second National Operators:

Kenya- Prequalification Notice for a SNO Licences- 2003 Nigeria- SNO National Carrier Licence

International Services Authorizations:

Canada- Licensing International ServicesUnited States- International Services Licensing RegimeBahrain- International Services Licence Switzerland- Invitation to Tender for GSM Licences - 2003 Jordan- Prequalification Notice for 3rd Mobile Licence – 2003Ireland- Mobile Licence Terms- 1999South Africa- Mobile Cellular Licence- 2002 Singapore -- Information Memorandum: Auction of Public Cellular Mobile Telecommunications Services Spectrum Rights

3G Wireless Services:

Norway- 3G Licensing Document - 2000 Estonia- 3G Licensing Information Document - 2004 France- 3G Licensing Consultation Document - 1999 3G Licensing Case StudiesLicence Fees for 2G and Combined 2G/ 3G Licences 3G Licence Results: Europe 3G Licence Results: Asia Pacific and Canada Comparison of 3G Nigeria -- Information Memorandum: 800 MHz Spectrum Auction Nigeria -- Information Memorandum for the 2 GHz Spectrum Auction Macedonia -- Tender for granting authorizations for radio frequencies utilization for the provision of 3G services according to the IMT-2000/UMTS standard Algeria -- Notice of Invitation to the expression of interest related to third generation (3G) mobile communications licenses assignment

Rural Service Licences- Least Cost Subsidy Auctions:

Nepal- Rural Services Licensing- 2003Venezuela- Rural Mobile LicensingSouth Africa- 'Under Serviced Area Licence'Handbook Universal Service Module **Nepal- OBA Approaches New Zealand- Allocation Plan for Satellite OpportunitiesCanada- Licence for Use of Satellite Orbital SlotHong Kong- Space Station Carrier Licensing Hong Kong- Outer Space LicencesPakistan- Application Form for the Establishment of a Satellite Earth Station Canada- Licensing of Fixed Earth StationsCanada- Mobile Satellite Services LicensingSatellite Industry Association- Regulatory Principles to Foster Market Access for Satellite Services**

VSAT Services:

Singapore- VSAT LicensingJamaica- VSAT Licence Application India- VSAT Licensing for Data Services Jordan- VSAT Licence Application FormPakistan- VSAT LicensingInternational VSAT Policy Declaration Iceland -- Application for a VSAT Licence Saudi Arabia -- Special Conditions of VSAT Licences Saudi Arabia -- General Terms and Conditions of VSAT Licence Switzerland -- VSAT Application Form

Submarine Cables:

Canada- International Submarine Cable LicensingUnited States- International Submarine Cable Licensing

Voice over Internet Protocol ("VoIP") Licences (see Box 3.7):

Note that some countries licence VoIP services as a fixed local service, while other countries licence VoIP services as part of Internet services. We have therefore included examples of both approaches.

◂ Box 3.7 Note on VoIP Licenses

Germany -- Key elements of the regulatory treatment of Voice over IP (VoIP) Finland -- FICORA opinion on the use of telephone numbers in VOIP Services Finland -- FICORA Opinion on the Regulation of Skype Services in Finland

Singapore -- Guidelines on Licensing and Regulatory Framework for IP Telephony in Singapore

Singapore -- Guidelines on Licensing and Regulatory Framework for IP Telephony in Singapore

Singapore -- Specific Terms and Conditions for IP Telephony Services

Finland -- Application of Communications Legislation to VOIP Services in Finland
Regulatory framework for voice communication services using Internet Protocol (CRTC, May 2005)
Hong Kong China -- E
Hong Kong China -- Consultation Paper on the Regulation of Internet Protocol (IP) Telephony Executive Summary of the Consultation Paper: Regulation of Internet Protocol (IP) Telephony Finland -- Application of Communications Legislation to VOIP Services in Finland
Frequently asked questions on the regulation of Voice over Internet Protocol services
Barbados: Voice over Internet Protocol Policy (Draft Second Circulation for Comments)
Statement of

The treatment of Voice over Internet Protocol (VoIP) under the EU Regulatory Framework Telecommunications Authority on Regulation of Internet Protocol (IP) Telephony, 29 June 2005

Federal Communications Commission - Voice Over Internet Protocol - Stevens Report
Hong Kong China - Regulation of Internet Protocol (IP) Telephony Statement of Telecommunications Authority on Regulation of Internet Protocol (IP) Telephony, 29 June 2005 IPTV:
REGULATING THE “TV” OF THE FUTURE: COMPARING THE TREATMENT OF VIDEO AS AN IP-ENABLED SERVICE IN THE U.S. AND CHINA

IPTV: Experiences of China and Chinese Taipei

IPTV in Korea and Japan

India -- Broad Guidelines for Issue of Licence for Commercial VSAT Service Providers and Captive VSAT Service

Converged Service Licenses:

Malaysia- Licensing for ConvergenceBrazil- Multimedia Communications ServicesIndia- ‘Unified’ Access Service Licensing

Tanzania -- Application Form for the Converged Licensing Framework

Tanzania -- Content Service Licence

Tanzania -- Application Service Licence

Tanzania -- Network Services Licence

Tanzania -- Network Facility Licence

Hong Kong China: Licensing Framework for Unified Carrier Licence Statement of the Telecommunications Authority

India -- Licence Agreement for Provision of Unified Access Services

Other Services:

Licensing WLAN TechnologiesGlobal Wireless LAN PoliciesBahrain- Paging Services LicenceNigeria- Public Payphone Services LicenceNigeria- Fixed Wireless Access LicenceHong Kong- Public Radiocommunications Services LicensingSingapore- PSTN Services Licensing

3.8 LICENSING FOR CONVERGENCE AND NEXT GENERATION NETWORKS

Convergence is one of the most important recent trends in the ICT sector. It has changed how services are delivered and has blurred the lines between fixed and mobile services. The move towards Next-Generation Networks (NGN) is the most recent step in the convergence-driven evolution of the ICT sector. The following sections outline authorization issues raised by convergence and NGN and review the practices and procedural approaches currently being developed in response to these issues.

Related Materials

Module 7, "New Technologies and Impacts on Regulation", section 1.4, "Next Generation Networks"

Module 7, "New Technologies and Impacts on Regulation", section 1.5, "Convergence"

3.8.1 CONVERGENCE AND NEXT GENERATION NETWORKS

Recent innovations in technology and ICT services are raising interesting discussions among the ICT community on how to describe these innovations: are they a revolution or an evolution? Moving away from this debate, one can only note that these innovations have significantly changed and continue to change how ICT services are provided, the nature of networks themselves, and the types of services that are available to consumers. From the perspective of authorizations, two developments have had a particular impact on the parameters of the ICT sector: convergence and the move to Next Generation Networks (NGN). As the parameters of the ICT sector change, there is a need for a careful re-consideration of traditional authorization practices and approaches.

Convergence and NGN have eroded traditional market boundaries and have heightened the importance of neutrality and flexibility in authorization regimes. At the same time, as network operators and access providers invest heavily in upgrading equipment and building new infrastructure, service providers seek regulatory certainty. Regulators must balance the need for regulatory certainty with the need for a regulatory framework that is sufficiently flexible to allow stakeholders to enjoy the benefits of technological innovations such as efficiency gains and new services. Regulators must be attuned to new bottlenecks and market dominance that may emerge in the ICT sector.

In light of the regulatory issues that flow from convergence and the transition to an NGN environment, regulators have begun to adapt the traditional, service-specific approach to authorizations. There are now three broad approaches to authorizations in the ICT sector:

- **Service-specific authorizations:** these authorizations allow the licensee to provide a specific type of service. Usually, the licensee is required to use a specific type of network and technological infrastructure. However, some service specific authorization regimes are technology neutral (e.g., the fixed and mobile services authorization regimes in Saudi Arabia and the Canadian basic international telecommunications services licences). These types of authorizations are sometimes issued as individual licences (particularly in developing and transitional economies) and sometimes issued as general authorizations.
- **Unified (or global) authorizations:** these authorizations are technology- and service- neutral. They allow licensees to provide all forms of services under the umbrella of a single authorization, using any type of communications infrastructure and technology capable of delivering the desired service. In most countries, unified authorizations are issued as individual licences. However, in some countries, the process for issuing the unified authorization blends aspects of general authorization processes and competitive licensing regimes. These hybrid processes can best be described as non-competitive individual licensing processes: while applicants do not compete for a limited number of authorizations, they must meet a variety of criteria to qualify for a licence and their applications are subject to close regulatory scrutiny.
- **Multi-service authorizations:** these authorizations allow service providers to offer multiple services under the umbrella of a single authorization, using any type of communications infrastructure and technology capable of delivering the services in question. Like unified authorizations, multi-service authorizations are technology neutral. However, multi-service authorizations are more limited than unified authorizations; licensees are permitted to provide any of a designated set of services, but not any and all services. Multi-service authorizations are sometimes issued as general authorizations and, in other cases, are issued as individual licences. It is not uncommon for a country to have both general authorization regimes and individual licence regimes for their multi-service authorizations. Individual multi-service authorizations are often issued using a non-competitive individual licensing process.

The following sections examine these types of authorizations in more detail and also review certain trends in authorization practices that have arisen in response to convergence and NGN.

For more information about the revolution in the ICT sector and how technological innovation has impacted the traditional approach to authorizations, see **section 8.1.1**.

3.8.1.1 REGULATORY ISSUES IN A CONVERGED AND NEXT GENERATION NETWORKS ENVIRONMENT

Note: This section is based in large part on Janet Hernandez & Daniel Leza, "Chapter 9: Enabling Environment for NGN" in *Trends in Telecommunciations Reform 2007* (Geneva: International Telecommunications Union, 2007).

This section considers a number of regulatory issues that have arisen as a result of technological innovation, convergence in the ICT sector, and the move to Next Generation Networks (NGN).

Up to very recently, ICT regulatory regimes have been designed for traditional circuit-switched communications. Regulatory regimes have focused on the specific means of telecommunications or on the specific service offered by the operator. Accordingly, authorizations in these regulatory regimes have been largely service-specific and technology-specific for many decades.

Service-specific authorizations were practical and logical given that there was a narrow scope of services available to end users and given the limits of technology at the time. The need for neutrality in licensing was not pressing when it was not yet possible to deliver multiple, diverse services over one platform or to deliver key services such as basic telephony using different kinds of technology.

Technological innovation has changed the parameters of the ICT sector. New developments have given rise to fixed-mobile convergence, eroding what was once an important distinction from the perspective of authorizing services. Internet Protocol (IP)-based networks and services have furthered contributed to convergence in the ICT sector. For example, basic cable television providers have entered into the telephony and Internet segments of the ICT sector, offering "triple play" bundles to customers: the provision of cable television services, basic voice telephony, and Internet access over the single median of cable. At the same time, wireless service providers are seeking more and more bandwidth to meet customer demands for mobile services that include voice telephony, Internet access, and even television.

Next Generation Networks (NGN) represent the next phase of development of convergence in the ICT sector. NGN will essentially enable consumers to receive a wide range of services over a single, IP-based network. The transition to an IP-based environment requires intensive investments as access providers and network operators must upgrade and build new infrastructure.

From a regulatory perspective, convergence in the ICT sector and the move to NGN raise a number of issues. First, traditional market boundaries are increasingly blurred. Moreover, multiple services can now be offered over a single platform. Service-specific authorizations can be troublesome in this environment because they hamper service providers' ability to take advantage of efficiencies engendered by technological innovation and to respond to consumer demand. Service-specific authorizations also represent an increasing regulatory burden as service providers must hold many different authorizations to provide a full range of services to their customers.

Additionally, service-specific authorizations may create competitive advantages for one type of service provider over another if the terms and conditions attached to the authorizations are not identical. For example, given that fixed PSTN services, mobile services, and VoIP may all be employed to provide consumers with basic voice telephony, the imposition of a large authorization fee on fixed service providers, but not on mobile and VoIP providers, puts fixed service providers at a competitive disadvantage. Arguably, this disadvantage is not fair given that all three types of service providers offer essentially the same service from the perspective of the end user. This disadvantage also creates artificial market incentives to provide mobile and VoIP services. These incentives thus discourage entry into the fixed voice market and from investing in related infrastructure. This ultimately could undermine efficiencies in the ICT sector that would otherwise have been enjoyed had more service providers entered into the fixed voice market.

Second, there is a significant gap between the market conditions that traditional regulatory frameworks were designed to address and the market conditions emerging in a converged, IP-based environment. Regulatory approaches to authorizations that made sense in a circuit-switched environment are no longer practical in converged, IP-based networks where multiple services can be offered using a single platform. Today, there is a much greater need for neutrality and flexibility in the approach taken to authorizations than there was in the era when services were exclusively offered using circuit-switched communications networks. Regulatory frameworks in general and approaches to authorization in particular must adapt in order to respond effectively to the current characteristics of the ICT sector.

Third, service providers are looking for regulatory certainty in light of the significant investments they must make to upgrade their equipment and to build new infrastructure. As changes are made to the regulatory framework in response to convergence and NGN, regulators must be sensitive to the concerns of service providers. Transition to a regulatory framework designed to respond to an IP-based environment must be carefully managed in order to avoid discouraging service providers from investing in NGN. Regulators should also take the high cost of rolling out IP-based networks into consideration when setting the terms and conditions for authorizations.

Finally, new bottlenecks and market dominance may emerge in the ICT sector as countries transition to NGN. As the regulatory framework is adapted for a converged, IP-based environment, regulators must carefully consider how to respond to potential bottlenecks and market dominance.

Section 8.1.2 outlines four regulatory trends relevant to authorizations that have emerged in response to these issues.

3.8.1.2 ADAPTING AUTHORIZATION REGIMES FOR CONVERGENCE AND NEXT GENERATION NETWORKS

Note: This section is based in part on *Regulatory Trends for Adapting Licensing Frameworks to a Converged Environment* (Geneva: International Telecommunications Union, 2007), prepared by Telecommunications Management Group, Inc.

This section introduces four trends in licensing service providers that have become increasingly important in light of the regulatory issues raised by technological innovation, convergence, and Next Generation Networks (NGN). These four trends can broadly be described as neutrality; simplification; flexibility; and reduction of the administrative burden.

Neutrality – Many countries are moving towards authorization regimes that are service- and technology-neutral. Rather than issuing service-specific authorizations, as was the most common practice when services were primarily delivered using traditional, circuit-switched networks, many countries now issue neutral authorizations. Neutral authorizations do not designate a single, specific service that the licensee can offer under the authorization, nor do they prescribe the technological infrastructure that must be used to deliver the service. Licensees are not restricted by narrow, service-specific and technology-specific authorizations. Instead, these authorizations permit the licensee to offer any of a range of services, using any technological infrastructure that is capable of delivering the desired services. Neutrality in licensing has been complemented by simplification of the authorization regime.

Simplification – Simplification involves the consolidation of different types of service-specific authorizations into a broad, generic category of authorization or even the unification of all authorizations into a single, unified authorization.

Simplification is a move away from traditional authorization regimes that tended to feature service-specific authorizations. In a traditional authorization regime, service providers would be required to hold separate authorizations for every kind of service they offered. Each separate authorization could be subject to a unique licensing process, different terms and conditions, and separate fees and reporting obligations. Regulators would be required to administer any number of different authorization processes and procedures and to oversee adherence to a broad range of different terms and conditions and reporting obligations. Simplification reduces the complexities that flow from service-specific authorization frameworks by consolidating the many authorizations that service providers are required to hold into a few or even one single authorization.

Neutrality and simplification in licensing have become increasingly important in a converged and NGN environment. Neutral and simplified authorization frameworks allow regulators to respond to the dynamism of a sector in which the range of services continues to expand and where multiple services can be delivered using a single, IP-based platform. Simplified, service- and technology-neutral authorization frameworks accommodate convergence and the blurring of traditional market boundaries in the ICT sector. Neutrality and simplification in licensing give service providers the ability to respond to market demand for services using the most efficient technology and infrastructure available. Neutrality and simplification also ensure that service providers are treated equally and are not subject to any competitive disadvantages by virtue of the service provided or technology used to deliver the service.

Flexibility – Many regulators have responded to the dynamism in the ICT sector by adding greater flexibility to the authorization regime. Regulators from Costa Rica, Jordan, Pakistan, Thailand, and Tunisia have all noted that flexibility in licensing, for example, enabling service providers to offer multiple services, is an important step in attracting investment in NGN.[*]

The adoption of service- and technology-neutral licensing practices is one example of how regulators have sought to make the authorization regime more flexible. Neutrality gives service providers the flexibility to respond to market demand and to take advantage of technological advances without having to seek new authorizations for each new service offered or for changes in their technological infrastructure.

A number of regulators have taken measures to add some flexibility to the authorization regime for spectrum usage. For example, some regulators have allowed licensees to refarm allocated spectrum: that is, regulators have allowed licensees to use spectrum initially allocated for 2G services to be used to provide 3G services. In Hong Kong China, mobile service providers have been given the right to choose to use 2G or 3G technology in the spectrum assigned to them in their 2G authorizations. France and Switzerland have also begun to allow operators to refarm spectrum in the 900 MHz range. Regulators have also allowed greater flexibility for spectrum licensees to resell all or some of their allocated spectrum on commercially negotiated terms. Countries that now permit such spectrum trading include: Australia, Canada, Guatemala, New Zealand, Norway, the USA, and the UK. Austria, France, Germany, the Netherlands, and Sweden have permitted spectrum trading on a more restricted basis. Spectrum re-allocation and re-farming is discussed in greater detail in **Module 5, section 2.3.8, "Re-allocating and Re-farming Spectrum"**.

Reduction of the administrative burden – Many regulators have adopted measures designed to reduce the administrative and formal requirements necessary to enter the ICT market and to provide a service. One of the key characteristics of the NGN environment is the separation of the provision of services and applications and the operation of the underlying network. It is expected that NGN will increase competition in the service and applications layers of the network since service providers will not have to operate network infrastructure to enter the market. The reduction of the administrative burden associated with licensing supports the development of competition by making it easier for service providers to enter the market.

The move to general authorization regimes and the adoption of open entry policies are two key measures that regulators around the world have used to reduce the administrative burden. Many services that were once subject to individual authorization requirements are now subject to general authorizations or a simple notification process.

[*] See the regulators' contributions to the 2007 Global Symposium for Regulators, available at **www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR07/consultation.htm**.

Practice Notes

- **Institutional and Organization Changes in the Era of Convergence**
- **Reducing the Administrative Burden in Licensing**
- **Refarming of Spectrum Resources**
- **Refarming Tools**
- **Simplification of Authorizations**

3.8.2 CONVERGENCE & AUTHORIZATION POLICIES

The word 'convergence' refers to the notion of moving together or the joining of things. Convergence has become a popular concept in ICT policy debates for a variety of different reasons. For one, ICT technologies have gradually permitted previously different types of services to be offered over the same networks. This is particularly true of IP-based networks, which can provide data, voice and video services – services that were previously offered over separate circuit-switched voice telephone networks, packet switched data networks such at the Internet, and broadband video networks such as cable television and satellite networks.

In general, convergence-based authorization policies promote equal treatment of services or technologies that had previously been licensed or regulated in different ways. Many observers have promoted such 'regulatory convergence' as being more technologically and competitively neutral – and therefore involving less regulatory intervention or determinism in communications markets.

Around the world, the implementation of convergence-based policies has very different implications, depending on the local environment and national policies. It has been a particularly 'hot' policy concept in countries that had maintained licensing distinctions between different types of technologies or services.

A prime example is India, where two types of service providers, which were licensed under very different licensing regimes, had started to compete with each other in the mobile wireless market. On the one hand, cellular mobile operators held licences that required them to pay very substantial licence fees and to use GSM technology. On the other hand, a subsequently licensed class of service providers called 'Basic Service Operators' were permitted to use copper wireline technologies or CDMA wireless technologies. They were charged much lower licence fees than the original cellular licensees. Yet their licence conditions allowed them to provide 'limited mobility", effectively allowing them to compete with the cellular licensees. This led to an obvious need for convergence – since two types of service providers competed in the same market, but had very different licence conditions.

In other countries, the term 'convergence' is used to refer to different types of policy issues than those that arose in India. For example, in Canada and some other countries, the convergence debate has centred on the different regulatory treatment of traditional telecommunications (i.e. transmission) services and broadcasting (i.e. content) services. New policies in some countries have 'converged' the regulatory treatment of transmission services, whether they transmit 'broadcasting' content or other information. Examples include the European Union's regulatory framework which uses the term 'electronic communications services' rather than 'telecommunications', to signal a converged regulatory approach to a broader range of communications services. Following the introduction of the new EU framework, the United Kingdom responded to the increasing convergence of its communications industries by creating a single communications regulator, OFCOM, to carry out the functions previously carried out by five separate regulators responsible for telecommunications, radio spectrum and broadcasting.

The practice notes set out below provide a detailed review of convergence-based approaches to licensing and regulation that have been adopted in a range of different countries.

Practice Notes

- Botswana: Multi-service Authorization Regime
- Brazil- Multimedia Communications Services
- Convergence in the EU Regulatory Framework
- India – Transition to the Unified Authorization Regime Chronology
- India's Communications Convergence Bill
- India- 'Unified' Access Service Licensing
- ITU Case Study: India's Unified Authorization Regime
- Malaysia- Licensing for Convergence
- Nigeria – Unified Access Service Licence
- Regulation and Convergence in Ireland
- Tanzania – The Converged Licensing Framework
- The UK's OFCOM- A Converged Regulatory Authority
- Uganda's Multi-Service Authorization Regime

Reference Documents

- Botswana -- Press Release, "Botswana Telecommunications Authority Introduces a New Licensing Framework"
- Botswana -- Service Neutral Licensing Framework in the Era of Convergence
- EU Authorisation Directive
- Hong Kong China -- Executive Summary of the Licensing Framework for Unified Carrier Licence
- Hong Kong China: Licensing Framework for Unified Carrier Licence
- India- DOT Guidelines for the Unified Licensing Regime (Phase I) (November 2003)
- South Africa -- Electronic Communications Act, 2006
- Tanzania -- Guidelines and Procedures For Licensing Electronic and Postal Services in Tanzania
- Tanzania -- The Communications (Licensing) Regulations, 2005
- Uganda -- Communications Licensing Application Guidelines
- Uganda Case Study: Licensing in the Era of Liberalization and Convergence

3.8.2.1 LIFTING RESTRICTIONS ON LICENSEES

The dynamic nature of the ICT sector and the significant investments that operators must make to transition to a converged, Next Generation Networks (NGN) environment has prompted some regulators to ease some of the restrictions previously placed on licensees.

A key example relates to spectrum refarming. As noted in section 7.1.2, refarming refers to using spectrum initially allocated for 2G services to provide 3G services instead. In response to consumer demand and in light of technological advancements that have made it possible to use frequency bands allocated for 2G services to provide 3G services, a number of regulators now permit licensees to refarm allocated spectrum. In Hong Kong, China, mobile service providers have been given the right to choose to use 2G or 3G technology in the spectrum assigned to them in their 2G authorizations. France and Switzerland have also begun to allow operators to refarm spectrum in the 900 MHz range.

Regulators have also allowed greater flexibility for spectrum licensees to resell all or some of their allocated spectrum on commercially negotiated terms. Countries that now permit such spectrum trading include: Australia, Canada, Georgia, Guatemala, New Zealand, Norway, the USA, and the UK. Austria, France, Germany, the Netherlands, and Sweden have permitted spectrum trading on a more restricted basis.

When issuing authorizations that will require the use of spectrum, regulators might consider giving licensees the freedom to determine whether to use 2G or 3G technology to deliver the authorized services. This gives licensees the flexibility to use the most efficient technology available to them. An alternate approach is to specify that a licensee must use 2G (or 3G) technology, but to include a provision that stipulates that a licensee may apply to use a different technology during the term of the authorization. This approach gives the regulator a bit more control and oversight over the type of technology used by licensees, but also adds some flexibility to respond to changing market conditions.

Another important area in which regulators have begun to lift restrictions on licensees in order to facilitate the transition to NGN relates to infrastructure sharing. While some regulators approach infrastructure sharing with caution in light of the need to safeguard competition, they have also recognized the potential benefits of carefully managed infrastructure sharing. An important benefit relates to the reduction of the capital and operating expenditures of operators. Reducing such expenditures helps to facilitate the provision of low cost access to services for end users. Moreover, permitting infrastructure sharing responds to the needs of operators who are incurring high costs as they upgrade existing infrastructure and build new infrastructure in preparation for the transition to NGN.

Infrastructure that has been increasingly opened to sharing includes non-replicable resources such as towers, ducts, and rights of way. Some regulators have also considered spectrum sharing. Spectrum sharing is technologically possible though care must be taken to avoid harmful interference. Such interference can be avoided using spectrum sharing strategies that are implemented on the basis of geography, time, or frequency separation.

One innovative regulatory strategy that was proposed by regulators in the best practice guidelines adopted at the International Telecommunications Union's 2008 Global Symposium for Regulators focusing on six degrees of sharing is to authorise market players who only provide passive network elements and who do not compete for end-users. These authorizations would apply to market players such as mobile tower companies, public utilities companies with rights of way, and fibre backhaul providers. Licensees would be authorized to provide access to key infrastructure to service providers and to manage the usage of such infrastructure.

The best practice guidelines relating to infrastructure sharing adopted at the International Telecommunications Union's 2008 Global Symposium for Regulators can be accessed through this link: **http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR08/PDF/GSRguidelines08_E.pdf** and through the website for the 2008 Global Symposium for Regulators: http://www.itu.int/GSR08.

Practice Notes

- **Reducing the Administrative Burden in Licensing**
- **Simplification of Authorizations**

Reference Documents

- **Best Practice Guidelines on Innovative Infrastructure Sharing Strategies to Promote Affordable Access for All**
- **Extending Open Access to National Fibre Backbones in Developing Countries**

3.8.3 UNIFIED AND MULTI-SERVICE LICENSING

Practice Notes

- **Australia and Singapore-Facilities-Based and Service-Based Licensing**
- **Botswana: Multi-service Authorization Regime**
- **Brazil- Multimedia Communications Services**

- Convergence in the EU Regulatory Framework
- India- 'Unified' Access Service Licensing
- ITU Case Study: India's Unified Authorization Regime
- Nigeria – Unified Access Service Licence
- Tanzania – Authorizations in the Converged Licensing Framework
- Tanzania – The Converged Licensing Framework
- Uganda's Multi-Service Authorization Regime

Reference Documents

- Botswana -- Service Neutral Licensing Framework in the Era of Convergence
- Nigeria- Licensing Procedures
- South Africa -- Electronic Communications Act, 2006
- Tanzania -- Guidelines and Procedures For Licensing Electronic and Postal Services in Tanzania

3.8.3.1 IMPLEMENTING UNIFIED AND MULTI-SERVICE LICENSING REGIMES

The implementation of unified and multi-service authorization regimes requires careful planning. Regulators must address a myriad of issues, including:

§ whether a unified or multi-service authorization regime is appropriate for the local ICT market;

§ whether to adopt a unified or a multi-service authorization regime;

§ the categories of authorizations in a multi-service regime;

§ the licensing procedures for issuing the new authorizations;

§ the terms and conditions attached to these authorizations; and

§ how to transition existing licensees to the new licensing regime.

Depending on the nature and scope of the authorizations, regulators and policy makers may have to grapple with the issue of which regulatory agency should administer the new forms of authorizations. Since many countries have traditionally distinguished between telecommunications (*i.e.*, transmission-based) services and broadcasting, or content-based services, it is not uncommon to have different regulatory agencies administer telecommunications and broadcasting services. In these countries, the inclusion of broadcasting and content-based services within the scope of a unified or a multi-service authorization thus raises the question of which regulatory agency should administer the authorization.

In the UK, for example, the implementation of the EU *Authorization Directive* required the introduction of a unified authorization, namely the electronic communications authorization. Electronic communications authorizations encompass all forms of electronic networks and services, including broadcasting and content-based services. There were five existing regulatory agencies in the UK whose authority touched upon one or more of the services and networks that came within the scope of the electronic communications authorization. Coordinating the activities of these five agencies would have been difficult and inefficient. Accordingly, the UK created a new regulator, the Office of Communications or OFCOM, to regulate the electronic communications sector. OFCOM replaced and assumed the responsibilities of the five regulatory agencies that previously had jurisdiction over various electronic communications networks and services.

In addition to the above substantive issues, regulators must also carefully consider the procedural dimension of implementing a new unified or multi-service authorization regime. In order to promote transparency and confidence in the process, best practices suggest that regulators should consult with industry stakeholders prior to implementing the new authorization regime. Many regulators have adopted a consultation process involving several stages prior to finalizing the details of unified licensing regimes or multi-service authorization regimes. In Nigeria, the consultation process had three phases, for example. The consultation process in Hong Kong, China also moved through three phases. The Hong Kong, China process involved consultation papers issued by both the regulator and the Ministry responsible for the ICT sector. In Kenya, the consultation process has thus far progressed through two phases.

Regulators may also find it helpful to establish industry forums so that they can collaborate with industry members on developing appropriate terms and conditions for authorizations, especially in the case of the technical aspects of access and interconnection. Given the dynamism in the ICT sector, it is likely that technical standards will continue to evolve. Industry members are often better placed than regulators to know what standards are appropriate.

Practice Notes

- Convergence in the EU Regulatory Framework
- Hong Kong, China – Consultations on the Licensing Framework for Unified Carrier Licences
- Hong Kong, China – Transition to the Unified Carrier Licensing Regime
- India – Transition to the Unified Authorization Regime Chronology
- India – Unified Licensing Regime Consultation Paper
- India- 'Unified' Access Service Licensing
- Ireland – Transition to the General Authorisation Regime
- ITU Case Study: India's Unified Authorization Regime
- Kenya -- Consultation on the Implementation of a Unified Licensing Framework
- The UK's OFCOM- A Converged Regulatory Authority

Reference Documents

- Botswana -- Service Neutral Licensing Framework in the Era of Convergence
- Hong Kong China -- Executive Summary of the Licensing Framework for Unified Carrier Licence
- Hong Kong China: Licensing Framework for Unified Carrier Licence
- Hong Kong, China -- Consultation Paper on Licensing Framework for Unified Carrier Licence
- Hong Kong, China -- Consultation Paper on the Creation of a Unified Carrier Licence under the Telecommunications Ordinance
- Hong Kong, China -- Executive Summary, Consultation Paper on the Licensing Framework for Unified Carrier Licence
- India- Annexures to the Consultation Paper on the Unified Licensing Regime (March 2004)
- India- Consultation Paper on the Unified Licensing Regime (March 2004)
- India- Consultation Paper on Unified Licensing for Basic and Cellular Services (July 2003)
- Ireland- Consultation Paper – Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- Ireland- E.U. (Electronic Communications Networks and Services) (Authorisation) Regulations 2003
- Ireland- Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- Ireland- Guidelines on the New General Authorisation Regime
- Kenya -- Implementation of a Unified Licensing Framework & New Market Strategy

3.8.3.2 IMPLEMENTING A UNIFIED OR MULTI-SERVICE LICENSING REGIME – SOME CONSIDERATIONS

Implementing a unified or a multi-service authorization regime is a significant undertaking for a regulator. Considerable resources will be necessary to ensure that the new licensing regime is well designed and to ensure a successful transition from the old, service-specific authorization regime. Moreover, given the centrality of licensing to the development of the ICT sector, decisions about implementing a unified or a multi-service licensing regime must be carefully considered.

Each country raises a unique set of conditions and circumstances that impact the decision about whether to adopt a unified or multi-service authorization regime. There are some issues that are relevant in almost all countries, however. One important consideration is the existing degree of convergence in the ICT sector. In Hong Kong, China, for example, the transition to the unified carrier licence regime began with a set of consultations related to deregulation in light of fixed-mobile convergence.

Another important consideration is the degree of competition in the ICT sector and the ability to prevent anti-competitive behaviour through *ex ante* or *ex post* regulation. A unified or multi-service licensing regime may not be advisable if such a regime would expose vulnerable service providers to unfair competition by dominant service providers. A related consideration pertains to whether maintaining service-specific authorizations creates unfair competitive advantages for certain types of service providers. This consideration may arise where a service that was previously not considered substitutable for another subsequently becomes increasing substitutable and where provision of the two services in question are subject to different regulatory terms and conditions.

In India, for example, the move to the converged licensing framework began after complaints arose when "basic service operators" (BSOs) were permitted to offer "limited-mobility" services over Wireless Local Loop (offerings abbreviated as WLL(M)) using CDMA technology in their coverage areas. This service innovation proved immensely popular since prices were generally lower for this service than for GSM cellular mobile services. BSOs were also able to offer all-India mobility using the CDMA WLL(M) technology, which contributed to the popularity of this service innovation. As the popularity of WLL(M) services offered by BSOs grew, a dispute emerged involving the BSOs and GSM cellular carriers. WLL(M) services were increasingly seen as largely substitutable for GSM services. However, GSM cellular carriers had paid substantial amounts for their licences, and they complained bitterly that when they had made those investments they had not known that they would face competition from WLL(M) providers offering similar services. The competition between BSOs and the cellular carriers spilled over into litigation. Ultimately, the Telecommunications Regulatory Authority of India (TRAI) and the courts had to find a balance between promoting service penetration and ensuring a level playing field among operators. This dispute led to the initiation of a consultation on the possible creation of a unified access services licence (UASL). This consultation set India on the path to adopting a converged licensing framework.

The Nigerian Communications Commission identifies the following as objectives of unified licensing:

- Encouragement of the growth of new applications and services;
- Simplification of existing licensing procedures to ease market entry and operations;
- Regulatory flexibility to address market and technological developments;
- Efficient utilization of network resources, so that individual networks may be used to provide a broad range of ICT services; and
- Encouragement of a full range of operators, including large scale and micro entrepreneurs.

◂ Box 1 Nigeria – Objectives of the Unified Licensing Framework

Source: Nigerian Communications Commission, "Licensing Framework for Unified Access Service in Nigeria", online: www.ncc.gov.ng.

Another factor that influences the adoption of a unified or multi-service authorization regime is the regulatory objective of encouraging the innovation of new services and applications. Nigeria identifies this objective as being one of several objectives of its unified licensing framework. (See Box 1.) Given the rapid pace of technological innovation, countries view unified and multi-service authorizations as a means of facilitating the roll-out of new services and of ensuring that the regulatory regime does not constrict the development of the ICT sector.

Practice Notes

- **Hong Kong, China – Consultations on the Licensing Framework for Unified Carrier Licences**
- **India – Transition to the Unified Authorization Regime Chronology**
- **India – Unified Licensing Regime Consultation Paper**
- **India- 'Unified' Access Service Licensing**
- **ITU Case Study: India's Unified Authorization Regime**
- **Kenya -- Consultation on the Implementation of a Unified Licensing Framework**

Reference Documents

- **Hong Kong China -- Executive Summary of the Licensing Framework for Unified Carrier Licence**
- **Hong Kong China: Licensing Framework for Unified Carrier Licence**

- Hong Kong, China -- Consultation Paper on Licensing Framework for Unified Carrier Licence
- Hong Kong, China -- Consultation Paper on the Creation of a Unified Carrier Licence under the Telecommunications Ordinance
- Hong Kong, China -- Executive Summary, Consultation Paper on the Licensing Framework for Unified Carrier Licence
- India- Annexures to the Consultation Paper on the Unified Licensing Regime (March 2004)
- India- Consultation Paper on the Unified Licensing Regime (March 2004)
- India- Consultation Paper on Unified Licensing for Basic and Cellular Services (July 2003)
- India- DOT Guidelines for the Unified Licensing Regime (Phase I) (November 2003)
- India- Preliminary Consultation Paper on Unified Licensing Regime (November 2003)
- Kenya -- Implementation of a Unified Licensing Framework & New Market Strategy

3.8.3.3 CATEGORIES OF MULTI-SERVICE AUTHORIZATIONS

In a multi-service licensing regime, there are typically a small number (three to four) of categories of authorizations. Each authorization category encompasses a broad range of services and is usually technology-neutral. The categories of multi-service authorizations vary from country to country. The following is a summary of the categories of multi-service authorizations that have been adopted by various countries.

Botswana

Botswana's multi-service licensing regime features three categories of authorizations: Public Telecommunications Operator (PTO) Licences, Value-Added Network Services (VANS) Licences, and Private Network Licences. PTO Licences authorise licensees to provide the full range of public telecommunications services, including (but not limited to) local, long distance, and international voice services and network services using any available technology. VANS Licences authorise licensees to provide all forms of value-added telecommunications services such as Internet and data services. Under the authorization framework, VoIP falls within the scope of the VANS Licence. Private Network Licences apply to the operation of private networks, which refers to networks that the licensee maintains for its internal own use and that does not interconnect with any public network.

Tanzania

Tanzania's Converged Licensing Framework (CLF) features four categories of authorizations: Network Facility licence, Network Service Licence, Application Service Licence, and Content Service Licence. The Network Facility Licence authorises licensees to operate and to maintain public electronic communications networks with various technologies (e.g., CDMA, GSM, WCDMA, WLL, and ASDL). Services that may be provided pursuant to a Network Service Licence include fixed lines services bandwidth services, mobile service, and broadcasting distribution services. To view these licenses, follow this link: http://www.tcra.go.tz/licensing/license_categories.php

The Tanzanian Application Service Licence authorises a licensee to provide electronic communications services to end users. Licensees may establish and operate their own private facilities or they may procure and resell services from licensed facility and/or network service providers. Services that fall within the scope of an Application Service Licence include Internet services, virtual mobile services, payphone services, and fixed and mobile services.

Content Service Licences are similar to Application Service Licences except that the licensee is responsible for the provision of content services such as satellite broadcasting, broadcasting terrestrial free to air TV, terrestrial radio broadcasting, subscription television, and other broadcasting services.[i]

Uganda

There are three categories of authorizations in the Ugandan multi-service licensing framework: Public Service Provider (PSP) Licence, Public Infrastructure Provider (PIP) Licence, and General Licence. There are two sub-categories of PSP Licences. Public Voice and Data Provider Licences allow the licensee to offer telephony and data services of any kind using any technology. However, licensees must use the capacity or infrastructure of a PIP Licensee. If a licensee wishes to offer services over its own infrastructure, it must acquire a PIP Licence. Examples of services that may be provided pursuant to a Public Voice and Data Provider Licence include: fixed voice services; mobile services, and Internet Access services, including VoIP. The second PSP Licence sub-category is Capacity Resale Licence. Capacity Resale Licensees are authorized to resell leased telecommunications services or capacity. Services that fall within the scope of Capacity Resale Service Licences include calling cards (both international and local, re-branded cards) and capacity resale to Public Voice and Data

Provider Licensees.

PIP Licences authorise licensees to establish, operate, and maintain infrastructure for the provision of communications services to the public and/or to offer infrastructure commercially for use by PSP Licensees. If a PIP Licensee uses its infrastructure to provide communications services to the public, it must also hold a PSP Licence. PIP licensees that wish to use spectrum resources or other essential resources and access facilities, including international gateways, numbering resources, and VSAT services, must apply for a separate authorization.

General Licences apply to public pay communications networks such as payphone kiosks, fax bureau services, internet cafés, and cyber cafés. Licensees may provide payphone services using VoIP technology. However, licensees are not permitted to provide any prepaid services to the public (e.g., calling cards) unless they obtain the appropriate authorization from the Ugandan regulator.

Uganda also issues authorizations for essential resources and facilities. These authorizations apply to the use of spectrum, numbering resources, international gateways, and VSAT.

Malaysia

Malaysia has moved from a system of 31 different types of service-specific authorizations to four different multi-service authorizations. The four categories of authorizations are: Network Facility Provider (NFP) Licences, Network Service Provider (NSP) Licences, Application Service Provider (ASP) Licences, and Content Application Service Provider (CASP) Licences.

NFP Licences authorise licensees to provide network facilities. NFP licensees include owners of satellite earth stations, fibre optic cables, communications lines and exchanges, radio communication and transmission equipment, mobile communication base stations and broadcasting towers and equipment. NSP licensees are authorised to provide network services such as basic connectivity and bandwidth that support a variety of applications. Under an ASP Licence, a licensee may provide various application services such as voice services, data services, Internet access services, and VoIP. CASP Licences are a special subset of ASP Licences. CASP licensees are authorized to provide traditional broadcast services and other content-based services such as online publishing and information services.

Singapore

The authorization regime in Singapore features two broad categories of authorizations: Facilities-Based Operators (FBO) Licences and Services-Based Operators (SBO) Licences. FBO Licences apply to the deployment and/or operation of any form of telecommunications network, systems, or facilities that is used by any person to provide telecommunications and/or broadcasting services to third parties. These third parties may include other licensed telecommunications operators, business customers, or the general public. All FBO Licences are individual authorizations.

SBO Licences must be held by operators who intend to lease telecommunications network elements (e.g., transmission capacity and switching services) from FBO licensees in order to provide their own telecommunications services or to resell services obtained from FBO licensees to any third person. SBO Licences are further sub-divided into the SBO (Individual) Licence category and the SBO (Class) Licence category. The distinction between these two sub-categories relates to the scope of the operations and the nature of the services being offered.

Trinidad and Tobago

Trinidad and Tobago's authorization regime features five types of authorizations, which are referred to as "concessions":

- Type 1: Network-Only Concession – authorizes a concessionaire to own or operate a public telecommunications network, but without the provision of public telecommunications or broadcasting services. This is a network-based concession.
- Type 2: Network-Service Concession – authorizes a concessionaire to own or operate a public telecommunications network in addition to providing public telecommunications services over that network. This is a network-based concession.
- Type 3: Virtual Network-Service Concession – authorizes a concessionaire to provide public telecommunications services without a related authorization to own and/or operate a physical public telecommunications network, in a manner that is transparent to the end user. Type 3 concessions are thus designed for resellers. A Type 3 concession is necessary in cases where an entity has the capability of providing multiple services (e.g., data, image, voice, video) over a single transmission medium that has been leased. However, a Type 5 Concession is necessary to provide broadcasting services over a telecommunications network. Type 3 concessions are service-based.

- Type 4: Telecommunications Service Concession – authorizes a concessionaire to provide a specific public telecommunications service without requiring an authorization to own and/or operate a telecommunications network. This is a service-based concession.
- Type 5: Broadcasting Service Concession – authorizes the provision of a broadcasting service without a requirement to hold an authorization to operate a telecommunications network. Type 5 concessions are service-based.

Only Type 2 and Type 3 concessions are service-neutral. Both of these types of concessions authorize the provision of any telecommunications service that can be provided over the relevant telecommunications network, except for broadcasting services. While Type 1 concessions are not service-neutral, there are sub-categories of this concession that encompass various services. Thus, Type 1 Concessions are multi-service authorizations.

[i] The description of the Tanzanian authorization categories is adapted from *Tanzania's Experience in Licensing of Communication Operators under the Converged Licensing Framework* (Geneva: International Telecommunications Union, 2007). This document was prepared for an ITU-D Study Group.

Practice Notes

- **Botswana: Multi-service Authorization Regime**
- **Malaysia- Licensing for Convergence**
- **Singapore – Categories of Multi-Service Authorizations**
- **Tanzania – Authorizations in the Converged Licensing Framework**
- **Tanzania – The Converged Licensing Framework**
- **Uganda's Multi-Service Authorization Regime**

Reference Documents

- **Botswana -- Service Neutral Licensing Framework in the Era of Convergence**
- **Malaysia- Class Licence for Applications Services**
- **Malaysia- Class Licence for Network Facilities Provision**
- **Malaysia- Class Licence for Network Services Provision**
- **Tanzania -- Application Service Licence**
- **Tanzania -- Content Service Licence**
- **Tanzania -- Network Facility Licence**
- **Tanzania -- Network Services Licence**
- **Tanzania -- Schedule of Licence Categories and Fees**
- **Uganda Case Study: Licensing in the Era of Liberalization and Convergence**
- **Uganda- Licences Issued in the Sector**

3.8.3.4 THE LICENSING PROCESS FOR UNIFIED AND MULTI-SERVICE AUTHORIZATIONS

Unified and multi-service authorizations often do not fit neatly into the categories of general authorizations or individual authorizations. In some respects, unified and multi-service authorizations resemble general authorizations in so far as they cover broad classes of services. Moreover, the licensing process for unified and multi-service authorizations in several countries is akin to a general authorization licensing process. In the EU, for example, the *Authorization Directive* stipulates that the provision of electronic communications networks and services may only be subject to a general authorization. Thus, to obtain an electronic communications authorization, regulators may only require service providers to file a notification, along with required information. Regulators cannot require service providers to obtain an explicit decision or any other administrative act by the regulator.

Nevertheless, in many cases, the process for obtaining unified and multi-service authorizations involves more intensive regulatory scrutiny and assessment of applicants, particularly where the authorizations permit the operation of network infrastructure. The application process often requires that applicants demonstrate that they can meet certain basic criteria for licensing. Although these criteria may not be onerous, they necessitate a closer degree of scrutiny than what might otherwise be expected in a straightforward general authorization licensing process.

For example, in Singapore, the Info-communications Development Agency (IDA) undertakes a merit-based evaluation of proposals made by applicants for a Facilities Based Operator (FBO) Licence. This evaluation process generally takes eight weeks. The process for obtaining a Service Based Operator (FBO) (Individual) Licence requires less intensive evaluation of licence applications, however. Provided that applicants have provided all necessary information, they generally receive their FBO (Individual) Licence within fourteen days of submitting their application.

The Tanzanian multi-service licensing process also involves a careful scrutiny of submitted applications. Applicants are required to file an application form, a business plan, a roll out plan, company registration, information on the technical proposal of the service to be provided, information about the applicant's previous experience in the ICT sector, and a company profile. The Tanzanian regulator assesses the materials submitted and conducts a detailed evaluation of how well the applicant meets the specific licensing criteria established for each type of multi-service authorization sought. As information about applicants are published in newspapers, an Evaluation Team also considers any comments received about the applicant by members of the public.

In some cases, the licensing process requires the submission of a range of information and documentation that extends beyond what is typically required in a notification for a general authorization. For example, applicants for a Public Infrastructure Provider (PIP) Licence in Uganda must submit a letter of credit in favour of the Ugandan Communications Commission (UCC) for at least US$25,000 with their application. PIP Licence applicants who propose to use spectrum resources must submit a letter of credit for either US $250,000 or US$2 million, depending on the frequency band.

Unified and multi-service authorizations are not typically subject to the types of licensing processes used to issue individual authorizations, however. Neither comparative evaluations nor competitive licensing processes are generally used to issue unified and multi-service authorizations. Moreover, most countries do not limit the number of unified and multi-service authorizations available for issue. Thus, unified and multi-service licensing processes do not fall neatly into the category of individual authorizations.

In many cases, the licensing process for unified and multi-service authorizations can best be described as a non-competitive individual licensing process. Such a process is a hybrid of typical general authorization licensing processes and aspects of competitive licensing processes. Applicants must submit an application that requires them to provide a range of information and documentation. The information and documentation that must be provided may be broader in scope than that which is necessary in many general authorization licensing processes, particularly in the case of authorizations that permit the operation of infrastructure. Some of the licensing criteria resemble the qualification and selection criteria common in comparative evaluation licensing processes. There is, however, an important difference: in the licensing processes for unified and multi-service authorizations, applicants typically do not compete with other each for a limited number of authorizations.

Regulators typically will issue a unified or multi-service authorization if the applicant has provided all necessary information and documentation and has met all licensing criteria. In this regard, the process bears a resemblance to general authorization regimes. However, determining whether the applicant has met the licensing criteria may involve a merit-based assessment of the applicant's proposal. This type of intensive regulatory evaluation goes beyond the scrutiny conducted in most general authorization licensing processes.

Practice Notes

- **Licensing Criteria for the Issuance of Unified and Multi-Service Authorizations**
- **Malaysia- Licensing for Convergence**
- **Nigeria – Qualification Criteria for Unified Access Service Licences Applicable to Existing Licensees**
- **Nigeria – Unified Access Service Licence**
- **Singapore – Licensing Process for Issuing Multi-Service Authorizations**
- **Tanzania – Multi-Service Licensing Processes and Procedures**
- **Tanzania – Weighted Evaluation Criteria for Issuance of Multi-Service Licences**
- **Trinidad & Tobago: Evaluation Criteria and Associated Weightings for Concession Applications**
- **Uganda's Multi-Service Authorization Regime**

Reference Documents

- India -- Licence Agreement for Provision of Unified Access Services
- India- DOT Guidelines for the Unified Licensing Regime (Phase I) (November 2003)
- Ireland- Guidance Note on Completion of the Notification Related to General Authorisations
- Ireland- Guidelines on the New General Authorisation Regime
- Ireland- Registration Form for General Authorisations
- Malaysia -- Checklist for Individual Licence Applications
- Malaysia- Individual Licence Application
- Malaysia- Licensing Regulation No. 17
- Malaysia- Licensing Regulation No. 19
- Malaysia- Registration Notice and Checklist
- Nigeria- Licensing Procedures
- Singapore- Guidelines for Submission of Application for Facilities-Based Operator Licence
- Singapore- Guidelines for Submission of Application for Services-Based Operator Licence
- Singapore- SBO Class licence application
- Singapore- Web Site for Registering for Licences On-line
- Tanzania -- Application Form for the Converged Licensing Framework
- Tanzania -- Diagrams of Converged Licensing Processes
- Tanzania -- Guidelines and Procedures For Licensing Electronic and Postal Services in Tanzania
- Tanzania -- Schedule of Licence Categories and Fees
- Trinidad & Tobago -- Application Procedures for Concessions and Licences
- Trinidad & Tobago -- Eligibility and Evaluation Criteria for Concessions
- Uganda -- Communications Licensing Application Guidelines
- Uganda -- Compliance Check List under New Licensing Regime
- Uganda- Application Processing Procedure
- Uganda- Application Requirements
- Uganda- Licence Process Flow Chart

3.8.3.5 TERMS AND CONDITIONS OF UNIFIED AND MULTI-SERVICE AUTHORIZATIONS

There is no standard set of conditions for unified or multi-service authorizations. The conditions attached to these authorizations vary from one country to another as they are the products of the individual circumstances and the regulatory framework in each country.

Some of the considerations relevant to determining what terms and conditions should be should be attached to a unified or multi-service authorization include:

§ The level of market development and competition in the country.

§ Whether the existing regulatory framework includes sufficiently detailed regulations on key matters such as interconnection and access, universal services, quality of service requirements, prohibitions on anti-competitive conduct, the use of scarce resources, the protection of consumer privacy, and other important aspects of network operation and service provision in the ICT sector.

§ Whether a country has elected to adopt *ex ante* or *ex post* regulation.

Practice Notes

- Terms and Conditions Permitted Under the EU Authorisation Directive

Reference Documents

- India- Licence Agreement for Unified Access Services (November 2003)
- Ireland- General Authorization Conditions
- Malaysia- Class Licence for Applications Services
- Malaysia- Class Licence for Network Facilities Provision
- Malaysia- Class Licence for Network Services Provision
- Singapore- Facilities-Based Operator Licence issued to Singapore Telecommunications Ltd
- Tanzania -- Application Service Licence
- Tanzania -- Content Service Licence
- Tanzania -- Network Facility Licence
- Tanzania -- Network Services Licence

3.8.3.6 TRANSITIONING EXISTING LICENSEES TO THE NEW LICENSING REGIME

Regulatory reform never occurs in a vacuum. When new forms of authorization are introduced, there will almost certainly be service providers active in the ICT sector that hold authorizations issued under the licensing framework that is being replaced. Regulators and policy makers must consider how to manage these service providers.

The question of how to transition existing licensees to a new, converged licensing framework becomes particularly important if the terms and conditions attached to existing authorizations are more favourable than those attached to the converged authorizations. In such a case, issues of fairness may arise if existing licensees are forced to transition to the new authorization regime. However, the failure to transition existing licensees may create competitive advantages for such licensees that ultimately distort competition and discourage new players from entering the market.

Conversely, existing licensees may be subject to a competitive disadvantage if the terms and conditions of existing authorizations are not as favourable as those attached to the new, converged authorizations. In such a case, if licensees are not permitted to migrate to the new authorization regime prior to the expiration of the term of their existing authorization, these licensees may find themselves subject to less favourable terms and conditions for several years. This situation also raises concerns about unfairness in the regulatory process and the distortion of competition.

Transitioning existing licensees to the new authorization framework is an important matter even when there are no substantial differences between the terms and conditions of existing authorizations and those of the new unified or multi-service authorizations. Maintaining different authorization frameworks imposes costs and administrative burdens on regulators. Transparency, efficiency, and regulatory certainty are all enhanced when all service providers are subject to the same authorization regime. However, requiring existing licensees to migrate to the new, converged authorization framework may trigger legal challenges and allegations of unfairness. Accordingly, it is often prudent to give existing licensees the option to migrate to the new authorization regime immediately or to continue to offer services under their existing authorizations until their terms expire. Indeed, many countries provide existing licensees with this option, as the experiences of countries such as Tanzania, Botswana, and India illustrate.

Chapter 15 of the *Electronic Communications Act, 2005* (ECA) sets out the general framework for the transition to South Africa's new technology- and service-neutral multi-service authorization regime. The key features of the transition include:

- Mandatory migration to the new authorization regime. The migration occurs through a conversion of existing licences to one or more licences that comply with the ECA.
- The Independent Communications Authority of South Africa (ICASA) must convert all existing licences by granting new licences that comply with the ECA within 24 months of the adoption of the ECA. (The schedule for conversion has been extended into 2008.)
- The new licences must be granted on no less favourable terms than the existing licences. However, as part of the conversion process, the ICASA may grant rights and impose obligations on a licensee to ensure that existing licences comply with the ECA.
- All existing licences issued under the *Telecommunications Act* (one of the predecessors to the ECA) remain valid until converted to a new licence by the ICASA. Existing licences remain subject to all terms and conditions that are not inconsistent with the ECA until these licences are converted and re-issued under the ECA.
- All licences converted pursuant to the ECA retain their original term of validity unless otherwise specified by the ICASA.
- Once an existing licence is converted and re-issued, the new licence is governed by the terms of the ECA and the existing licence is considered to have been surrendered and is of no force or effect.
- The ICASA is not permitted to grant or to include in the terms of a converted licence any monopoly or exclusionary rights in any network or services contemplated in the ECA or related legislation. Existing monopoly and exclusionary rights are null and void, subject to the proviso that radio frequency spectrum that is assigned to a licence holder is not considered to be a monopoly or to constitute exclusionary rights.

◄ Box 1 Features of the Transition to the Multi-Service Authorization Regime in South Africa

Source: South Africa, *Electronic Communications Act, 2005*, Act No. 36, 2005, Chapter 15

The experiences from a number of countries that have implemented unified or multi-service authorization regimes suggest that the following practices are helpful in managing the transition to a new unified or multi-service authorization regime:

§ Engage industry stakeholders in discussions about the new authorization regime. Most countries conducted consultation processes on the proposed unified or multi-service authorization regime prior to implementing any changes. In some countries, the consultation process has gone through a number of phases. In Hong Kong, China, for example, the regulator and the policy maker concluded three rounds of consultations before introducing the framework for the unified licensing regime. The Nigerian transition to a unified licensing regime was also proceeded by three rounds of consultations.

§ Once the details of the unified or multi-service authorization regime has been finalized, host meetings with existing licensees and other industry stakeholders to explain the new regime. The status of existing licensees and their options with respect to the new authorization framework should be carefully explained to them. It is also helpful to develop materials for existing licensees (as well as other stakeholders) that explain the nature of the new authorization framework and that provides guidelines for applying for authorizations. Uganda, Tanzania, Singapore, and Botswana have all published information designed to provide stakeholders with information about their unified or multi-service licensing frameworks.

§ Be flexible in terms of the time frame for implementing the new unified or multi-service authorization regime. In many countries, existing licensees are given a period of time in which they may apply for a unified or multi-service authorization under the new licensing framework. After this period of time expires, if a licensee has not yet applied for a new authorization, the licensee is deemed to have elected to continue its operations under its existing authorization for the duration of the term of that authorization. While it is important to set deadlines, the experience of Tanzania suggests that flexibility with respect to such deadlines is important. The Tanzanian Communications Regulatory Authority (TCRA) initially set a 12 month period for existing licensees to migrate to the new Converged Licensing Framework (CLF). However, at the end of this 12 month period, several communications operators had not yet migrated to the new regime since they were not sure about which authorization category was most appropriate for them. Under the circumstances, the TCRA granted a six month grace period for such operators to complete the migration process. During this period, the TCRA held a number of meetings with operators to provide them with information about the CLF and to explain the advantages of migrating to this framework.

§ Employ incentive regulation to encourage existing licensees to migrate to the new unified or multi-service authorization regime. In Tanzania, for example, the TCRA waived application fees and initial licences fees for existing licensees that chose to migrate to the CLF.

§ Existing licensees should be migrated to the new authorization regime on the same or more favourable terms and conditions as those featured in the new authorization regime.

§ Provide existing licensees with the option of migrating to the new unified or multi-service authorization regime, but do not require such a migration. In Tanzania, operators that elected to migrate to the CLF were issued fresh authorizations. *i.e.*, authorizations whose term began as of the date of issuance and was not off-set to account for the years that the operator had held its previous licence. Similarly, in Botswana, existing licensees who opted to apply for a new multi-service licence were granted a new authorization with a full term. Licensees that opted not to apply for a new authorization were advised that they would continue to operate under their existing authorization until their current authorization expired.

Practice Notes

- **Approaches to Transitioning to New Authorization Regimes**
- **Hong Kong, China – Transition to the Unified Carrier Licensing Regime**
- **India – Transition to the Unified Authorization Regime Chronology**
- **India- 'Unified' Access Service Licensing**
- **South Africa – Individual Licence Amendment Provisions in the Electronic Communications Act**

Reference Documents

- **Hong Kong China -- Executive Summary of the Licensing Framework for Unified Carrier Licence**
- **Hong Kong China: Licensing Framework for Unified Carrier Licence**
- **South Africa -- Electronic Communications Act, 2006**

3.8.3.7 SELECTING THE SECTOR REGULATOR

As has already been noted previously in this Section, regulators and policy makers may have to grapple with the issue of which regulatory agency should administer the new forms of authorization. This issue is most common if the new unified or multi-service authorizations consolidate authorizations that had previously been administered by more than one regulatory agency. It is not uncommon, for example, for different regulatory agencies to be responsible for telecommunications (*i.e.*, transmission services), content-based services (*e.g.*, broadcasting), and wireless services. When consolidating such authorizations, a decision must be made about which regulatory authority will administer the authorizations.

As a general rule, countries must either assign the responsibility to one of the regulatory agencies or create a new "converged" regulator to administer the unified or multi-service authorization framework, as well as other aspects of the ICT sector. In order to promote clarity and regulatory certainty, it is best to avoid creating an authorization framework where different regulatory agencies share concurrent jurisdiction. Moreover, having more than one regulator with authority over various aspects of the ICT authorization framework increases the costs of regulation and adds to the administrative burden of service providers.

Practice Notes

- **The UK's OFCOM- A Converged Regulatory Authority**

3.8.3.8 CONSULTATION PROCESSES

The adoption of a unified or a multi-service authorization regime is a significant development in the overall regulatory framework. In order to foster transparency and to bolster the confidence of key stakeholders in the ICT sector, best practices suggest that the policy maker and the regulator should undertake a consultation process on the issue of the proposed authorization regime. This is particularly important at present since many operators are looking for regulatory certainty in response to the large investments they must make in their infrastructure in order to transition to a converged NGN environment. Moreover, policy makers and regulators would likely benefit from the knowledge and experience of industry stakeholders. Such stakeholders are often better placed than policy makers and regulators to understand the technical and operational requirements of providing converged NGN-based services.

There is no set formula for shaping a consultation process. However, issues that are commonly considered in a consultation process on the implementation of a unified or multi-service authorization regime include:

§ The advisability of transitioning to a converged licensing regime

§ Whether to adopt a single unified authorization or several categories of multi-service authorizations

§ What categories should be established for multi-service authorizations and the scope of multi-service authorizations

§ The terms and conditions that should be applicable to the new form of authorization

§ Access and interconnection requirements of licensees under the unified or multi-service licensing regime

§ Whether licensees will be permitted to share infrastructure and, if so, what part of the network must be shared

§ Quality of service requirements for holders of unified or multi-service authorizations

§ The plan for transitioning existing licensees to the new authorization framework

§ Licensing fees

§ Whether the number of unified or multi-service authorizations that will be issued should be limited

§ The process to be used for issuing unified or multi-service authorizations (e.g., notification, comparative evaluation, auctions)

§ Licensing criteria

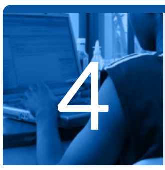
Practice Notes

- Hong Kong, China – Consultations on the Licensing Framework for Unified Carrier Licences
- India – Unified Licensing Regime Consultation Paper
- Ireland – Transition to the General Authorisation Regime
- Kenya -- Consultation on the Implementation of a Unified Licensing Framework
- Public Consultation Processes

Reference Documents

- Hong Kong, China -- Consultation Paper on Licensing Framework for Unified Carrier Licence
- Hong Kong, China -- Consultation Paper on the Creation of a Unified Carrier Licence under the Telecommunications Ordinance
- Hong Kong, China -- Executive Summary, Consultation Paper on the Licensing Framework for Unified Carrier Licence
- India- Consultation Paper on the Unified Licensing Regime (March 2004)
- India- Consultation Paper on Unified Licensing for Basic and Cellular Services (July 2003)
- India- Preliminary Consultation Paper on Unified Licensing Regime (November 2003)
- Ireland- Consultation Paper – Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- Kenya -- Implementation of a Unified Licensing Framework & New Market Strategy

Next: 4 Universal Access and Service ➜



Universal Access and Service

Availability, Accessibility and Affordability for Universal Service

The concept of Universal Access and Service (UAS) has been evolving in recent years, primarily due to the growth of the internet and the mobile phone, in combination with market liberalization and explosive demand in the developing world. This Module introduces the concept, and explores a number of topics, such as marketing mechanisms and financial analysis. Availability, accessibility, and affordability are discussed throughout as fundamental requirements of universal service.

4.1 UNIVERSAL ACCESS: AN OVERVIEW

This module explores key aspects of universal access and service (UAS) for information and communication technologies (ICTs). The value and importance of ICTs cuts across all other sectors of the economy. ICTs are recognized as a pillar of modern society, as no other sector seems to work efficiently without them. Diverse sectors such as governance, education, health, business, finance and tourism are critically dependent upon information and communications. Also, no country, irrespective of its economic status, can ignore the trend towards ubiquitous use of ICTs. This is why the term enabler is often used to describe ICTs.

This module is structured as follows:

- Chapter 1 is an introduction to UAS;
- Chapter 2 gives an overview of regulatory reform which is the first vital step of increasing UAS using market mechanisms and good regulation;
- Chapter 3 introduces the main approaches and specific UAS instruments, policies and interventions that policy-makers and regulators can use beyond sector reform;
- Chapter 4 discusses details of UAS policy development, its framework and process;
- Chapter 5 explains financing issues related to UAS and financial analyses;
- Chapter 6 outlines details of UAS programme development and economic analysis, in particular for project prioritization;
- Chapter 7 describes the competition process of awarding subsidies for the provision of UAS by operators and service providers; and;
- Chapter 8 gives an overview of technology issues and trends that are particular relevant for UAS.

Chapter 1 provides information that is critical to understanding the basic concepts of universal access (UA) and universal service (US), the progress being made towards UAS internationally, the rationale behind UAS policy, international trends and developments, and integration of UAS for ICTs with other national policies and programmes.

Origins of universal service

Historically, the term and concept of US existed before UA. US for telephone service, first mentioned in the 1934 Communications Act of the United States, describes the concept of affordability of telephone services, as well as its universal availability for households desiring that service. UA is focussed on public, community or shared access to telecommunications.

US only came to the forefront with the advent of market liberalization and sector reform. For example, specific aims for serving all reasonable demands for basic telephony service were formulated in 1984 with British Telecom's privatization. Prior to that, affordable service for all was an implicit obligation by the management of the state-owned enterprise, similar to the situation in many other countries.

Market liberalization and competition triggered a debate on US, surrounding the key questions of how to achieve it in a deregulated environment, how much US costs, and who shall bear the costs. The debate distinguished between the goal of US and the means of achieving it, while acknowledging that telephone service is an important basic right, essential for social cohesion and economic development. Since then, tremendous strides have been made towards achieving US and in many countries it is a reality.

Universal service and access today

The concepts of US and UA to telecommunications and ICT are distinct. US refers to service at the individual or household level, e.g., typically a telephone in each home. UA refers to a publicly shared level of service, e.g., through public payphones or Internet telecentres. However, they are also intrinsically linked to each other, as UA is the pre-cursor for US.

In the past, developing countries typically focussed mostly on universal access (UA), meaning community and publicly shared access, as UA was the appropriate and most feasible target. However, since the maturation of mobile communications, which extended services further and lowered access barriers to take up, many developing countries might realistically target US for telephony in urban areas. And also, in addition to setting UA targets for rural areas, the objective of increasing rural penetration can be set.

ICTs include both telephony and Internet, and some countries are at the stage where they have achieved UA to telephony and their goal is to achieve US, while in the Internet realm their goal is UA. Thus, their policy is no longer solely focussed on UA but on both UA and US.

In the more developed world which previously had US policy goals, the onset of broadband has led to re-use of the term UA. It is often recognized that universal availability of broadband services may not necessarily yield universal service-like household penetration for many reasons, though the provision of affordable access is an important goal.

As the reality in more and more countries relates to both UA and US, it makes sense to use the generic term universal access and service (UAS).

Thus, this module of the toolkit will refer to both terms with a focus on addressing UAS in the context of developing countries and emerging markets, while also drawing on best practice and experience in the developed world.

Scope of universal access and service

While US was once reserved for basic voice communications, UAS policies and strategies go beyond telephony, and include at least data and Internet communications, and increasingly look towards broadband communication. Traditionally, broadcasting has not been a part of UAS, but is now regarded as part of ICTs, in particular as the underlying technologies and delivery mechanism between telecommunications and broadcasting are converging. First models of how to include broadcasting in UAS policies are explored. However, media laws and policies have fundamentally different requirements which go beyond affordable access and service. Their focus is on a diversity of content providers, quality content development, pluralism and independent news reporting, choice and media freedom, and media ethics and control against illegal and harmful media content. These content elements have traditionally not been part of UAS for telecommunications. As a consequence, developing UAS requirements for broadcasting is breaking new ground.

Increasingly, UAS policy needs to be as forward-looking as possible and include broadband developments, the move towards a next-generation network (NGN) environment and address issues of convergence. The future challenges for policymakers are how to address the increased requirements and complexities of UAS while at the same time having UAS policies and programmes that achieve their goals quickly and efficiently. This Toolkit is intended to inform and support policymakers and UAS policy implementers to meet this challenge.

Reference Documents

- **Universal Access & Service (UAS) and Broadband Development**

4.1.1 CONCEPTS OF UNIVERSAL ACCESS

For ICTs, UA and US can largely be characterized by the availability, accessibility and affordability of telephony and the Internet, with increasing consideration of the inclusion of broadband and broadcasting. These terms, as used in this toolkit, are found in **Section 1.1.1**. Typically targets for universal access and service (UAS) in developing countries relate to telephony and the Internet. How these targets can be selected and related to indicators of development is described in **Section 1.1.2**. A more general discussion of extending targets to communications capabilities is discussed in **Section 1.1.6**.Technological developments, liberalization, improved sector regulation, and enlightened import duty and tax regimes let network infrastructure and service provision be expanded at lower costs and with better quality than before. However, these developments make it necessary to continually monitor the scope and status of UAS and to make sure that all members of society can benefit from them. In fact, as outlined in **Section 1.1.3**, the scope of UAS tends to broaden: because of the developments in technology and society it often includes not just telephony and Internet, but special services based on telephony, and also the Internet in one form or another. A method for choosing which services to include in the scope of

UAS, is suggested in Section 1.1.4. Developments in the ICT sector and changing UAS requirements impact the debate on required regulatory intervention, as discussed in Section 1.1.7. The question of how to target groups for special assistance, if and when it is appropriate, is discussed in Section 1.1.5.

4.1.1.1 BASIC DEFINITIONS

This toolkit uses the following definitions in regards to communications services:

- **Universal access (UA)** is when **everyone can access the service somewhere, at a public place, thus also called public, community or shared access**. How many points of access are needed is discussed in Section 1.1.2. In general there would be at least one point of access per settlement over a certain population size.
- **Universal service (US)** describes when **every individual or household can have service, using it privately, either at home or increasingly carried with the individual through wireless devices**. For some services, a goal of full US would be too ambitious at present in a developing country, because the services must be affordable as well as available. Goals may relate to the proportion of the population that can afford private service (i.e., subscriber penetration targets).

The three hallmarks of UA and US are:

- **Availability**: the service is available to inhabited parts of the country through public, community, shared or personal devices;
- **Accessibility**: all citizens can use the service, regardless of location, gender, disabilities and other personal characteristics; and
- **Affordability**: the service is affordable to all citizens.

These three aspects are relevant to both UA and US, but in different ways and to different degrees. The table below illustrates UA/US similarities and differences: the essential characteristics are *in italics*, while desirable characteristics are not.

Aspect	Universal Access	Universal Service
Availability	Focused coverage	Blanket coverage
	Public access (e.g. at a payphone or telecentre)	Private service on demand
	Free emergency calls	Free emergency calls
Accessibility	Walking distance, convenient locations and hours	Simple and speedy subscription
	Inclusively designed premises (e.g. for wheelchair users); inclusively designed terminals or available assistance (e.g. for the blind or deaf)	Inclusively designed terminals and services (e.g. for blind or deaf people)
	Assistance from an attendant	Assistance through the terminal (e.g. by making calls or viewing help pages for the web)
	Adequate Quality of Service (e.g. having few failed call attempts)	Reasonable Quality of Service (e.g. having few dropped calls)
Affordability	Options of cash and card payment	Cost of average monthly usage is a small percentage of monthly GNI per capita.
	Options of cash and card payment	Options of cash, card and electronic payment
	Payment per use (e.g. for a single call or message or an hour of Internet access)	Flat rate, bundles of services or low monthly subscription fee

The following concepts are the steps in the progression of UA to US:

- Universal access: Every person has affordable and reasonable public access to defined ICT services considered essential for social inclusion and economic development;
- Universal geographic coverage: 100 per cent of the population living in population centres above a certain size can obtain a defined ICT service provided that the user has the ability to pay for the service; and
- Universal service: 100 per cent of individuals or households can afford ICT services categorized as part of US, and a majority of the population subscribes to these services.

The concepts of UA and US are applicable to the following ICT services:

- Telephony (voice calls and text messages), offering one-to-one communication as well as content distribution to a wider group. Text messages are often also significant for UAS, because the affordability of text messages outweighs the inconvenience of using mobile phone keypads and displays.
- Narrowband and broadband Internet, providing e-mail, live-chats, web-browsing, content distribution, Voice Over IP (VoIP) and IP Television (IPTV), among many other applications and services. Many countries also want UA to the Internet however his requires higher levels of skill and education than with broadcasting or telephony. Therefore, accessibility through instruction and assistance and content that is useful and appealing is particularly important.
- Radio and television broadcasting. While broadcasting has traditionally not been a part of UAS policies, it is increasingly being considered, due to the convergence of technologies and triple-play offers by service providers (e.g., cable TV operators also providing telephone and Internet services). UAS policies exploring the inclusion of broadcasting are emerging. This is especially the case in countries that have adopted a multi-sector regulator overseeing both telecommunications and broadcasting.

4.1.1.2 UNIVERSAL ACCESS AND SERVICE TARGETS

Universal access and service (UAS) measures are usually targeted at rural areas that are unserved or underserved, and especially low-population density areas where provision of services is not viable. But UAS targets can also be focussed on very poor urban areas in large metropolitan cities, including slums.Developing countries typically set the following universal access (UA) targets:

- A public phone for a certain size of community (e.g., for all communities larger than 2000 inhabitants);
- A limited walking distance to a public phone (e.g., 5 km for communities too small to have their own public phone);
- An Internet POP in districts centres, provincial capitals or towns above a certain size (e.g., above 20,000 inhabitants) that provides either high-speed or broadband capacity; and
- A public access Internet centre accompanying the Internet POP.

Increasingly, modest universal service-like targets are included in developing countries policies, such as:

- An overall telephony subscriber penetration of 20 per cent and a rural penetration target of 10 per cent within a specific time frame (e.g., by 2010); and
- Asking operators to provide a tariff option that allows households in the lowest income decile (10 per cent) a minimum or modest use.

To be useful, targets need to have the following characteristics:

- Targets should focus on needs that have clear indicators and high priorities so that efforts are not spread too thinly among too many targets;
- Targets should be designed to look ahead three to five years;
- Targets should be ambitious but realistic in the light of a country's actual situation;
- Targets should be reviewed regularly (e.g., every two or three years) to remain ambitious but realistic; and
- Targets should be objectively measurable, so that progress can be assessed.

Ideally, targets should be in line with the goals set by the World Summit on the Information Society (WSIS) process in support of the Millennium Development Goals (MDGs). These are discussed in Section 1.5.1. The recommendations from the Economic Community of West African States (ECOWAS) [1] cite an example of specific goals set on a regional basis by regulators. While providing global and regional guidance, simply adopting general recommendations might not work for individual countries. The specific needs of each country will determine UAS goals and benchmarks. One country might set a feasible target of having a public phone in every community with more than 200 inhabitants for example, while another, such as Uganda, might wish to set a target of having one public phone for 2500 inhabitants. The same applies to Internet related targets and broadband. Once achieved, new UAS targets can be set for the next phase of UAS. Thus, UAS targets for a particular country can be developed using the following general criteria:

- The current state of the sector and current levels of UA in the country;
- The resources available and required for achieving UA targets;
- Financial sustainability after implementation;

- The feasible quality of service (for uniform quality countrywide); and
- Planned periodic reviews in light of technological and market developments.

The UN Partnership on Measuring ICT for Development, set up after WSIS, established and defined a detailed set of forty core indicators, listed in *Partnership on Measuring ICT for Development: Core ICT Indicators* [2]. All countries that adopt these forty indicators are able to compare their status and progress to other countries'. For individual countries, these indicators are most valuable on a disaggregated basis so that the situation in different parts of the country or for different population groups is made clear.

Practice Notes

- **Finland defines "universal service" to include 1 Mbit internet connection**

4.1.1.3 THE SCOPE OF UNIVERSAL ACCESS AND SERVICE

The scope of universal access and service (UAS) always includes telephony and the Internet, and increasingly broadband. In June 2009, France's highest court went as far as to declare that access to the Internet is a human right. In October 2009, the Finnish Ministry of Transport and Communications issued a decree that amended the definition of "universal service" to include access to a 1 MBit internet connection, in other words, access to a broadband Internet connection.

Radio and television broadcasting has traditionally not been included in UAS, but this is changing rapidly due to developments such as convergence, Internet broadcasting and broadcasters also offering Internet and telephony services (e.g., cable TV operators). Broadcasting policies and regulation typically have coverage requirements, though without specifics about actual access, whether by public means or for private subscribers. The scope of UAS is often specified in detail to ensure that it is fit for purpose. It needs to be accessible and affordable as well as available. Features of UAS that might be specified include the following:

- Times of day when there is access to the service;
- Type of shelter for the terminals (e.g. secure building for a telecentre);
- Access to and usability of the terminal for people with physical disabilities;
- Convenience and pleasantness of location for all target groups of users (e.g., women might not wish to enter a bar to use a service);
- Quality of service (network reliability, fault repair times and call quality for telephony and prescribed down and upstream data rates for the Internet service).
- Payment methods (e.g., cash or prepaid cards) and for prepaid cards, availability of sales outlets; and
- Personal support for using the services.

Other services that are entering UAS policies include:

- Directories and directory enquiry services;
- Support services for Internet subscribers (e.g. help-lines, training);
- Emergency call answering facilities (dispatch of help for emergencies); and
- Special facilities to permit use by people with disabilities on par with all other facilities.

While mobile phones are now widely accepted as a way of providing telephony, and are also used to provide public access, and countries like France and Australia use their universal service policies to provide mobile coverage in rural areas, their inherent value of mobility has not, to date, been included in any countries' US definition. In Mexico, for example, there are both market and legal obstacles standing in the way of this step even though it has been suggested that wireless telephony has become the new norm. Including mobile services in US obligations is considered of national benefit by fostering UA to the Internet, as latest networks have data capabilities allowing basic Internet access [*].Similarly, although text messages are popular and strongly appeal to poor people because of their relatively low and fixed (per message) price, they are not yet required in US obligations (USOs). However, text messages are sometimes required to be included in UA obligations, where public phones are operated by people (e.g. village phones) who can help users with texting. The scenario of excluding text messages from US policy could change specifically for services geared towards people with disabilities (e.g., the hearing impaired will use text messages but not voice calls).

Practice Notes

- **Finland defines "universal service" to include 1 Mbit internet connection**

4.1.1.4 CHOOSING SERVICES FOR INCLUSION IN THE UNIVERSAL ACCESS AND SERVICE SCOPE

The services to be included in the scope of universal and service access (UAS) will change as technology and society change. Because of this, in 2002, the European Union (EU) built into the EU Universal Service Directive a requirement that the scope of universal service (US) obligations be reviewed every three years. To be included in the scope of a UAS policy, a service has to satisfy two tests:

- In the light of social, economic and technological developments, has the ability to use the service become essential for social inclusion; and
- Are normal commercial forces unable to make the service available for all to use?

The scope of US in the EU was originally confined to telephony at a fixed location for voice calls, fax calls and data calls (for narrowband Internet using dial-up). The first review of the scope took place in 2006. Two services, mobile telephony and broadband Internet were new candidates for addition to the US's scope. After consultation, reported in Communication on Report regarding the outcome of the Review of the Scope of Universal Service, neither mobile telephony or broadband Internet, was added for the following reasons:

- Mobile telephony passed the first requirement—ability to use a mobile phone is now seen as essential for social inclusion in Europe—however, normal commercial forces had led to widespread availability and use of mobile phones, so the balance of opinion was that there was no need for regulatory intervention to achieve universal mobile service;
- Broadband Internet, on the other hand, failed the first test—well under half of European households subscribe to broadband Internet and currently it isn't seen as essential for social inclusion. Therefore, the second test was not applied.

In 2008, broadband Internet is defined by the ITU and OECD as always on service with download speeds equal or faster than 256 Kbps. The Federal Communications Commission (FCC) of the United States defines broadband as 768 kbps or faster. Broadband speeds develop rapidly: in 2004 the average advertised broadband speeds were typically 2 Mbps in OECD countries, while this increased to almost 9 Mbps in 2007. However, the European Commission finds that actual download speeds are between 144 and 512 kbps in rural areas and 1 Mbps in urban areas in the years 2004 and 2005. Despite not including broadband into the scope of universal service, the EU is very active in promoting and expanding broadband take-up and in providing access to above minimum download speed broadband also in rural areas for quality of life, social inclusion and economic-strategic reasons. The European Commission believes all Europeans need broadband access [1]. Finland may be leading the way in Europe to including broadband internet access in the definition of "universal service". In October 2009, the Finnish Ministry of Transport and Communications issued a decree that amended the definition of "universal service" to include access to an Internet connection featuring a download rate of at least 1 Mbps. For developing countries, modified forms of this general test regarding which services to include into the UAS scope might be preferred. The main driver for UAS may be economic before social factors come to the fore, so policy makers in developing countries could ask the following questions:

- In light of economic, social, and technological developments, has the ability to use the service become essential for uniform countrywide economic development or social inclusion; and
- Are normal commercial forces unable to make the service available for all to use, within a timescale consistent with the contribution of the service that will meet the Millennium Development Goals?

If the answer to the first question is affirmative, then UAS goals should be set for the service. Social research can help clarify what has become a new social norm. This might be, for example, the greatest distance that it is reasonable for people to travel in order to use phones or the Internet. The Practice Note Finding out what the necessities of life are and how many people lack them shows one approach to social research used in the UK. If, in addition, the answer to the second question is affirmative, and normal commercial forces cannot guarantee that the goals are achieved soon enough, then regulatory intervention is needed. Later chapters of this module discuss effective forms of regulatory intervention.These test questions relate specifically to whether a service can be accessed by everyone. They refer to uniform countrywide economic development, not just to a country's general economic development. A service such as broadband Internet might be essential to the overall economic development of a developing country [2]. But while uniform countrywide economic development is desirable, it is rarely regarded as essential on the same time scale as the overall economic development of the country.

Practice Notes

- **Finding out what the necessities of life are and how many people lack them**
- **Finland defines "universal service" to include 1 Mbit internet connection**

Reference Documents

- **Communication from the commission to the council, the european parliament, the european economic and social committee and the committee of the regions.**
- **EU Universal Service Directive**

4.1.1.5 TARGETING SPECIAL ASSISTANCE

Providing special assistance to specific groups that are considered to be in need of support, is typically related to universal service (US), not to universal access (UA). UA aims to make a service available and affordable in poorly served areas, and uses public, community or shared access. Often the rural and remote areas requiring assistance can be identified by examining wireline and wireless coverage. All subsidies for US should be focused. This view accords with both economic theory and common sense; subsidising a large population group will always subsidise some people who do not need help, and thereby reduce the amount that is available for people who do need help. However, focusing subsidies has costs as well as benefits, and it may be desirable to avoid formal eligibility tests that may effectively exclude many people that the subsidies are intended to help. Also, providing individual end-user subsidies comes with administrative costs. Subsidies focused on specific groups of people are intended to make a service accessible and affordable, particularly to citizens with low incomes. When focussing subsidies, policymakers and regulators need to ask the question, "Which group is likely to justify special assistance through subsidies?" The answer to this question is those who are in need, but what does this mean? In many countries, elderly people or those with disabilities are thought to justify special assistance. Other populations sometimes thought to justify special assistance include:

- Women, who, in some developing countries, often have lower incomes and social obstacles which exclude full use of communications;
- Ethnic communities who have traditionally suffered from discrimination or neglect. When these people live in poorly served areas, these areas may get extra priority for UA;
- Unemployed people, for whom Internet access can provide new skills, networking capabilities, or knowledge leading to employment;
- Young people, who usually have low or no income but who are often early adaptors of new technologies and can easily learn to make the most of them for the wider benefit of their families and eventually society; and
- War veterans or others felt to deserve recognition of national service. Veterans are often singled out in former Communist economies.

Each country must decide which, if any, groups justify assistance and for which services. Again, the decision needs to be guided by current service penetration, by financial resources necessary, and by financial sustainability. It is recommended that most countries should probably not provide assistance to particular people for a service until the service has achieved reasonable take-up (e.g., over 75 per cent) among the greater population.

Practice Notes

- **Guidelines for universal access and universal service in Western Africa**

4.1.1.6 USER COMMUNICATIONS CAPABILITIES

In addition to physical infrastructure, certain levels of types of service (e.g. public, shared or private) and user communications capabilities are required to progress ICT usage. In fact, as the figure below shows, there is a relation in terms of available access and service use.

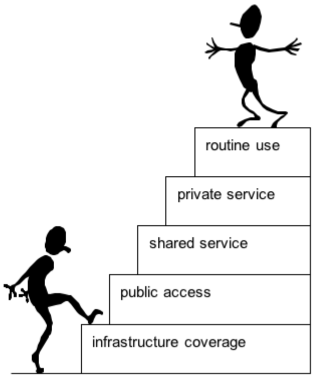


Figure: Steps in developing communications capability

Source: ITU-infoDev ICT Regulation Toolkit – UA Module

A routine user typically uses a service as a matter of course whenever it is valuable in daily life and not just in exceptional circumstances or emergencies. To become routine users, most people need the convenience of private service that will only be acquired if the service is accessible and affordable. The progression from infrastructure coverage to routine use is applicable to the Internet, as well as to telephony. However, there is an important difference between the telephony and Internet staircases—no special skill or education is needed to use phones, while using the Internet effectively needs certain levels of literacy and practice as well as other skills (e.g., use of software, knowledge of foreign language, etc.). Broadly speaking, most people need or want affordable telephone service, however, the same is not always true for the Internet. Even in developed countries, sizable proportions of the population do not want to use the Internet for a variety of reasons. The skills needed to use the Internet seem to come much more easily to younger people, and older people sometimes lack both interest and skills. However, more importantly, in developing countries, with lower educational levels and less relevant content, there are more barriers for people to use the Internet, even where it is accessible and affordable. Universal access (UA) programmes for the Internet are therefore often far behind those for telephony.Many countries do want goals for universal access and service (UAS) for both telephony and Internet (and even for broadband Internet), recognizing the potential of enhanced and ubiquitous ICT services for social and economic development. Tracking progress across all of these goals becomes increasingly complex. A possible new approach for tracking progress that focuses on people's capabilities to use the technologies, rather than on the underlying infrastructure, is described in the Practice Note *Communications capability profiles.*

Practice Notes

- **Communications capabilities profiles**

4.1.1.7 REGULATORY INTERVENTION FOR UNIVERSAL ACCESS AND SERVICE

Telecommunications markets are dynamic; new technologies are constantly emerging, and new services rapidly become popular and then indispensable. So, universal access and service (UAS) aspirations are likely to rise over time. This is illustrated in the figure below.

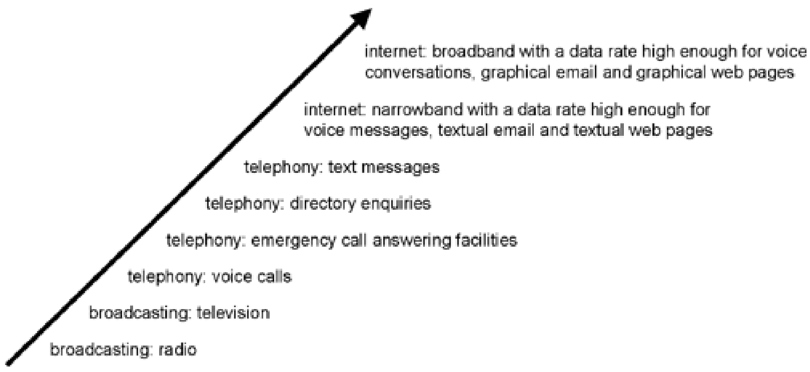


Figure: Possible rising aspirations for ICTs

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

With liberalization and effective regulation, normal commercial forces are more likely to be capable of fulfilling some, if not all, of the new aspirations. So it is not obvious whether more or less regulatory intervention will be needed as aspirations rise.Universal Service Obligations (USOs) have been a form of regulatory intervention for achieving universal service (US). The future of USOs is a topic for debate among stakeholders in developed countries, as represented by the OECD and the EU [1]. Some believe that USOs will soon be both impracticable and unnecessary, while others see them as more important than ever in an era when universal broadband access could contribute significantly to mitigating climate change and its effects. The outcome of this debate will differ from country to country, depending on political factors as well as on the need for, and supply of, communications services.For developing countries, a parallel debate will take place, with an equally uncertain outcome. Industry stakeholders like the GSM Association (GSMA) argue forcefully for regulators to stand aside and allow the markets to stimulate and fulfil demand for new services. At the same time, ICTs are a vital tool for development in sectors such as health and education that are usually understood to be commercially unviable and that need central government support. This toolkit aims to help policymakers and regulators in developing countries make informed decisions about the scope of UAS and regulatory intervention in their own countries.

4.1.2 CURRENT STATUS OF UNIVERSAL ACCESS BY WORLD REGIONS

In **Section 1.1.1**, Universal access (UA) and universal service (US) were defined in terms of availability, accessibility and affordability. This section explores these concepts in more detail and with practical illustrations, while at the same time summarizes the status of UA or US by world regions. For most developing countries, the availability of telephony is understood primarily as mobile coverage. In almost every country of every region, mobile service has reached a greater level of penetration and, in most developing countries and emerging markets, a greater level of population coverage than fixed networks.

Figures for this are discussed in **Section 1.2.1**.The accessibility and affordability of telephone service have been improved by innovations in the mobile industry, such as prepayment (which does not need a monthly subscription, a bank account and regular income) and low-denomination refill or scratch cards (which allow poorer people to buy smaller amounts of telephone service). Interestingly, none of these innovations has to do with the actual price of a mobile call, which is still more expensive than fixed services in most countries, but rather with the packaging of services. Various other ICT service providers follow this approach, e.g., by offering prepaid Internet access or fixed voice services.

Section 1.2.2 describes the ways in which mobile phones have become more affordable and accessible.However, affordability analyses show that even with cheap phones and very low entry-price tariffs, a significant portion of householders in rural areas may still need public access phones as they are too poor to pay for their own phone.

Section 1.2.3 outlines various forms of public access using mobile phones designed to meet this need.

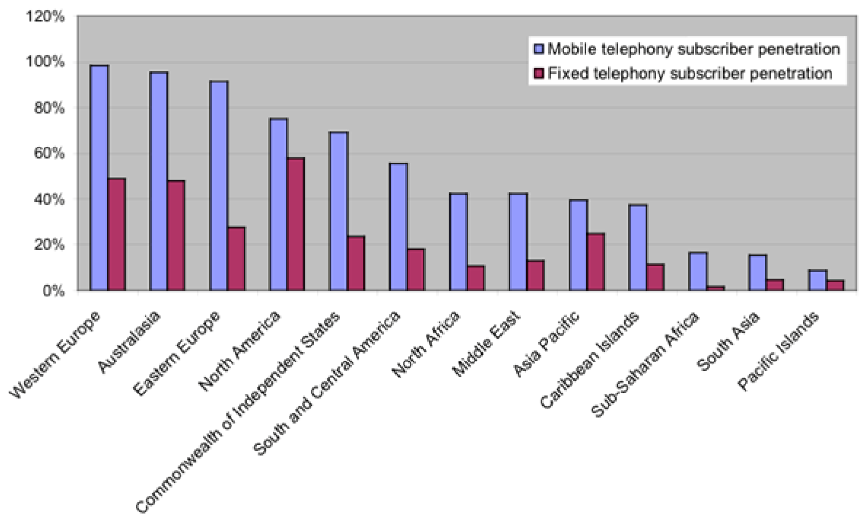
Section 1.2.4 provides figures on Internet subscriber and user penetration, Internet costs and broadband development. Internet use is much slower to develop than telephony use. It has higher barriers in regards to literacy in general and computer literacy in particular, cost of required terminal equipment (i.e., the personal computer) and useful content, support and maintenance. Universal Internet access therefore needs to overcome these barriers, besides ensuring the development of infrastructure (international and national backbone) and public access Internet centres, such as telecentres.

Section 1.2.5 outlines various forms of public access Internet centre.

Finally, **Section 1.2.6** provides a brief summary of broadcasting equipment penetration for comparison with the Internet.

4.1.2.1 AVAILABILITY OF TELEPHONE SERVICES

For most developing countries today, the availability of telephony is primarily through mobile coverage. Mobile service has reached a greater level of penetration than fixed networks in almost every country and region worldwide; in most developing countries and emerging markets, more of the population is covered by mobile than fixed networks. In 2002, mobile penetration overtook fixed penetration in the world as a whole. This phenomenal change is illustrated in the figure below, and must be recognized as an opportunity for the more rapid achievement of universal access and service (UAS) than was thought possible even a decade ago.



◂ **Figure: Mobile and fixed telephony subscriber penetrations by region, 2006**

Source: ITU World Telecommunication/ICT Indicators Database

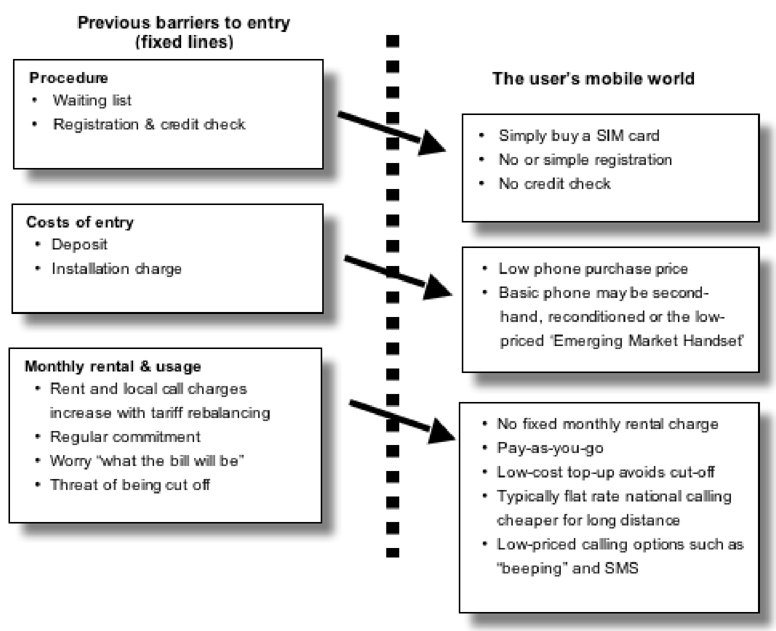
The commercial development of mobile networks is doing much to provide a platform for UAS in the developing world. ITU reported that approximately 70 per cent of the world's population was covered by mobile wireless signals at the end of 2005 and over 82 per cent at the end of 2007 [1]. A study estimated that this number would reach at least 90 per cent by 2011. The 2006 study found that 38 European countries have achieved over 95 per cent population coverage and typically 90 per cent geographical coverage. Even the least developed world region, Africa, had at least ten countries with greater than 90 per cent population coverage, with a further eight countries having over 70 per cent population coverage. Africa's total population coverage was 60 per cent and its geographical coverage less than 30 per cent [2].While in 2006, 80 per cent of the world's population was covered by mobile wireless signals, less than 50 per cent were subscribers. Though the coverage might show the availability of the service, it does not show the accessibility and affordability, which are looked at in **Section 1.2.2**.

4.1.2.2 ACCESSIBILITY AND AFFORDABILITY OF TELEPHONE SERVICES

Service take-up by low-income users depends on the removal of both price and non-price barriers.

Removing non-price barriers

Mobile services have become popular in developing countries primarily because barriers to service-take up have been removed and new service features making the service more accessible have been introduced. Features that make mobile service more attractive to individuals wanting private service are shown in the figure below.



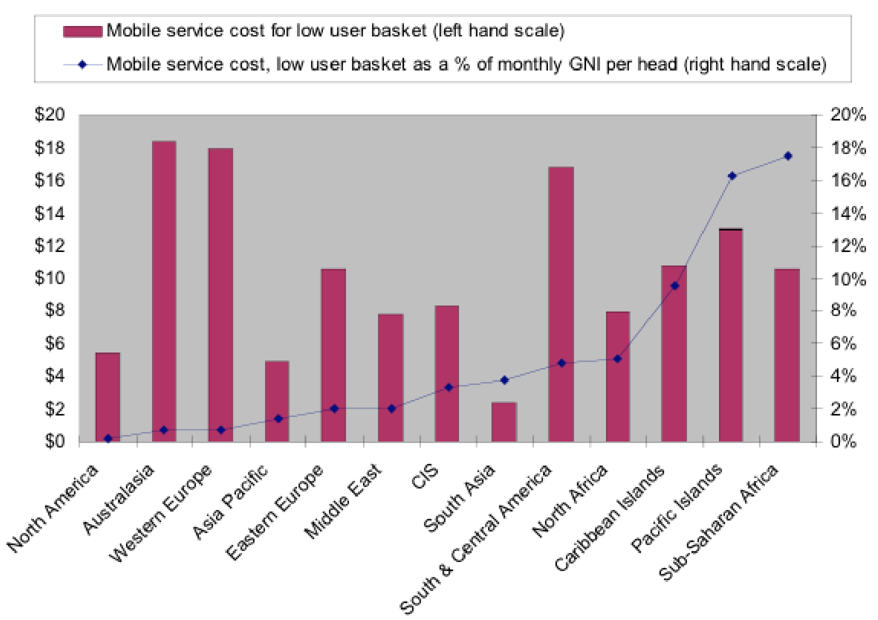
◂ **Figure: The use of mobile phones to remove barriers to private service**

Source: Universal Access: How Mobile can bring communications to all (GSMA, 2006).

All of these features are available in most developing countries. Interestingly, some wireline operators and ISPs have copied a number of these features successfully. Fixed network operators may offer prepaid accounts, and ISPs offer prepaid scratch cards. Also, technological developments and market forces have brought significant price reductions to phone service. With all of these trends, the barriers impeding private service for low-income people within mobile coverage are being significantly reduced.

Removing price barriers and increasing penetration

The cost of private telephone service and routine use may still be too high for a considerable number of people in developing countries. The following figure shows the monthly cost of mobile phone usage on a regional average basis, using the first OECD low user basket measure that includes 25 90-second mobile calls, and 30 text messages per month. This illustrates that people in sub-Saharan Africa would need to spend 17 per cent of the Gross National Income (GNI) per head to be considered low level users in the context of developed countries. However, this is based on a low-usage basket oriented to the norms of low-usage in the developed world. The figure below demonstrates that in several regions, expenditure on mobile telephony costs would be about four per cent of GNI per head, whereas in most developed countries, the equivalent level of usage would cost less than one per cent of GNI per head. It is important to note that personal income is usually less than the GNI, which includes various corporate money flows.



◂ **Figure: Mobile telephony costs by region, 2006**

Source: ITU World Telecommunication/ICT Indicators Database

Operators and policy makers recognize the social, economic and commercial value of private ownership and improved market penetration, even in low-income countries and at very low levels of usage (well below the OECD expectation for low usage). Operators recognize that if they offer very low entry-price tariff schemes that enable low-income users to become subscribers and stay connected, the users will potentially receive more calls than they originate; this factor contributes significantly to increased commercial viability. Thus, the majority of operators in developing countries offer low-priced access tariff schemes which allow subscribers to stay connected even if the subscribers make only a few outgoing calls. Research into the minimum amount a subscriber has to spend on usage to be prevented from being disconnected by the operator due to inactivity for 61 operators, almost half of which were from developing countries, revealed that the minimum required usage was less than USD 2 per month, and in most of the developing country cases, the amount was even below this [1]. Although these tariffs could result in some users spending an average of only 17 per cent of the surveyed operators' Average Revenue Per User (ARPU), the operators are prepared to allow users to remain as subscribers at these levels. In many cases, these subscribers are receiving calls from friends and relatives that far exceed the expenditures they make directly.The trends are for these lowest available entry-level prices, pertaining to network access alone, to become even lower, and for users to be able to replenish their prepaid accounts with very small denomination refills. This obviously increases the potential that low-income people may become and remain subscribers. An analysis of household incomes in developing countries and observed demand, indicates that once service becomes available geographically and is offered on least entry-price terms, the majority of users can afford the monthly costs of staying connected and will make a minimal number of calls. The level of affordability may extend beyond 90 per cent of households even in low-income countries, though for various reasons the actual penetrations still remain below this figure [2]. With strong encouragement from service providers, equipment vendors have been developing low-cost mobile phones. In 2007, 2G phones were available for as little as 30 USD, and 3G phones were available for 130 USD. The 30 USD price for an individual mobile phone is still too much for at least 1 billion people, so some mobile phones are now being designed for sharing. See also **Section 8.4.1**.

4.1.2.3 PUBLIC ACCESS TO TELEPHONE SERVICES

Network operators can tolerate low Average Revenue Per User (ARPUs) from some users however affordability analyses show that even with cheap phones and very low entry-price tariffs, a significant portion of households in rural areas may still need public access phones [1]. These services may be formalized public phones or informal shared access and street-side or village reseller businesses. The reasons why people need public access phones include the following:

- The cost of phones or entry-price private access tariffs may still be too high for some individuals or households;
- A number of users who are physically or intellectually challenged, pre-literate, or otherwise impaired, may need a human intermediary to assist them with accessing the service;
- Some people prefer to use private phones mainly for incoming calls and to make outgoing calls at public telephones because some volume-discounted tariff schemes allow public access providers to offer calls at a lower per-minute price than private users have to pay; and
- Emergencies may occur when a private phone is not available.

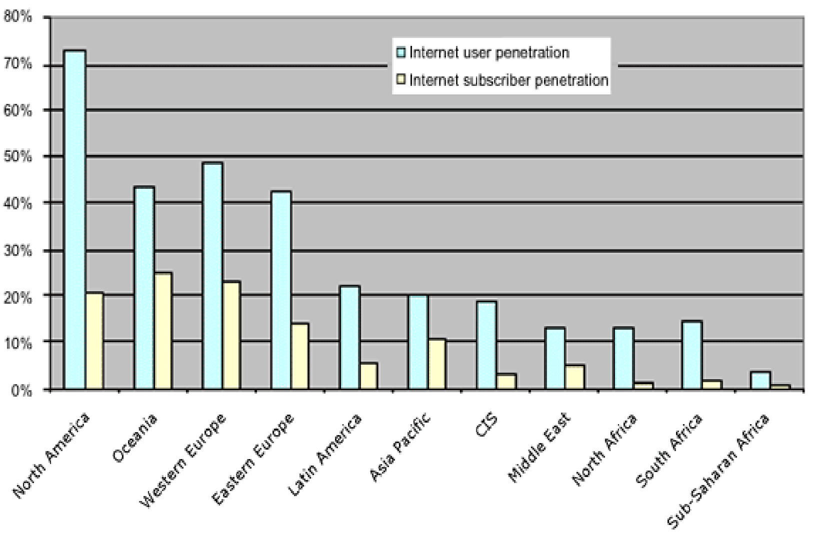
Public phones or shared access phones, managed by individual service providers or resellers, will continue to remain important for those without private service, or with challenges, for some time to come. Formal and informal shared usage and airtime resale businesses emerge virtually everywhere mobile networks exist. These may be phone kiosks, simple public phones offered on the street, often with only a small chair, an umbrella for weather protection, and operated by individuals, often women (phone ladies or umbrella people), and operator branded outlets. Informal resellers have led the way, or at least moved in parallel with more formal institutional phone reselling establishments, to provide public access in both urban and rural areas. In all world regions, there are many variations of and approaches to public access with new ones emerging constantly. A sample of some of the public telephony models that currently exist appears in the table below.

Source: Adapted from *Universal Access: How Mobile can bring communications to all* (GSMA, 2006).

Types of Mobile Public Access		
Type	Description	Example
Unmanned coin- or card-operated public phone box or cabin	Often managed by the main fixed-line incumbent operator	Telus Canada, Deutsche Telekom, British Telecom, etc.
Micro-credit led community phones	Micro-Finance Institutions members assume loan in exchange for mobile phone kit	Grameen Village Phone (VP), MTN Uganda VP, Rwanda VP
Mobile Payphones	Payphone deployment to further universal access objectives and obligations	Vodacom and MTN South Africa, MTN Uganda
Entrepreneurial locally-owned and operated Public Call Offices (PCO)	Micro-entrepreneur provides public access to existing networks	Celtel Burkina Faso, MTN Nigeria, MTN Nigeria umbrella ladies
Independent companies	Private company provides public access to existing networks	OnePhone Mozambique, Fones4U Botswana, Smile Communications South Africa
Company initiated public phones	Mobile operator offers direct phone reseller opportunities to local people	Spice Telecom, India
The GSMA shared phone and shared-phone software initiative	Using various terminal types, including low-cost phones, the GSMA is linking up with a number of operators to help streamline the model, lower costs and broaden the deployment of public access	Shared access pilots are taking place in South Africa, Nigeria, Kenya, India and Albania
VoIP telecentre services	Generally co-located with cybercafés	

4.1.2.4 INTERNET USAGE

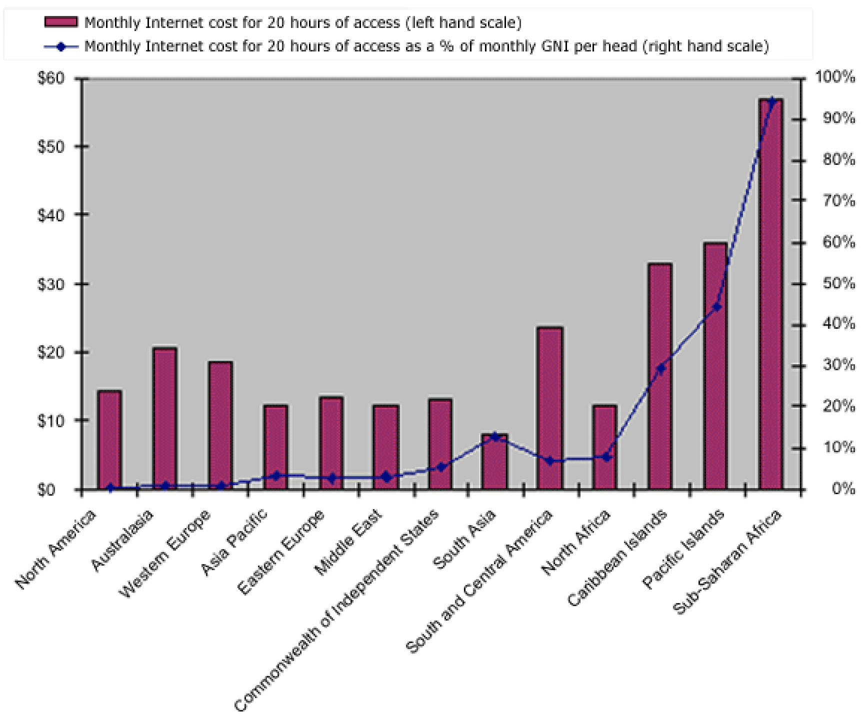
As described in Section 1.1.6, Internet penetration is significantly slower to develop than telephony. Internet take-up is constrained by developments such as the availability of low-cost personal computers or similar user terminals, wide-spread electrical power to run computers, public education aimed at improving Internet literacy and relevant Internet content, applications and services such as those provided by e-government initiatives (see **Section 1.6.2.**), as well as others. The figure below summarizes Internet subscriber and user penetration in 2006.



◂ Figure: Internet subscriber and Internet user penetrations by region, 2006

Source: ITU World Telecommunication/ICT Indicators Database

Data of the number of Internet users is not readily available in many countries. The most reliable source of information on this indicator is surveys, and in Europe and East Asia they provide solid evidence of the state of Internet penetration. However, the data is not obtained in consistent ways in different countries, and is often estimated based on the number of Internet Service Providers (ISPs) and the number of users per subscriber. Even allowing for this, the ratio of user penetration to subscriber penetration varies a great deal regionally. In developed countries, where the cost of Internet access is relatively low, the ratio is typically around 2:1 and in countries with low incomes or higher prices, the ratio is considerably higher (between 3:1 and 10:1, for example) as many more users share single subscriptions. The figure below summarizes costs to users of a total of 20 hours of household Internet access using the cheapest available method (narrowband or broadband). There is generally an inverse relationship between penetration and cost. Sub-Saharan Africa, for example, has very high costs and very low penetrations.

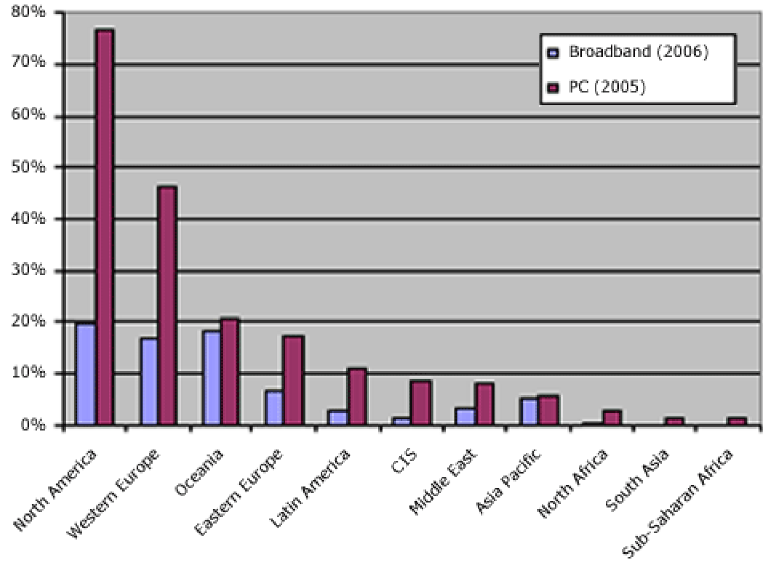


◂ Figure: Monthly Internet costs by region, 2006

Figure: PC and broadband penetration

Source: ITU World Telecommunication/ICT Indicators Database

Source: ITU World Telecommunication/ICT Indicators Database



In 2006, broadband penetration reached approximately 20 per cent in North America. Western Europe had above 15% per cent penetration, as has Oceania. In all other regions broadband penetration average was still below 10 per cent, as shown in the figure below.

4.1.2.5 PUBLIC ACCESS TO INTERNET SERVICES

As in the case of telephony, forms of public Internet access are essential at the community level for social and economic development. All continents have multiple public points of Internet access, which have been developed through policy, private entrepreneurship and other public initiatives designed to overcome the barriers for Internet access. These access points range from purely commercial cyber-cafés, to non-profit or publicly funded telecentres and may consist of small public Internet access points with one to four computers (many hundreds of these access points have been established through universal access and service funds [UASFs] on semi-commercial or non-profit bases) to large multi-purpose community telecentres, most of which have been financed separately through aid agency activities and agreements.The table below summarizes a survey of such models in Latin America. While there is a lot of information on classifications of telecentres, case studies and best practice, there is little comprehensive data that give an overview of the numbers of public access Internet centres by world region.

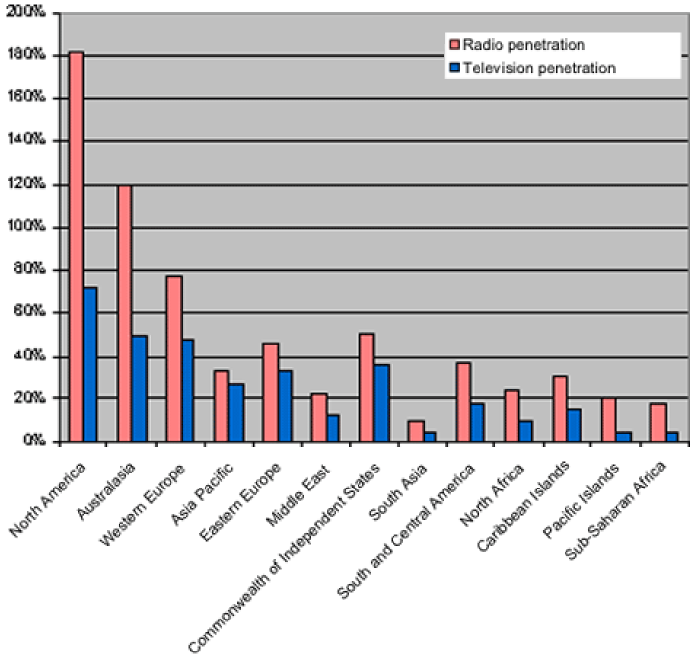
◂ **Table: Classification of telecentres**

Source: *Adapted from Telecentres for Socioeconomic and Rural Development in Latin America and the Caribbean* (Francisco Proenza and others, IADB, May 2001).

Type	Services	Management-Administration	Examples
Commercial	The basic service is computer plus Internet connection. Called a cybercafé when a cafeteria or bar is present, but these other services generate only a small part of the income (<20%).	Private business	Cabinas Publicas in Peru, cybercafés in Bolivia, Argentina and elsewhere; E-Choupal in India.
Franchise	Seeks to stand out by improved quality, faster connection, more and better services, atmosphere and comfort.	Private business	There were examples in Latin America and Africa, however, they have ceased to exist, as the low margins of Internet cafes make a franchise model challenging. In India, Akshaya uses a public-private partnership, franchise model.
NGO	Wide diversity of services, orientation, and target group, depending on location and orientation of promoting institution. Services include Internet combined with training and development activities. Hours of Internet may be subordinated to use of machines for other uses by NGO staff.	NGO or development project (dependent on grants from private businesses for initial computers and software)	CDI (Brazil), El Encuentro (Chile), LINCOS (Costa Rica), AEDES (Cotahuasi, Perú), Gemas da Terra Rural telecentres (Brazil), Infoplazas (Panama),, MS Swaminathan Research Foundation Village Knowledge Centres (India).
University	Many terminals (30 to 100) mainly for students but also available to general public. Specialized technical support available. Academic courses in computers and preparation of contents easy to organize.	University	Universidad Nacional San Agustín (UNSA), Universidad San Antonio Abad del Cusco (UNSAAC)
School	The school opens its doors to the community after class hours. Services tend to be many and varied (Internet, e-mail, content preparation). Most suited are e-literacy programmes and continuing education.	School	Leo Ussak (Canadian Arctic), Casi (Uruguay), Fundacion Omar Dengo (Costa Rica)
Municipal/State	In principle, can include a wide range of services (public and private).	Municipal government directly, in partnership with other entities, or entrusted to private enterprise	Infoplazas in Pedací and Penonomé (Panamá), Amic@s (Paraguay), Sao Paulo Acessa (Brazil), Pirai Digital Project (Brazil), IT clubs (Egypt), Gyandoot (India), e-Sri Lanka
Multipurpose	Rural: Access to Internet, e-mail and related services. Commercial web hosting to community, telephone booths, sales of working materials and stationery, Internet café, training courses.	Administrative board representing donors, service suppliers and community members	LINCOS (Costa Rica), Joven Club de Computacion (Cuba), Puntos de Acceso (Venezuela), GESAC (Brazil), Compartel (Colombia), UNESCO Community Multimedia Centres (Mali, Uruguay and elsewhere).

4.1.2.6 BROADCASTING USAGE

Traditionally, broadcasting has not been a part of universal access and service (UAS), but is now regarded as part of ICTs, in particular as the underlying technologies and delivery mechanism between telecommunications and broadcasting are converging. First models of how to include broadcasting in UAS policies are explored.Interestingly, there are fewer radio and television than telephony subscriptions in many regions of the world. In some cases this is due to the fact that free-to-air radio and TV does not require subscriptions, and the number of actual radio and TV users is much higher than subscription numbers imply. These numbers might increase as people take up phones that also support mobile radio or television services. The number of radios is higher than the number of televisions by a factor of two in many regions of the world, and the number of televisions is much higher than the number of personal computers in regions made up of developing countries. The figure below summarizes the numbers of radios, televisions and personal computers by region.



◂ **Figure: radio, television and personal computer penetration by region, 2003**

Source: CIA Fact Book

While broadcasting has been available for much longer than the Internet, figures for usage of broadcasting are not always comparable between countries because in many countries the numbers of radios relate only to stand-alone radios (not to radios incorporated in other equipment such as cars) and the numbers of subscribers may not account fully for free-to-air users.

4.1.3 RATIONALE FOR A UNIVERSAL ACCESS POLICY

Section 1.2 illustrates that although great strides have been made in universal access and service (UAS), the objectives of access and service for both telephony and the Internet have not yet been achieved. In that context, this section examines why there is a need for UAS policy.The main arguments for a UAS policy are the following:

- **ICTs are social and economic enablers.** ICTs are increasingly used in all sectors of economies. In many regions, economic activity is shifting away from agriculture and industry to services sectors, and towards the new information economy and society. The ICT sector is considered to be a significant engine of growth for economies. This is elaborated in **Section 1.3.1**.
- **Supply and demand increases the importance of UAS policy.** Interestingly, the increased supply of ICTs through rapid technological developments and base of pyramid marketing, actually fuels the requirement for UA. Mobile phones, not too long ago considered luxury items and out of reach for most, are now providing the main access to voice service for the majority of people in many countries, making it more urgent that the population without access be provided with access to phone service. Similarly, for large parts of populations work and life without the Internet is unthinkable, and ever more megabyte-rich applications require increased broadband development. The more ICTs are used, the more there is a dependence upon them, which in turn makes it more essential that all citizens have access to ICTs. This is explained in **Section 1.3.2**.
- **Market gaps can remain in place.** While it has been demonstrated that market forces, after liberalization and sector reform, have had the greatest impact on improvement of UAS in many developing countries, for various reasons market gaps can remain in place. Some countries, for example, have exceptionally challenging geographic characteristics combined with extremely low population densities (e.g., Mongolia and Botswana) or isolation (e.g., many islands in the Pacific region) or extreme poverty, which make UAS tremendously challenging. In other

countries, the market might be able to achieve UAS, but the timeframe in which this could be obtained, might be considered too long.

- **Monitoring UAS and updating it.** Constant change in technology, services, and pervasiveness of various ICT services makes it necessary that the status of UAS should be monitored and policies continue to be updated and developed. Also, there are countries where the market can achieve UAS, but there is a need for public oversight to confirm that it has been achieved, to improve regulation, and to continually review the concept of what is considered UAS.

Market gaps and the need to monitor UAS are presented in **Section 1.3.3**.

4.1.3.1 ICTS AS SOCIAL AND ECONOMIC ENABLERS

Over the past decade the role of ICTs in all economies has become critical. The move towards an Information Society is distinguished by the following characteristics:

- **Growing dependence on ICTs.** As ICTs become more pervasive in business and personal contexts, people become more dependent on them for their livelihoods and for fulfilling their social and recreational needs. Being unable to access or use ICTs can become a serious deprivation;
- **Growing ICT sectors.** The provision of ICTs and related services forms a sizeable sector of many economies. Increasingly, developing countries are introducing high-level ICT strategies that aim to develop this sector of their own economies as well as using ICT as a tool in other sectors. One study for a mobile network operator has suggested that a 10 per cent increase in mobile penetration in a country can grow the gross domestic product by 0.6 per cent [1]; and
- **More use of ICTs.** Economic development and growth entail a shift in the proportions of national output, away from the primary sector of agriculture, through the secondary and tertiary sectors of industry and services, towards the new information economy. The services sector has become increasingly ICT-intensive, and the knowledge sector is largely dependent on ICTs. ICTs enhance productivity across all sectors, including government. The figure below illustrates the shift for the three traditional main output sectors—agriculture, industry and service sectors—for countries at different income levels.

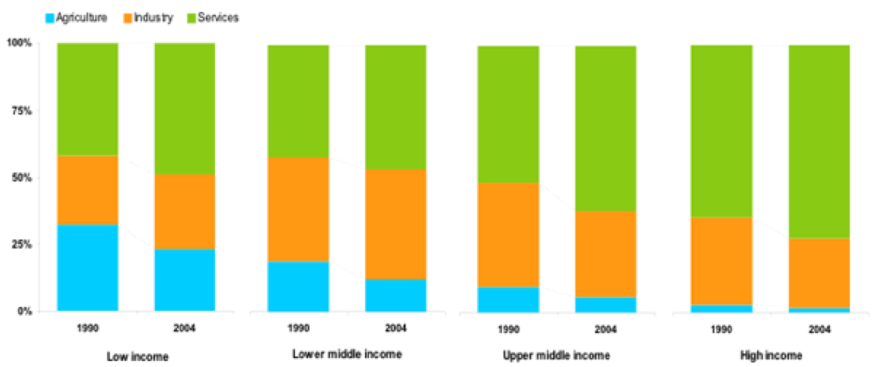


Figure: Percentage of total output by main economic sectors for countries at different income levels, 1990 and 2004

Source: World Bank Development Indicators 2006

Reference Documents

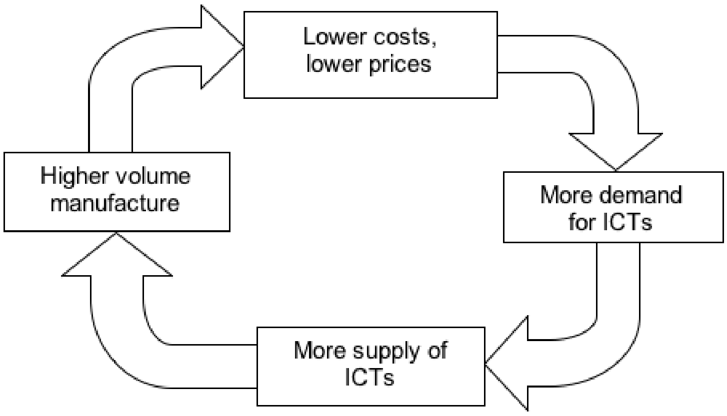
- **Nigeria: The Impact of Mobile Services in Nigeria: How Mobile Technologies Are Transforming Economic and Social Activities**

4.1.3.2 DRIVERS FOR UNIVERSAL ACCESS AND SERVICE POLICY

Several inter-related factors are now converging to increase the importance of universal access and service (UAS) policies for ICTs, in every country. There is high growth on both the supply and the demand sides of the sector, largely but not completely balanced through the market.

In particular, on the supply side:

- Rapid technology innovation and development has provided multiple options for communications, which are especially promising for Internet and broadband (especially wireless). **Chapter 8** explores what the implications are for UAS. These technological developments vary widely in maturity, capability, complexity, cost and economic scale for deployment. The suppliers of many of these technologies are vying for opportunities to sell into emerging markets, creating a potential for a virtuous spiral of high volume manufacturing with corresponding cost savings, lower prices and further market expansion;



◂ **Figure: A virtuous spiral towards ICT growth**

Source: ITU-infoDev ICT Regulation Toolkit – UA Module

- Base of pyramid marketing (selling low-cost goods and services to mass markets of low-income groups) is widely recognized for its significant commercial potential across many sectors as well as social impact, including communications. Many approaches and techniques are copied from one sector to another, e.g., the concept of single-use packages of a tangible item such as shampoo or sauce, has been copied by providers who will offer very small pre-paid phone top-up cards, costing USD 0.50 or less, and in some cases even a single phone call or a few text messages. This is also increasingly used in the context of Internet services, where one can purchase scratch cards which give passwords to enable Internet use in units of 10 minutes, 30 minutes, 1 hour etc.; and
- Liberalized telecommunications markets are becoming the norm in more countries; in markets where there are no barriers to the entry of providers, the boundaries of telecommunications and broadband coverage and the number of people served, are expanding further and faster than previously imagined possible.

On the demand side:

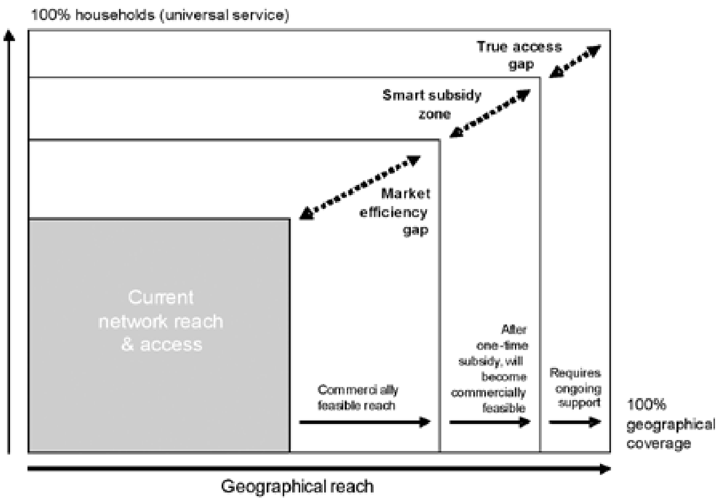
- Many people, who once would not have dreamed of using, let alone possessing telephones, can do so because phones have become both more available and more affordable. Citizens derive various personal and economic benefits from phone use, including being able to keep in touch with family (who are now often absent for work) and friends, and are especially useful in emergencies. The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction presents evidence of this;
- For many more people, however, telephones remain out of reach (physically, financially or both), although they would get similar benefits if they could—this has significant implications for UAS and represents vast untapped potential; and
- Public benefits for the society and the economy from wider telecommunications access are greater than, if not equal to, the personal benefits that citizens gain with access. E-government, agriculture and rural livelihoods, health, education and financial services can all promote economic and social development. Some of these benefits are discussed in **Section 1.6**. A lesser-known example of how the public benefits from wider phone access is the spread of social support helplines. These provide support for callers, often abused children or adults seeking information or assistance.

Reference Documents

- **The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction: A study of rural communities in India (Gujarat), Mozambique and Tanzania**

4.1.3.3 MARKET GAPS AND UNIVERSAL ACCESS POLICY

Three separate zones exist within the so-called access gap, namely the market efficiency gap, the smart subsidy zone and the true access gap, as illustrated in the figure below. Each zone requires a distinctive set of policies and strategies which together yield an integrated universal access and service (UAS) programme. There are also two dimensions to the challenge of achieving UAS: these are poverty and high-cost areas. Poverty, of course, exists in both urban and rural areas, however the cost of addressing both poverty and high-cost areas together, as exists in many rural settings, is much higher. Providing access to the urban poor is well within the reach of the market.



◂ **Figure: Distinctions within the access gap**

Source: Initial concept in "Telecommunications & Information services for the Poor. Towards a Strategy for Universal Access", by J. Navas-Sabater, A. Dymond, N. Juntunen, 2002. Modified by Intelecon.

The market efficiency gap is the gap between the service reach which can be achieved in a fully liberalized and efficient market and what is actually achieved by markets under existing conditions. This gap can be bridged through private service provision so long as the regulator and policymakers remove non-economic barriers, create enabling regulation, ensure a level playing field among all market participants and the create a positive fiscal, business and investment climate. This allows operators and service providers to be able to serve a much broader area and its inhabitants and thus close the market efficiency gap. This frontier can be reached within the context of telecommunications sector reform and does not require subsidies. Many countries are now doing very well in bridging this gap through effective competitive service provision. The only questions relate to how far the market can actually reach commercially, and how best to implement and sequence more pro-market conditions to reach the limits of the market. The theme of an effective liberalized market, together with the regulations needed to implement it, is discussed in detail in **Chapter 2**.

The smart subsidy zone refers to rural or high cost areas, and low-income population groups that will not be reached by the market alone, even if it is an efficient market, or at least not for a long time to come. Targeted financial intervention beyond normal regulatory measures and incentives is required to provide services to these population groups and areas. A smart subsidy is the term used to describe an initial subsidy (usually given on a once-only basis) that is designed to be results-oriented, does not distort the market, and encourages cost minimization and growth of the market. It helps to kick start a project or service, with the ultimate objective of the programme becoming commercially viable, whereas without the subsidy investors might otherwise have been reluctant to invest. Investors' reluctance could be due to perceived risk or general lack of capital for the kind of service opportunities that are considered by government to be essential for socio-economic development. The important element of the smart subsidy zone is that an initial subsidy to private sector providers will make the project commercially viable on an ongoing basis by filling the financial gap with a one-time subsidy, which increases the operator's rate of return and reduces his risk. No further subsidies are needed if the service targets are set realistically, with medium term commercial viability in view. Targeted interventions are usually implemented using a Universal Access and Service Fund (UASF). **Section 5.3.8** recognizes that the extent of the smart subsidy zone is sometimes hard to predict and can be a moving target, as it is not uncommon that operators exceed expectations and close this gap.

The true access gap comprises areas or communications targets that are beyond commercial viability, even in instances where initial smart subsidies are given. Commercial sector operators or service providers serving these areas or population groups would need ongoing financial support, possibly in the form of operating subsidies (or end-user subsidies in the case of universal service [US]). It is a political decision if and to what extent to subsidize ongoing service provision to areas and population groups that are beyond the limits of the smart subsidy zone and whether or not to use UASFs to finance such operations. However, even the true access gap can sometimes be bridged with innovative commercially-related approaches. In some cases, true access gap areas can be combined with more profitable areas, without need for ongoing subsidy. Also, in most countries, the true access gap may, in fact, apply only to a small percentage of the total population. In cases where the market is in fact achieving most UAS objectives, a degree of public oversight remains reassuring. It can make progress more visible, highlight any deficiencies and provide a safety net for unfortunate people or places not otherwise served. Constant change in technology, services, and pervasiveness of various ICT services makes it necessary that the status of UAS should be monitored and policies continue to be updated and developed. In all cases, it is important to work with the market as it develops. This involves, for example:

- Consulting industry and the wider public on the details of UAS policy and its implementation, and taking views expressed into account, especially those that rest on practical experience;

- Ensuring that all market participants have the opportunity to contribute to UAS goals, and receive appropriate recognition when they do so;
- Reviewing policies and practices regularly to keep pace with market and technological developments; and
- Wherever practicable, incorporating competitive mechanisms into the distribution of subsidies for UAS projects.

4.1.4 CHANGING CONTEXTS AND TRENDS FOR UNIVERSAL ACCESS POLICY

Universal access and service (UAS) policies must fit contexts that have changed significantly over the past decade. In developing countries, these policies now have:

- **Much more ambitious goals.** Technology change and market growth have lowered costs to the level where near-universal access to telecommunications is an achievable goal for many countries, and a degree of use can be affordable for almost all citizens. Many countries have now set their sights on universal access (UA) for Internet and broadband services, as well as universal service (US) goals for telephony. Chapter 8 discusses the implications of new technologies for UAS. ICT spending is now entering the budgets of base of the pyramid consumers [1]. Gapminder provides several interesting ways of visualising some of the tremendous changes, country by country, which have been taking place in technological usage [2].
- **More complex interactions with other policies.** ICTs are often interdependent and support many applications and services; these increasingly close relationships are often called convergence. UAS policies should ideally be designed in co-ordination with, or at least with consideration of, other government policies, including those for computer applications, health, education, government, and rural livelihoods (including electricity, infrastructure, etc.). Countries require overarching national ICT policies that address the sectors impacted by ICT. UAS policies are typically a sub-policy to the national ICT policy, which is outlining ICT development in all sectors of the economy and society. However, UAS policies aimed at increasing telecommunications infrastructure and access need not be held up if other sectors are slower; and
- **More experience and best practices to build on.** Over the past decade, many developing countries have introduced UAS policies. This toolkit aims to bring together the most important lessons from this experience.

These changed contexts are reflected in the observed and possible future trends in UAS policies described in Sections 1.4.1 and 1.4.2.

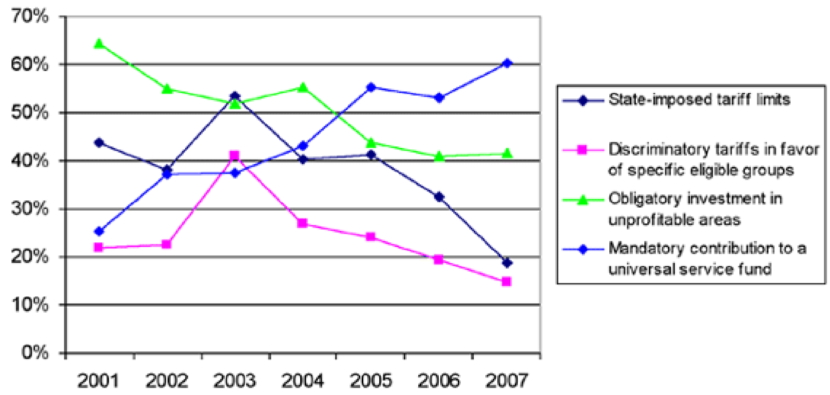
Reference Documents

- ITU Global Symposium for Regulators (GSR) Best Practice Guidelines

4.1.4.1 TRENDS IN UNIVERSAL ACCESS POLICY

The ITU World Regulatory Database (www.itu.int/ICTeye) helps in detecting trends in regulatory practice. The chart below summarizes data supplied on universal service (US) policies over the years 2001-2006. There are random fluctuations from year to year because of changes in the number and composition of survey respondents. Also, though the database refers to universal service, many of the policies relate to universal access, not to universal service. Still, the data support the following views:

- Universal Access and Service Funds (UASFs) are rising in popularity, and in 2007 are used in 60 per cent of countries that responded to the ITU survey;
- Obligatory investment in unprofitable areas has correspondingly been declining in popularity; and
- The use of state-imposed tariff controls, to benefit all customers or just to benefit specific eligible groups, declines steadily since 2003 and dipped below 20 per cent of respondent countries in 2007.



◀ **Figure: Responses to questions on universal service policy, 2001-2007**

Source: ITU World Regulatory Database

Fuller analysis of the responses shows that USAFs have been established across countries of all income levels. Although many countries have established a fund, the number of entities that are already operational is smaller. Other trends that can be observed are [1]:

- Using competitive processes when awarding UASF. Competition increasingly determines the company that receives funding, and also the amount of funding to be awarded, however, sometimes the amount of funding is decided in advance and the company chosen on the merits of its proposed activities (e.g., the amount of coverage that it offers);
- Greater diversity in the type and size of project that may receive UASF. Though new network infrastructure (both passive and active) is still the biggest charge on the funds, other costs such as telecentres, training and content may also be funded;
- Opening competition for funds to a wider range of entities. Large infrastructure projects require large companies with financial and technical muscle, but smaller projects may be suitable for smaller companies and greenfield operators and for more local participation;
- Specifying minimum requirements rather than specifying the technology, so as to gain the advantages of the latest technical advances (technology-neutrality);
- Greater awareness of the equal rights of people with disabilities and other disadvantaged groups, and the benefits of design for all to make ICTs accessible for everyone at little extra cost; and
- Using simplified methods of cost estimation when not using competitive processes. Estimation is based on trends or negotiation instead of complex cost modelling.

4.1.4.2 THE FUTURE EVOLUTION OF UNIVERSAL ACCESS: E-INCLUSION

The notion of universal access (UA) to telephony has extended in two directions: towards UA to ICTs (and particularly to the Internet, with broadband Internet access becoming the new norm), and towards universal service (US), in which access is convenient and affordable, so that use becomes routine. The future of universal access and service (UAS) will probably consist of “e-inclusion”, which is the goal of the European Union (EU) in *EU Ministerial Declaration on e-inclusion, Riga*. The Riga declaration recognizes the social consequences of lacking access to ICTs when ICTs have become engrained in all parts of the economy, public and personal life. It stresses actions in the following areas:

- Using ICT to address the needs of older workers and elderly people;
- Reducing geographical digital divides;
- Enhancing e-accessibility and ICT usability for people of all abilities;
- Improving digital literacy and competences;
- Using ICT to promote cultural diversity; and
- Promoting inclusive e-government.

Aspirations have become much broader and include large elements of human social development and constructive applications, as well as the spread of technology and infrastructure. Developing countries have not yet reached the levels of dependence on ICTs that are current in the EU, but the following sentiments voiced in the Riga Declaration hold a broader relevance and illustrate the direction of change to be expected over the next decade:

- ICT contributes to improving the quality of everyday life and social participation of Europeans, facilitating access to information, media, content and services, to enhanced and more flexible job opportunities, and to fight against discrimination. Improving ICT access for people with disabilities and elderly is particularly important.

- E-inclusion means both inclusive ICT and the use of ICT to achieve wider inclusion objectives. It focuses on participation of all individuals and communities in all aspects of the information society. E-inclusion policy, therefore, aims at reducing gaps in ICT usage and promoting the use of ICT to overcome exclusion, and improve economic performance, employment opportunities, quality of life, social participation and cohesion.
- To convincingly address e-inclusion, the differences in Internet usage between current average use by the EU population and use by older people, people with disabilities, women, lower education groups, unemployed and less-developed regions should be reduced to a half, from 2005 to 2010.

Reference Documents

- EU Ministerial Declaration on e-inclusion

4.1.5 INTERNATIONAL DEVELOPMENTS

The main international initiatives related to universal access and service (UAS) are the World Summit on the Information Society (WSIS) objectives, and the Millennium Development Goals (MDG).The WSIS objectives (reviewed in **Section 1.5.1**) raised the political profile of ICT development and recognized that access to communications is necessary to achieve basic human rights. The WSIS objectives also recognize the need for special action (i.e., a UA policy and its implementation) to provide such access to all, especially disadvantaged groups. They also prompted commitments to provide a large amount of funding for connecting communities globally by 2015. The Millennium Development Goals (MDGs), discussed in **Section 1.5.2**, include a global partnership for development whose target is to provide citizens with all the benefits of new technologies, especially information and communications, in cooperation with the private sector. There is some debate around whether and how ICT deployment assists in reaching the MDGs, but the following points seem clear:

- ICTs can help in implementing many initiatives that contribute directly to reaching development goals even when they do not necessarily contribute directly themselves;
- ICTs have impacts that depend on the technical, economic, administrative and social environment, so general assessments of their contributions without considering the local context are difficult; and
- ICTs are increasingly understood to be complementary to other development imperatives and not to be traded off against them.

4.1.5.1 THE WORLD SUMMIT ON THE INFORMATION SOCIETY OBJECTIVES

The World Summit on the Information Society (WSIS, Geneva 2003 – Tunis 2005) brought together world leaders to address themes related to the information society, ICT development and the digital divide. The summit and its follow-up process have been the focus of many activities that are relevant to universal access and service (UAS), including the following:

- **Declarations of widespread support.**
  These declarations cover:
  - Recognition of access to communications as necessary to achieve basic human rights; and
  - The need for special action to help provide such access to many disadvantaged groups, including least developed countries, inhabitants of remote rural areas, and people with disabilities. The Practice Note *The WSIS principles and commitments, 2003 and 2005* reproduces some particularly relevant passages.
- **Funded projects.**
  The ITU "Connect the World" initiative, which aims for global connectivity for every community by 2015, lists 70 multi-stakeholder projects, each related to one or more of three building blocks of UAS – enabling environment, infrastructure and readiness, and ICT services and applications [1]. Taken together, these projects reach practically every country in the world. They build on the 375 "Golden Book" commitments made by all types of stakeholders immediately after the Summit [2]. These commitments, represented new funding, amounted to nearly USD 4 billion. The stocktaking database currently lists more than 3000 projects, over 1000 of which relate to ICT infrastructure building. Also, the World Bank is actively funding major connectivity initiatives, especially in Africa, notably the Eastern Africa Submarine Cable System (EASSy) and Africa Regional Communications Infrastructure Program (RCIP).

Of course some of this activity would have happened without the WSIS, but the WSIS raised the profile of information society building and attracted new finance. In particular, the WSIS Outcome Documents highlighted the importance of ICTs for helping to meet the Millennium Development Goals (MDGs), as discussed in **Section 1.5.2**.The term digital divide, which means grossly unequal and inequitable access to the benefits brought by modern ICTs, has been current for several years. WSIS tried to replace the somewhat negative objective of closing the digital divide with the more positive idea of pursuing digital opportunities for everyone. WSIS set in motion follow-up procedures and annual reports, which include assessing progress. An early assessment is given in the Practice Note *The prospects of achieving the WSIS targets, 2005*. A fuller discussion of many possible indicators is in *Partnership on Measuring ICT for Development: Core ICT Indicators*.

Practice Notes

- **The prospects of achieving the WSIS targets, 2005**
- **The WSIS principles and commitments, 2003 and 2005**

Reference Documents

- **Partnership on Measuring ICT for Development**

4.1.5.2 THE MILLENNIUM DEVELOPMENT GOALS

The eight Millennium Development Goals (MDGs) relate to different aspects of human development [1]. The eighth MDG articulates the need to "develop a global partnership for development," and includes a specific target, "18: in cooperation with the private sector, make available the benefits of new technologies, especially information and communication," with indicators drawn from Partnership on Measuring ICT for Development: Core ICT Indicators (measuring telephone lines, cellular subscribers, personal computers in use and Internet users per 100 inhabitants). The extent to which ICTs should be deployed in support of other MDGs has been controversial as it was questioned whether money spent on ICT was taking away resources for more urgent needs such as clean water, health and education etc. [2]. But, the debate in the 1990s of choosing between ICTs and other development imperatives has now shifted from one of tradeoffs to one of complements [3]. With each year that passes, as ICTs improve and people become better equipped to make the most of them, this shift towards seeing ICT as complementary is likely to increase. In fact, ICT deployment could support each of the MDGs, as is shown in the Practice Note Examples of the role of ICTs in supporting the MDGs in Asia. Development specialists stress that for ICT to make a positive contribution to poverty alleviation, the following are essential considerations:

- A well thought out development strategy should come first;
- Information and communications needs for implementing the strategy should be identified; and
- ICT should be deployed appropriately to meet these needs.

Telephone service almost always has clear benefits for the poor, while Internet and advanced services need to be deployed as a tool for specific development goals. Many case studies are provided in Information and communication technologies for poverty alleviation. In the past, there were too many examples of the ICT arriving first, with the tail wagging the dog or a solution looking for a problem. To avoid this, the development-strategy-led approach now points to the inclusion of ICT goals in Poverty Reduction Strategy Papers, in order to ensure the availability of ICT as and when needed for poverty reduction [4]. This has been done in Rwanda, for example [5]. The reference document Good practice paper on ICTs for economic growth and poverty reduction points out that ICTs can support progress towards the MDGs through the following main routes:

- Empowerment and the Poverty Reduction Strategy Paper process;
- Efficiencies in service delivery; and
- Livelihood enhancement.

Practice Notes

- **Examples of the role of ICTs in supporting the MDGs in Asia**

Reference Documents

- **Good Practice Paper on ICTs for Economic Growth and Poverty Reduction**
- **Information and Communication Technologies for Poverty Alleviation**
- **Partnership on Measuring ICT for Development**

4.1.6 INTEGRATION WITH OTHER NATIONAL PROGRAMMES

Universal access and service (UAS) policies do not exist in isolation, they are relevant to education, e-government, electricity, and micro-finance and e-banking, among others. However, overarching national policy on ICT development should provide overall direction and facilitate and define the inter-linkages among the various sectors, policies, stakeholders and initiatives. ICTs are especially important for education, but voice alone is a limited medium, telephony and radio broadcasting are not enough in the context of dynamic education. In consequence, universal access (UA) generally means "universal Internet access", and increasingly, "universal broadband Internet access". Many UAS policies include the provision of Internet access to schools, often partially paid for by Universal Access and Service Funds (UASFs). However, while Internet access for schools might be paid for by UASFs, making effective use of the access is the responsibility of the school, the ministry of education and others. The task of training teachers and providing enough useful and appealing content is particularly significant.

The relation between UAS and educational development programmes is considered in further detail in **Section 1.6.1**.E-government is the use of ICTs to make government more responsive, efficient, effective, and transparent. The conditions within a country, including communications infrastructure and public access, transparency of governance, but also government capacity and public literacy, affect what is worth attempting in e-government.

These conditions are considered in **Section 1.6.2**.Though electricity is essential for telecommunications, in some developing countries telecommunications are often more widespread or more reliable than the main electricity supply; network operators provide their own power generators and their customers find unorthodox ways of recharging equipment, e.g., through car batteries. Important benefits could be gained by co-ordinating the provision of telecommunications with the provision of the main electricity supply.

As discussed in **Section 1.6.3**, telecommunications networks would be easier to operate and use and could share physical infrastructure with electricity networks. While it is a highly desirable practice, this co-ordination might be difficult to achieve. However, this absence does not need to prevent telecommunications provision in places that do not yet have the main electricity supply. Financial services that deal with small sums of money (micro-finance) are widely believed to help people escape from poverty, for example, the Grameen Village Phone programme, provided women with loans to buy phones, sell phone calls, make profits and repay the loans. E-banking uses ICTs to make micro-finance available to more people in new, less expensive ways.

As discussed in **Section 1.6.4**, these initiatives raise regulatory challenges of their own, separate from those of telecommunications; customers must be protected against fraud but regulation must not prevent the development of valuable and trustworthy services.

4.1.6.1 EDUCATION

Education is a major part of all human development programmes. Achieving universal primary education is the second of the eight MDGs. The following four of the ten WSIS targets (for 2015) also relate to education:

- Target 2. Connect all universities and colleges, secondary and primary schools;
- Target 3. Connect all scientific and research institutions;
- Target 4. Connect all public libraries, archives, museums, cultural centres and post offices; and
- Target 7. Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances.

Education is a favoured area for funding and deploying modern ICTs [1]. The reasons for this include the following:

- ICTs record and distribute knowledge that people need to learn in a timely manner. Modern ICTs can maintain more up-to-date and accessible information than books, link teachers and pupils with their peers elsewhere (as in Singapore, where every classroom is connected to the Internet);
- ICTs provide interactive learning experiences which complement face-to-face teaching, and can remedy teacher shortages (e.g., by transmitting lessons to small remote groups of children or by enabling scarce specialist expertise to be shared);
- For an ever-larger number of people, ICT skills are essential to future employability;
- Children and young people everywhere take readily to new technologies. Long-term national ICT strategies naturally focus on equipping today's young people for the future; and
- As educated people and respected community members, teachers are often the first to perceive the benefits of

improved ICTs in their community and are instrumental in bringing them about.

As stated earlier, for education, voice alone is a limited medium, and universal access (UA) generally means universal Internet access, and increasingly, universal broadband access. Content to be accessed is a prime concern. When suitable educational content has been obtained, making it available on a non-networked basis (e.g., on CD-ROM) may be beneficial, as it can be used by more people and without occupancy of scarce or unreliable bandwidth; the Practice Note The eGranary digital library gives an example of this scenario. The widely publicized One Laptop Per Child initiative is an example of an ICT-for-education project focusing on terminals (with appropriate content) rather than on networks. ICT-for-education projects do not always require telecommunications networks end-to-end. Telecommunications networks, with video, could be used in remote teaching, teacher support and teacher training to help to overcome the shortage of teachers in rural and remote areas. However, the cost of implementation has to be compared with other ways to overcome the shortage, such as paying higher salaries. In several countries, universal access and service (UAS) and educational development programmes are linked to some extent. Two examples of these programmes are:

- In South Africa, connectivity and computers for school computer labs continue to be provided under the community service obligations of network operators; and
- In Uganda, a separate component of funding from the Rural Communications Development Fund (RCDF) is used for connecting secondary schools in rural areas.

It is useful for UAS policymakers and educators to communicate and cooperate in regards to educational development programmes. However, Universal Access and Service funds (UASFs) should focus mostly on connectivity and possibly hardware, while the ministry of education and schools need to ensure the effective use of that access through providing computers, content, training and support. Universities find Internet access particularly valuable because staff and students can build networks of contacts that bring about enhanced knowledge development and transfer. Universities have been leaders in the introduction of Internet access into education.

Practice Notes

- **The eGranary digital library**

4.1.6.2 E-GOVERNMENT

The term e-government (and its close relation e-governance) gets used in many different ways [1]. Broadly speaking, e-government is the use of ICT (or more narrowly, the Internet) to make government more efficient, responsive, effective, and transparent. In this context, government can mean any activity by officials at a national, regional, or local level, and can encompass whole development programmes, such as improving health or education, as well as day-to-day administrative activities [2]. Governance and the Internet underlines how conditions within a country affect what it is possible or sensible to attempt in e-governance, with illustrations from Asia.The most popular use of the term e-government in developing countries may be applying ICTs to make administrative transactions, such as getting certificates or permits, or registering a birth or death, more accessible to citizens and less prone to corruption: citizens make fewer journeys, complete fewer forms and meet fewer officials. This approach has been pioneered in India, to modernise procedures suited to a different era and way of life [3]. Successful e-government projects [5] sometimes get more publicity than unsuccessful ones, but it is important when developing UAS policy to take lessons from both [6]. The reach of e-government depends on the availability of infrastructure, and in some cases e-government projects provide or contribute to this availability. However, e-government has many other requirements besides the availability of infrastructure; they may jointly be called e-readiness. To ensure that e-government applications are matched to the readiness to accept and use them, they should often be introduced in stages. The Practice Note A staged approach to developing e-government shows stages suitable for the least developed countries.

Practice Notes

- **A staged approach to developing e-government**

Reference Documents

- **GOVERNANCE AND THE INTERNET**

4.1.6.3 ELECTRICITY

Electricity is extremely relevant to Internet and broadband development, as end-user terminals such as computers require much more power than mobile phones. While telephone networks and use has not been stopped by the lack of public power infrastructure (though the lack has increased cost and slowed speed of network development), further Internet and broadband development and geographical spread will depend highly on increasing national electrification as a pre-condition. *The Energy Challenge for Achieving the Millennium Development Goals* does not expect universal access (UA) to electricity before 2030 (and possibly much later in rural areas of some least developed countries,) yet it stresses that electricity makes a huge contribution to achieving the MDGs. Without electricity to power hospitals and schools, health and education objectives become difficult to achieve. Households quickly acquire simple electrical appliances as a high priority once an electricity supply is available; electric lights or fans enhance personal comfort and productivity, televisions entertain and inform. It is hard to imagine a comfortable lifestyle in the modern world without electricity. There are several important links between electricity supply and telecommunications:

- Most obviously, the lack of electricity supply raises telecommunications network costs significantly, so funding universal access and service (UAS) in areas without electricity supply represents an additional burden on the budget;
- There is often potential for shared backbone infrastructure. Power poles and ducts can carry optical fibre alongside the power cables at low marginal cost, indeed, recently installed power systems are very likely to include optical fibre for the use of the power company;
- There is sometimes potential for shared access infrastructure. Local telecommunications distribution can occasionally use Power Line Communications (PLC), in which the power cables themselves carry telecommunications. However, the technology has to date been used too little to become sufficiently general and inexpensive; and
- Community capacities developed by local participation in distributed electricity generation (such as solar or micro-hydro schemes) could also lead to community demand for, and provision of, communications facilities.

As people generally give higher priority to electricity supply than to telecommunications, one might logically expect that electricity supply would arrive in a community first. When this happens, telecommunications follow more easily, however, often the reverse is true. Network operators install base stations complete with their own primary generators (not just the standard backup generators), and people show great ingenuity in keeping their mobile phones charged (e.g., by using car batteries or taking phones in batches to nearby towns for recharging). Ideally, piecemeal ways of supplying power to terminals and network equipment would not be needed. Telecommunications and Internet could be provided in co-ordination with electricity generation and transmission, and the power requirements of telecommunications would benefit from efficiencies of scale. Such schemes would not need to cover the country; more local schemes, in which the points of consumption are close to the points of generation, might well have more acceptable environmental and other effects, and give both users and producers greater feelings of responsibility. Whether telecommunications provision and electricity generation and transmission can be coordinated in this way depends upon local circumstances. As a policy objective, coordination is desirable, however, communities may not accept delay in telecommunications provision just because they do not yet have the main electricity supply.

Reference Documents

- **The Energy Challenge for Achieving the Millennium Development Goals**

4.1.6.4 MICRO-FINANCE AND E-BANKING

This section looks at micro-finance, a leading application of ICTs, which can be provided through e-banking or m-banking.

Multi-stakeholder partnerships, including the public sector, the private sector and often non-governmental organizations (NGOs), are important for most development applications that exploit communications networks. However, the balance of public and private sector participation in the application programmes varies. Education and health applications are usually government-led, with strong NGO participation and some private sector partners. Other applications may be led by the private sector, with government and NGOs in support. Micro-finance is a good example of this type of application.

There is a widespread perception that appropriate financial services, including credit, savings, cash transfer and insurance, can help people work their way out of poverty. This is reflected in the “Nextbillion” initiative, which focuses on “development through enterprise” and provides a large database of activities that combine both business and development benefits [1]. The benefits often result from selling to poor people or production by poor people. Of the 16 Nextbillion activity classifications, six relate to financial services (and a further three to ICTs). The 2006 Nobel Peace Prize, awarded to Mohammad Yunus and Grameen Bank for pioneering achievements with micro-finance (and specifically with micro-credit for supporting small businesses), has raised the profile of this aspect of development.

The Grameen Village Phone programme was an early application of the Grameen Bank micro-credit services in Bangladesh. Suitably qualified women received loans to buy Grameen Phones so they could sell phone calls to their fellow villagers and generate income from which they paid back the loans. Similar village phone schemes have followed in many other countries. It is a tribute to the extensive growth of the mobile market and the village phone programme itself that in Bangladesh the village phone programme may no longer be very profitable in areas where the market has matured and shared as well as individual access is now widespread [2].

Of course, financial services designed for poor people pre-date telecommunications access in rural areas. However, these projects can grow significantly along with wider telecommunications access. The synergies of telecommunications networks and financial services can be regarded as a form of convergence.

New ICTs make it possible to provide financial services in new, cheaper ways, and to more people. Several projects in developing countries are exploring how e-banking using ICTs can spread access to financial services. The Practice Note *Examples of financial services using mobile phones* explains some of the main models for m-banking and describes several specific examples in different countries.

The intensive development work on e-banking holds great promise for the future [3], however, financial services often inspire mistrust, sometimes with good reason (e.g., excessive interest rates on loans). E-banking raises challenges for regulation separate from those of telecommunications services. For instance, funds must be supervised to provide prudent protection from loss, but regulation must not be so great a burden on service providers that transaction prices would rise out of reach of the target customers. A similar situation has been resolved in some countries of the EU where mobile phone operators are not regulated as banks if only small funds are generated by prepaid cards and needed for customer transactions [4].

Ways in which telecommunications policymakers and regulators could integrate universal access and service (UAS) and micro-finance initiatives are as follows:

- Stay informed about rural financial service expansion;
- Keep abreast of emerging value-added services with a financial component offered by telecommunications operators or over telecommunications networks;
- Ensure that the responsibilities for regulating value-added services with a financial component are laid down clearly and understood widely. Financial regulators, not telecommunications regulators, might have the main responsibilities, but users will not be interested in the demarcation: they will expect to be protected adequately and are likely to see problems as defects in telecommunications services;
- Take part in any national working groups on expanding financial services or e-commerce for poor people. Cyber-security, and user identity management, are prerequisites for the development of e-commerce; and
- When formulating UAS programmes, aim where possible to support target areas and activities for financial services expansion.

Practice Notes

- **Examples of financial services using mobile phones**

Reference Documents

- **Mobile Phones for Microfinance**
- **The Transformational Potential of M-Transactions**
- **Using technology to build inclusive financial systems**

4.2 REGULATORY REFORM & UNIVERSAL ACCESS AND SERVICE

Universal access and service (UAS) is achieved through a combination of sector reform, dedicated financing instruments and additional measures that stimulate market expansion into rural and remote areas. This chapter explores the role of sector reform in achieving UAS. Regulatory reform is integral to UAS policy. It is important to emphasize that regulatory reform is part of UAS policy and not separate. There is a misconception that privatization and liberalization does not promote UAS and benefits only investors, industry players and urban and business customers, thereby creating a need for a UAS policy that will ensure that all are served. It is more accurate to consider regulatory reform as the first step in achieving UAS, and that a UAS policy is an additional measure to complete and supervise what a well-regulated and efficient market begins.

Section 2.1 emphasizes the advisability of implementing regulatory reform before implementing any specific measures such as Universal

Access and Services Funds (UASF). The section also describes the main regulatory reform topics such as authorizations/licensing, interconnection, competition and price regulation, that need to be addressed, and their impact on UA. The most important step of sector reform is introducing competition, which coupled with fair and independent regulation, creates a level-playing field between operators. This is especially important if the incumbent operator is not yet privatized. The positive impact of effective competition has been demonstrated in most countries' mobile services.

Section 2.2 discusses how competition affects and improves UAS. Also, operators can and do view UAS provision as a business opportunity. How they address the UAS market is described in **Section 2.3**.

Section 2.4 outlines specific regulatory measures that can be used in addition to general reform and best practice regulation to improve UAS.

Section 2.5. is dedicated to discussing measures and options to create an enabling broadband environment. If put into practice, then the regulatory reform measures discussed, create more sustainable and widespread communications access as well as service growth.

Reference Documents

- **Universal Access & Service (UAS) and Broadband Development**

4.2.1 REFORM FIRST

A thorough liberalization process, whereby the communications sector is effectively regulated and open to fair competition from private investors, is vital to the success of a universal access and service (UAS) programme for the following reasons:

- Without an effective regulator operating within a modern communication law, there are significant challenges for the implementation of a UAS programme;
- Where a government continues to be a market player, usually by owning all or a part of the incumbent operator, it is likely that the government cannot be impartial when making sector policy and UAS policy, as it will have a vested interest in one of the market participants. Also, there is a risk that governments will continue to direct the incumbent operator to serve certain areas for political reasons, regardless of viability; and;
- Only a reformed or renewed institutional framework is conducive to network and service expansion on an equitable basis. Therefore, competition, interconnection, licensing/authorization policies, tax burdens and any economic disincentives must be properly addressed.

Liberalization, through private sector participation and open competition, encourages UAS by setting targets or providing opportunities that motivate operators, such as the following:

- Setting license or contractual obligations for the roll-out of services that are explicit and realistic;
- Exceeding roll-out obligations for reasons of longer-term profit;
- Ensuring the ability to run efficient and politically un-encumbered communications businesses;
- Creating fiscal benefits for introducing investment capital and expertise; and
- Facing less political interference (decisions based on non-commercial issues) than incumbents have traditionally faced.
- Being demand-driven increases the chances of both responding to consumers' needs and closing the market efficiency gap.

Thus, governments should implement regulatory reform measures before creating Universal Access and Service Funds (UASFs) or other specialized subsidy tools. Such regulatory reform efforts should include:

- The development of a modern regulatory framework, including addressing the impact of convergence, and the establishment of an independent and effective regulator. The national regulatory authority (NRA) should have the qualities of an accountable entity with decision-making powers that are isolated from vested interests. Consideration needs to be given to the scope of the regulatory authority's role and responsibility, introduction of a statutory framework that enables effective operation within government hierarchy and ability to set and enforce measures that are publicly acceptable. For a discussion of this, see **Module 1: Regulating the Telecommunications Sector: Overview**, and **Module 6: Legal and Institutional Framework**;
- The effective regulation of competition and the establishment of interconnection and tariff rules is examined in **Module 2: Competition and Price Regulation**;

- The pursuit of technologically neutral licensing, unified licensing or general authorizations is discussed in **Module 3: Authorization of Telecommunications Services**; and
- The management of radio spectrum, maximizing the use of this scarce resource, and allowing for innovative and emerging technologies, including Broadband Wireless Access (BWA) is explored in **Module 5: Radio Spectrum Management**.

Sections 2.1.1 to **2.1.3** tackle some of the main regulatory reform issues. These issues include:

- New licensing approaches that allow operators to have the freedom to choose technologies to be used and services they wish to provide; and
- Competition regulation, especially regarding open access and the importance of interconnection and tariffs.

These sections discuss specific cases that illustrate potential problems with UAS programmes if certain reforms or regulatory requirements are not addressed. **Section 2.1.4** review radio spectrum management and regulation, while **Section 2.1.5** addresses other economic incentives that can be used to improve UAS before any special UASF or other intervention is used: taxes, import duties and other (regulatory) fees. **Section 2.1.6** discusses the importance of the removal of pre-liberalization Universal Service Obligations (USOs), often borne by the fixed incumbent operator. The discussion about regulatory reform concludes with **Section 2.1.7** providing some considerations about the timing of a UAS programme in relation to regulatory reform.

4.2.1.1 TECHNOLOGY NEUTRAL, UNIFIED LICENSING OR GENERAL AUTHORIZATIONS

In regards to universal access and service (UAS), having operators in the marketplace that are restricted to fixed service provision only (usually, the incumbent operator) can be a considerable obstacle for the implementation of a UAS programme. Fixed incumbents are disadvantaged and, often resistant to the introduction of a modern UAS programme. Wireless technologies are more cost-efficient in reaching rural areas than fixed services, including broadband wireless access (BWA). Even if a UAS tender for a subsidy (see **Section 7**) is designed technology neutral, wireless operators have a significant technological advantage. At the beginning of sector reform, with the introduction of new entrants and competition for the incumbent, creating a level playing field meant limiting the power of the incumbent, especially in regard to interconnection and access to the incumbent's long-distance transmission network. However, with the success of wireless and mobile technology, the position of many fixed network operators in developing countries is actually weaker, especially in reaching rural areas. Thus, in regard to a UAS programme, creating a level playing field now often means ensuring that incumbents can compete by introducing technology neutral or unified licences, or general authorizations, especially when they have been incorporated as commercial companies or privatized, and no longer receive favouritism and financing from the government. In a competitive UAS mechanism to allocate funding requires all operators to have a fair chance of participating. For example, in Uganda there were three players (MTN, UTL and Celtel) during the universal access (UA) competitive subsidy tenders and they were all able to participate. MTN had a technology neutral licence, UTL was the former fixed incumbent and was not only privatized, but also had a mobile licence, and Celtel was a mobile operator. They all had the same opportunity to use the most cost-efficient technology that contributed to the industry's acceptance of Uganda's rural communications development policy and UA programme and its success to date. Also, there were three regions for which a subsidy was on offer; operators were allowed to bid for all three regions or pick and choose any of the three. The winning bidder was the operator who offered the lowest request for subsidy in each of the three UA areas. In Botswana, further liberalization is being implemented in time for the new Universal Access and Service Policy. In response to a government study on further liberalization of the sector [1], key further liberalization steps were taken in 2006. These included major moves to achieve service neutral licensing of the three major operators and to allow further competition in the market. Service-neutral means that the licence does not restrict the services that can be provided under this licence, also smoothing the pace for broadband development. The steps include:

- The two mobile operators are permitted to provide their own long distance transmission systems without the current condition of having to request services first from the fixed incumbent operator BTC;
- Current fixed line and mobile operators are able to apply for service-neutral licenses; this, in effect, means that BTC is allowed to operate a mobile network and to utilize mobile technology as it deems appropriate;
- International voice gateway services is liberalized, ending BTC's monopoly; and
- In December 2009, potential new entrants will be invited to apply for a public telecommunications license, under the service-neutral licensing regime.

These steps ensure that the main operators who are asked to contribute to a UASF will compete on a level playing field for future UAS subsidies and projects, and share the burden and opportunity of UAS more equally. Where UAS policies are being implemented without fixed incumbent operators or other major operators having a chance to participate, opposition and un-co-operative behaviour is to be expected. For example, incumbents have been asked to contribute to a UASF, without being able to bid. Fairness and a level playing field require that a technology neutral or unified licensing regime is implemented before or in parallel with the implementation of a UAS programme.

Practice Notes

- Botswana: Multi-service Authorization Regime
- Saudi Arabia -- General Authorization Framework
- The Regulatory Framework for General Authorizations
- Uganda's Multi-Service Authorization Regime

Reference Documents

- Botswana -- Service Neutral Licensing Framework in the Era of Convergence

4.2.1.2 OPEN ACCESS AND REGULATING DOMINANT MARKETS

Access to competitively priced national and international long-distance transmission is crucial for the success of a universal access and service (UAS) programme, both for the telephony part as well as the Internet or broadband part. In a more general way, any dominance over transmission or international gateways usually keeps bandwidth and leased line prices higher than in a competitive environment and affects affordability for the end-user. It also limits the investment capacity of the other operators and service providers, which pay high prices for transmission or bandwidth rather then investing in network expansion. More specifically, being able to participate in a particular UAS competitive bid depends, at least partially, on the existing backbone footprint of each operator - especially in very large and geographically challenging countries. If the backbone networks of the main operators are vastly unequal, so too will be their participation in a UAS subsidy bid assuming no regulation is in place allowing open access at fair prices. This is even more so the case with Internet Service Providers (ISPs) and Mobile Virtual Network Operators (MVNOs), which are often not facilities-based and depend on receiving fair access to and pricing of transmission networks. Mozambique launched a universal access (UA) pilot project in 2007, in the northern provinces of Zambezia and Nampula, which was initially unsuccessful. An investigation of the bid unveiled a combination of inhibitive factors; prominent among those was the challenge of the backbone. The fixed incumbent operator has the largest fibre-optic network in the country, however, its backbone prices are considered by most of the industry to be too high, prompting other players to build their own networks or to use satellite transmission. As a consequence, the high long-distance transmission cost to provide UA service in the far-north deterred most potential bidders, especially ISPs that were interested in the separate Internet component. Uncovering such challenges is precisely why a pilot project is recommended. Mozambique has now put itself in a position to move forward on a UAS programme with greater knowledge of inhibitive factors.As discussed in more detail in **section 3**, there are several reasons why open access is important and there are several ways of achieving it. As can be seen from the example above, open access must be addressed before UAS projects are implemented.

related materials

Module 2, **"Competition and Price Regulation"**

4.2.1.3 INTERCONNECTION AND TARIFFS

Interconnection agreements are a crucial regulatory factor for the commercial viability of rural telecommunications, because rural operations typically have more incoming calls. Interconnection agreements are particularly necessary vis-à-vis the payment for terminating access. For interconnection and tariffs see also the ICT RegulationToolkit **Module 2 - Competition and Price Regulation**, and **Section 2.4.6** in this Module for asymmetric interconnection. A study in 2003 [1] that analyzed the success of Peru's Fund for Investment in Telecommunications (FITEL), the country's programme to address rural telecommunications development and universal access (UA), found that almost 60 per cent of the traffic on the FITEL phones was incoming. This is typical for rural networks, where the more affluent urban relatives or friends make calls into rural areas. However, the interconnection rates and procedures for the licensed rural operators were the same ones applicable to the remaining non-rural operators and did not reflect their considerably higher network, operation and maintenance costs, especially since they used VSAT technology. The effective interconnection charge (a combination of a termination charge plus local and long-distance transport) received by rural operators was USD 8.5 cents. As a comparison, in Chile, where the interconnection charge had been established through cost-based studies, the interconnection rate for a rural operator was USD 18.7 cents. This strongly affected the viability of the two Peruvian rural operators. While outgoing traffic accounted for less than half of all traffic, it provided over 80 per cent of revenue. Incoming traffic accounted for more than half of all traffic, but for only 15-20 per cent of revenue. The problem was compounded through very low regulated retail tariffs, equivalent at the time to USD 5 cents for a local call. A local call was defined as a call within a department, an administrative unit of Peru. There are 24 departments within Peru, all of which are geographically quite large, so a local call might in fact be between two destinations over 200 km apart. Financial analysis at the time of rural company, GTH, with three years of operating history, reflected a loss-making enterprise even with subsidies included. Once aware of the issue, the regulator OSIPTEL took action and changed tariff and interconnection regulation for the rural operators.

4.2.1.4 RADIO SPECTRUM REGULATION

Module 5 of the ICT Regulation Toolkit, **Radio Spectrum Management**, describes the fundamental objectives, principles, and processes of spectrum policy and management. There are three basic approaches to the allocation of frequencies, namely administrative, market and commons. The balance between them is now open to change due to the pressures of wireless innovation, as well as the need and also the opportunity for meeting the needs of rural areas and other targets of universal access and service (UAS).

- **Administrative approach** — assignment of frequencies by licensing to specific users for specific purposes, in a prescriptive fashion dictating the details of spectrum use, permissible equipment types, emission powers, etc;
- **Market approach** — recognizing that the conditions dictating the licensed ownership and use of the spectrum can change, even in the course of a licensee's operation. The approach creates markets for spectrum including trading of spectrum and even change of use with market demands; and
- **Commons approach** — covering the unlicensed use of frequencies, usually for short range, within certain technical limits. This includes applications such as Bluetooth, wireless identification and telemetry, and frequencies such as 2.4 GHz and 5.8 GHz used by Wi-Fi and sometimes WiMAX equipment to provide wireless LANs (WLAN) and MANs (Metropolitan Area Networks).

Broadband innovation and the need to enable service providers to meet UAS targets economically are both strong drivers for regulators to consider creative change [1]. In the current environment, effective spectrum management for the broadband era should follow the 2005 ITU Global Symposium for Regulators Guidelines, which are the following:

- Facilitate deployment of innovative broadband technologies - including the principle of minimum regulation and allocation of frequencies in such a way that facilitates new entry into the market;
- Promote transparency - including consultation and publishing of market forecasts, plans and registers of industry interest;
- Embrace technology neutrality;
- Adopt flexible use measures - including minimizing barriers to entry and adopting lighter regulatory approaches in rural and less densely populated area;
- Ensure affordability - reasonable spectrum fees that encourage innovation;
- Optimize spectrum availability on a timely basis;
- Manage spectrum efficiently;
- Ensure a level playing field - especially to prevent spectrum hoarding by incumbent operators;
- Harmonize international and regional practices and standards; and
- Adopt a broad approach to promote broadband access - including special measures for UAS.

Several international gatherings have focused on trying to promote Broadband Wireless Access (BWA) globally – and with some success. For instance, the WRC-07 event held by the ITU saw progress on the allocation of certain common frequency bands. Key issues remaining include choosing the bands, dealing with regional variations, and sharing the bands in an era of convergence. In the context of UAS, it is possible that strategies should vary geographically within the country to allow for vastly different conditions from region to region or from urban to rural areas. Choices can be based on such things as spectrum scarcity in various parts of the country and in various portions of the spectrum and population density across the country. Consideration should be given to the various possibilities for both basic mobile telephony and BWA that may exist for:

- Reclaiming or splitting national spectrum allocations for rural areas only, to enable more operators to share spectrum than might be possible in urban areas.Especially in hilly, mountainous or low population regions, some GSM or CDMA mobile allocations are not fully utilized, even though they might be needed in urban zones. Operators often resist change, but regulators can look creatively at the need and resources available for enabling new market entry into the technologies that are proving to be economic, and efficiency of spectrum use. This has been successfully done in Brazil, where the regulator Anatel obligated major cellular players to split their spectrum and a new entrant, Ruralfone, entered the rural market;

- Reducing or eliminating spectrum licensing fees for competitive operators in rural areas or those providing UASF tendered services;This would encourage the entry of small operators and would also mean that UASF competitions become efficient one-stop shops for license, subsidy contracts and the required spectrum under certain conditions. One of the reasons for the success of the initial Chilean UASF competitions, which resulted in very low required subsidies, was that spectrum was offered in the tender package [2];
- Reducing the technical constraints in the commons approach, such as allowing the power radiation limits to rise in rural areas where interference is not a major problem.The Peruvian regulator, OSIPTEL, allows high powered use of the 2.4 GHz band for wide area Wi-Fi in rural areas [3/];
- Allowing frequencies normally limited to access networks (e.g., in the 2.4 and 5.8 GHz bands) to be used also for backhaul;
- Allowing spectrum trading where underused frequency allocations are freed for use by other operators; and
- Encouraging national roaming that helps drive up the overall use of communications and the ease of use between regions.

The Practice Note Ireland's regulation of broadband wireless access provides an example of the principle of barrier reduction and a creative approach to options 3) and 4) to encourage both BWA development and encouragement of small operators meeting potentially high cost challenges in rural areas.Further discussion of spectrum issues specifically related to rural and UAS applications is provided in Section 2.4.4.

Practice Notes

- **Ireland's regulation of broadband wireless access**

Reference Documents

- **Broadband Spectrum Management of Trends in Telecommunications Reform 2006: Regulation in the broadband world, ITU, 2006.**
- **CTU Workshop: Administrative and Market Methods for Assignment, 2006**
- **Global Symposium for Regulators**

4.2.1.5 TAXES, IMPORT DUTIES AND OTHER FEES

Countries need to carefully review their ICT-related tax and fees regime before considering a Universal Access and Service Fund (UASF) or any other special government intervention. A UASF collects money, often from the industry itself through a small percentage of gross revenue, and then re-distributes it to operators willing and qualified to provide universal access and service (UAS) in certain areas for the least amount of subsidy (for more details on UASFs see Section 3.2).High taxes, including corporate tax, import tax, and tax on services and handsets, result in fewer people gaining access to telephony services and slower network roll-out. Some countries with higher taxations of mobile services and handsets have low subscriber penetration [1]. In general, lower taxes, especially import duties, do lower the cost of network equipment, resulting in more network build-out. Lower taxes on end-users equipment, including computers, make them more affordable to customers; thus lower service taxes impact demand elasticity and can increase usage.Countries can review and benchmark their tax regimes, especially with those countries that can be categorized as comparable (e.g., in regards to their economy), but have higher network coverage and subscriber penetration. It is also worthwhile to analyze whether a tax reduction could be revenue neutral as the tax base increases (e.g., when more people buy handsets or use services). It might also be possible that lower import duties result in more revenue, or the same amount of revenue, for the government, as there are fewer import duty losses due to black market activities. An illustration of this possibility is that a 30-50 per cent import duty on handsets makes them attractive for the black market to supply because of the opportunity for a good profit margin. A 5-15 per cent import duty reduces that attractiveness. It is a well-known general concept that a black market is likely to occur where there is excessive taxation.A country with high taxes on ICT equipment and services could initially do more for network and access expansion by reducing taxes than by implementing a UASF or any other special UAS measures. Reducing taxes is easier than establishing a UASF and implementing a UAS programme, though it might be politically more controversial. Also, tax reductions can be used selectively to support the UAS objective. In Malawi, the 2007 draft Universal Access Policy foresees, as one of its key measures, to exempt low-cost end user terminals (e.g., mobile handsets and CDMA fixed phone sets) from the import duty, as well as reducing VAT on small denomination pre-paid cards by 50 per cent. In Mozambique, operators can apply to the Investment Promotion Center (CPI) for some fiscal and tax benefits, and operators have received tax exemptions for investments in (rural) network roll-out.Another form of incentive that lowers the barrier to providing services and offsets the initial start-up costs is tax forbearance for a limited time period or tax rebates offered on a sliding scale. There are numerous opportunities through tax benefits to help encourage investment.

Reference Documents

- **GSM Association: tax and the digital divide**
- **Review of sector taxation policies and determining the elasticity of penetration and price of the various telecommunication services in Uganda**
- **Tax Incentives to Attract FDI**

4.2.1.6 THE REMOVAL OF PRE-LIBERALIZATION OBLIGATIONS

A central tenet of the privatization process is that a level playing field must be created for all operators, including recently privatized incumbent operators. The potential burdens and opportunities of a market should be equal amongst all participants.As such, pre-existing universal access and service (UAS) obligations must be dismantled in order for there to be fairness in the market. The incumbent, ex-monopoly operator has often been shouldered with the burden of serving rural areas (even if inadequately) at the behest of political interests. The incumbent should be given the option to retreat from those areas where it does not wish to provide a communications service, including areas where it believes existing service provision is economically unviable.Should an incumbent operator decide to withdraw its UAS service offering from an area, it should make adequate provision for a delayed departure and a handover to any potential buyer. If no buyer is interested in acquiring the network or service area targeted for withdrawal, this may trigger the implementation of a UAS (subsidy) plan. Of note is the importance of technology neutrality when either identifying or licensing a new operator to provide network and service. New technology – whether mobile, an IP network or broadband wireless – tends to reduce costs, can offer more services and therefore has the ability to turn economic loss into gain.An example of how to deal with pre-existing obligations is the approach Botswana was considering in 2007. BTC, the fixed incumbent operator, stated during stakeholder consultations on UAS policy that it had to continue to operate rural networks that previously received initial capital subsidies but are chronically loss-making. Fundamental issues with regard to this situation may include the following:

- Many of BTC's fixed rural networks may not represent the ideal or least cost solutions for rural service provision; and,
- In the newly liberalized UAS regime, BTC should not necessarily be required to continue offering end-user services in areas where they are uneconomic and have been replaced by mobile options.

In order to address this situation, the following approach could be taken: BTC is required to declare in detail which of the rural communities they consider unviable and for which they would like to cease operation. Once these details are known, one of the following three options is recommended:

- BTC be permitted to cease providing services in areas where the services are redundant because of existing mobile service provision;
- BTC sell all or part of its non-economic facilities to another interested operator; or
- Areas now unable to be operated economically by BTC as fixed networks should be bid as new UAS subsidy competitions under the competitive least-subsidy rules.

Related Materials

Module 3, "Authorization of Telecommunication/ICT Services", section 8.3, **"Unified and Multi-Service Licensing"**

4.2.1.7 TIMING OF A UNIVERSAL ACCESS AND SERVICE PROGRAMME

There are several reasons why the timing of a universal access and service (UAS) programme must be carefully considered, as well as linked to the liberalization process. They are:

- If a best practice UAS programme is implemented before major reform measures have been taken, it has a high risk of failure or of being ineffectual. It will be more costly, as the market does not operate efficiently; subsidies will be used for areas that could be commercially served in a better regulated market, leaving less subsidy for areas that truly need it;

- If a UAS programme is implemented too early, before the market has had an opportunity to work efficiently, or while it is still in a period of major expansion, the UAS programme can quickly become outdated; and
- If a UAS programme is implemented before existing pre-liberalization obligations are addressed, it can face major disruptions and pushback from the incumbent.

When is the right time to implement a UAS programme? Regulatory reform can go on for many years and with ongoing developments in the sector like convergence or broadband development, improving and adapting regulatory efficiency is a never-ending endeavour.The following recommendations are made in regards to pre-requisites for implementing effective best practice UAS programmes that rely largely on competitive allocation methods for funding and on working with the industry to achieve UAS. These recommendations should be regarded as minimum regulatory reform requirements:

- The majority of the main operators should be privatized [1]. That does not mean that operators cannot still be government-owned; a possible scenarios is that the government owns less than 50 per cent, i.e. has no controlling interest;
- The regulator, if recently established, needs to have had sufficient time to establish a minimum amount of capacity, trust and credibility within the industry, and a demonstrated ability to make regulations free of vested interests, which are evidence-based and have been developed in consultation with stakeholders;
- The sector and its sub-sectors, such as public telephony, long-distance transmission, mobile, Internet, etc., should have a minimum amount of competition, e.g., at least three competing major service providers and prospects of further opening of the market (plans to issue more licences or authorization or set full liberalization dates); and
- Policymakers and regulators should have a clear view of which areas or population groups are clearly underserved with certain services despite some considerable regulatory reform. Through consultation with the industry, it should be clearly established that these areas and groups would indeed not be served in an acceptable amount of time. This is when special measures are taken and a UAS programme is implemented.

However, even if some of these pre-requisites are not yet achieved, it is still possible to develop a UAS policy. It is even advisable, as the development of a UAS policy can take up to a year, since it requires inter-governmental co-ordination and agreement, public and industry consultations, and an assessment of the sector status quo. Also, subsequent changes to laws and regulation and the development of additional regulatory instruments, take significant amounts of time.

4.2.2 IMPACT AND IMPORTANCE OF COMPETITION ON UNIVERSAL ACCESS

Competition, intrinsically linked to universal access and service (UAS), promotes UAS in the following ways:

- Competition drives expansion (i.e., coverage and availability), as discussed in **Section 2.2.1**;
- Competition lowers prices (i.e., affordability), introduces new pricing models and promotes better quality of services, as presented in **Section 2.2.2**;
- Competition encourages market segmentation and stimulates the introduction of innovative new services (i.e., more choices and new services); and promotes the servicing of the less affluent, through removal of non-price barriers (see **Section 1.2.2**) and subscriber growth, as outlined in **Section 2.2.3**; and;
- Competition makes universal access and service fund (UASF) tenders for subsidies to provide UAS successful; it often needs more than two major operators in the market for a UASF tender to work;

An openly competitive marketplace is essential for the delivery of communications services to those who had no such service before. For example, fixed telephone penetration in India reached only 2 per cent of the population in the 50 years following independence, 1947-1997. However, industry reforms, including competition and other regulatory measures, launched in 1998 had, by 2008, propelled penetration (including mobile) to almost 20 per cent. The Indian mobile phone market in 2007 had 220 million subscribers and this figure is growing by more than 6 million users per month. [1].Research shows that privatization can significantly lead to improved performance regarding increased sales, profits, investment and employment. Across the board, this research also finds that competition drives the greatest improvements in the sector [2]. For example, markets operating with a duopoly are less able to realize the benefits of free competition, as there is not enough incentive to capture market share by expanding service, or by lowering prices. Collusion between the two operators on keeping retail prices high is also a potential concern.For more information please also see the ICT Regulation Toolkit, **Module 2: Competition and Price Regulation**.

4.2.2.1 COMPETITION AND COVERAGE

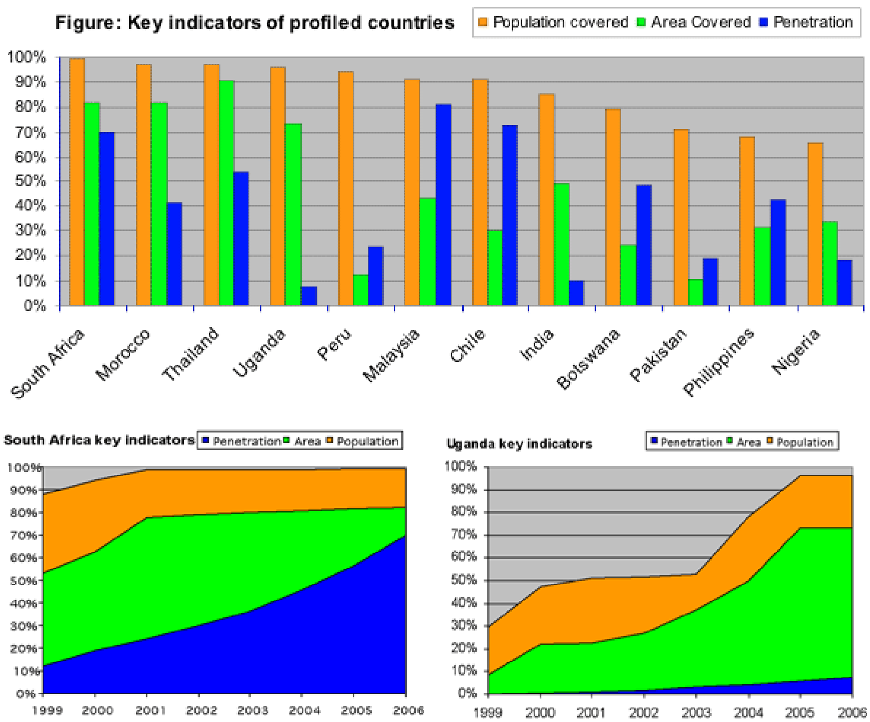
Competition encourages expansion of networks and services as a result of a general increase in the available investment capital necessary for providing services; this expansion is due to an increased number of operators involved. Another benefit of the competitive environment is that currently marginal or uneconomic areas may be offered services based on expectations of demand growth and competitive pressure for operators to position themselves as first in and establish their brand.The expansion of networks is particularly true of mobile or wireless communications as the infrastructure needed is far less expensive to roll-out and has a greater ability to reach more territory (and therefore more consumers).Countries that introduced (mobile) competition early and/or licensed more than two operators achieved high signal coverage and considerable penetration. This has to be seen in conjunction with other important indicators. For example Pakistan and India, both having GDP per capita of around USD 600, and with roughly two-thirds of their population being rural, have done quite well in terms of coverage and penetration is increasing. Same applies to Nigeria. The table below shows countries that were analyzed in more detail, including the number of wireless operators, and key socio-demographic data.

Country	Population	% Urban	Per cap GDP	Per cap PPP	Gini Index	Geog. Area	Population density	No. of GSM operators	% of Pop covered by GSM	% of Area covered by GSM	Q2/2006 GSM teledensity
Botswana	1,720,000	54.0%	$5,014	$10,500	63.0	600,370	2.9	2	79.5%	24.4%	48.7%
Chile	15,956,000	87.0%	$5,898	$11,300	57.1	756,630	21.1	3	94.0%	30.3%	51.2%
India	1,079,721,000	29.0%	$641	$3,300	32.5	3,287,260	328.5	8	60.9%	39.0%	7.5%
Malaysia	24,894,000	64.0%	$4,672	$12,100	49.2	329,740	75.5	3	91.7%	43.5%	81.1%
Morocco	29,824,000	58.0%	$1,637	$4,200	39.5	446,550	66.8	2	97.3%	82.0%	41.4%
Nigeria	128,709,000	47.0%	$516	$1,400	43.7	923,770	139.3	4	71.8%	33.9%	18.4%
Pakistan	152,061,000	34.0%	$632	$2,400	30.6	796,100	191.0	5	36.0%	7.4%	18.8%
Peru	27,562,000	74.0%	$2,483	$5,900	54.6	1,285,220	21.4	2	56.6%	6.3%	11.2%
Philippines	81,617,000	62.0%	$1,041	$5,100	46.1	300,000	272.1	3	68.3%	31.2%	42.5%
South Africa	45,509,000	57.0%	$4,668	$12,000	57.8	1,219,090	37.3	3	100.0%	81.9%	69.6%
Thailand	62,387,000	31.0%	$2,621	$8,300	42.0	514,000	121.4	4	97.1%	90.5%	53.7%
Uganda	27,821,000	12.0%	$264	$1,800	43.0	241,040	115.4	3	96.3%	73.3%	7.5%

Table: Country comparison of pop. coverage, geographical coverage and penetration (GSM only) [1]

Source: Universal Access – How mobile can bring communications to all, GSMA 2006 (Data from 2005 and 2006)

The graph below shows the percentage of population covered by wireless signal, the percentage of geographic area covered, as well as the actual wireless subscriber penetration. Almost all of the countries that have achieved high service coverage have three or more mobile operators. Also, in almost every case where transition from slow to rapid growth in population coverage is observable, an increase in the number of operators, to more than two, is at least partly responsible for this growth. Good examples of this are Pakistan and India, both of which experienced rapid growth between 2003-2006 and which currently have five and eight mobile operators respectively.



Source: Universal Access – How mobile can bring communications to all, GSMA 2006

Even the threat of impending liberalization can result in existing operators creating a growth spurt. This was seen in Morocco when large scale coverage growth occurred just prior to and during the roll-out period of the second mobile operator. There is less evidence, though, that a very high number of operators is conducive to reaching out into remote rural areas, as market fragmentation could reduce the incentive for expansion.Uganda and South Africa as examples of competition and coverageAlthough they have widely differing economies, both Uganda and South Africa show the impact of liberalization, competition and policy leadership in the mobile sector, and both have achieved high population and geographic coverage.South Africa's mobile market has had competition since the mid 1990's. Encouraged by an aggressive government policy that required mobile operators to meet roll-out targets and to provide public access telephones at concessionary prices, the operators were reaching over 80 per cent of the population and 50 per cent of land area before 1999.

Figure Sources: Universal Access – How mobile can bring communications to all, GSMA 2006

Uganda's story illustrates the immediate impact of competition. The second national operator received its licence in 1998. Prior to this, the country had an ineffective incumbent fixed line operator and one mobile operator with only limited coverage. Rapid roll-out of the new entrant led to 50 per cent population coverage within less than two years. The granting of a third mobile licence to the privatized incumbent led to a second stage of rapid expansion from 2003 to 2005. Under this second growth stage, the operators together covered 96 per cent of the population in 2006. Subscriber penetration though is still low, largely due to the cost of handsets and high taxes on telecom services.

4.2.2.2 ACHIEVING AFFORDABILITY AND IMPROVED SERVICE

An increased level of competition generally has the effect of lowering prices which can expand the market through price elasticity of demand. Competition also lowers the access barrier for new subscribers through new and innovative pricing options, as well as shared or public access. Therefore, the consumer stands to gain from the price effects of competition. Operators are generally driven to increase their efficiency and reduce costs by a need to be more competitive in the market and increase the subscriber base. A lowering of prices, which is operationally feasible for the operator helps to close the market gap. An integral part of the service quality package is to offer reliable communications services with greater customer support and to a wider service area. This availability and reliability increases the attractiveness of the service offering which leads to greater use and increased economic viability.Competition generally improves the quality of services, though periods of rapid growth may temporarily lead to lower quality of service provisions. However, similar to the rationale behind a lowering of prices, improvements to service quality is driven by each operator's desire to differentiate itself from competitors, and thus to further its brand. Competition also allows customers to switch their service provider if they are unsatisfied with the quality of service. For example, operators in Nigeria, Mozambique and Malawi experienced a considerable amount of churn from customers when their networks were either too congested or had technical problems due to an upgrade, especially when the problem persisted for some time. In numerous countries, because SIM cards are cheap (often approximately USD 2.00), customers can easily switch to another provider if their existing service is poor quality. Regulation that mandates number portability, a customer's ability to retain their phone number when switching service provider, facilitates both affordability and improved service as it is even easier for customers to switch if another service provider offers better rates or quality of service.

4.2.2.3 MARKET SEGMENTATION AND SERVICING THE POOREST

Competition causes greater segmentation of a communications market. This results in a stronger differentiation of customer groups and a variety of services that are more tailored for each segment. In the developed world, there are services designed specifically for teenagers and students who typically text message extensively, swap photos, frequently talk to specific groups of friends (and receive discounts for calls to those numbers), and call more on weekends. For example, the company Blyk in the UK offers a free number of calls and text messages to 16-24 year olds, which is paid for by advertising. In contrast, developing countries, especially for the third or fourth entrant mobile operator, the service focus often shifts to the rural or lower income segment of a country, leading to products and services suited for minimal spending and aimed at economies of scale.Competition therefore also strikes at the core of the universal access and service (UAS) mandate, which is to reach the population that is currently unconnected and has no electronic communication medium at their disposal. As operators compete for more business, with it higher revenues, they look to consolidate the greatest share of subscribers (or users). While this race to subscribe tends to take place first in urban areas, due to higher income and easier network roll-out, the trend is to continue seeking new consumers where there is still profit to be made and then, where there is a future potential for profit.Consequently, operators that are late entrants into the market may focus efforts on areas or segments of the population who are not yet subscribers to, or regular users of, an existing service provision. New operators, unencumbered by other sunk costs, previous obligations, or outmoded delivery concepts, may have very effective expansion into previously underserved areas, with or without a formal UAS subsidy. For example, Atelit (Life) of Ukraine is three years old and covers 90% of the population, and Mobitel of Sri Lanka who installed 300 base stations within only 18 months of existence.In addition, competition is increasing the variety of services on offer. In order to attract or to hold consumers through service or product differentiation, an operator will tend to offer more products, using various technologies or innovative pricing packages. The desire to provide innovative services and products includes a commitment to using smarter technology that offers greater coverage, brings more applications, provides better quality, uses less power, and requires fewer resources to operate.An example of an innovative technological solution for coverage is the increasing use of WiMAX, a communications technology that provides wireless data over long distances. The OECD notes that “the introduction of competition to markets has a profound effect on penetration rates, even when the competition comes via a different technology. Evolving wireless technologies such as WiMAX may dramatically increase the reach of backbone networks in developing economies, but other wireless technologies have already been implemented and have made a difference in competitive markets around the world” [1]. An example of innovation in services and applications is the trend towards new value-added services such as voice SMS (e.g., Bubbletalk), daily prayers (e.g., The Ilkone), forms of entertainment such as horoscopes and sports scores, and updated commodity prices via SMS, instant messaging over mobile, mobile e-banking (as seen in countries like the Philippines, South Africa and Kenya), VoIP over mobile, m-learning (mobile learning), gaming, and mobile TV.

4.2.3 THE UA MARKET AND HOW OPERATORS ARE ADDRESSING IT

In the past, many countries were concerned that competition and private-sector market participation would leave their urban poor and their rural areas un-served, or at least under-served. The underlying perception was that the urban poor and rural areas could not be profitably served and would therefore be neglected by private operators. Increasingly, policy-makers and industry experts are altering their views of un-served and under-served areas, regarding them less as intractable problems and more as potential markets for investment. Clearly, this has been prompted by the success of mobile operators and their expansion into un-served and under-served markets. Also, there are models demonstrating how to serve the poor profitably; these are discussed in "The Fortune at the Bottom of the Pyramid" by C.K. Prahalad, a professor of corporate strategy and business consultant, who addresses a complex emerging market, the world's poor and the innovative business models that promise to end world poverty.Section 2.3.1 examines the universal access and service (UAS) market in detail by looking at sources of revenue of operators in rural and poor markets, and demonstrating that potential revenue is not limited to the expendable income of the rural poor. Section 2.3.2 provides a practical demonstration that low Average Revenue Per User (ARPU) does not imply a lower profitability for operators.

4.2.3.1 SOURCES OF OPERATOR REVENUES IN RURAL AREAS

Decreased per-subscriber revenue with increasing reach is a general assumption (see figure below); to effectively reach low-income areas and increase penetration to poor users, a lowering of certain user prices – specifically the lowest possible tariff to secure and maintain access, as well as the minimum pre-paid card top-up denomination – is often necessary. However, the operating model need not necessarily be so limiting from the operator’s perspective. Operators’ revenues when serving rural areas are not limited to the apparent outgoing marginal revenue generated by the rural users themselves.

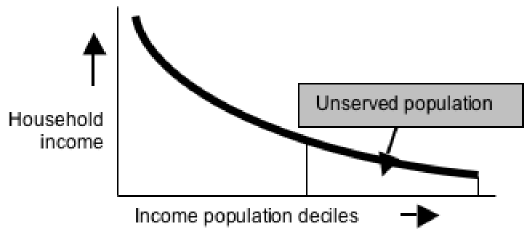


Figure: Decreasing per-subscriber revenue with increasing reach

Source: ITU-infoDev ICT Regulation Toolkit – UA Module

Many demand studies have observed that the vast majority of rural citizens have relatives, friends and business correspondents in urban areas [1]; the urban relatives earn more and are usually willing (or expected) to assume the larger share of the cost of communication. This is often achieved by “beeping” a technique employed by users trying to avoid the costs of calls. To “beep”, a user makes a call, lets it ring briefly, and then hangs up before the call is answered, incurring no charges. Beeping practice is reported to be so widespread in Africa that operators have had to develop explicit “call me” services for a minimal fee to avoid the short call and hang-ups that are swamping networks [2].Another consideration is that not all rural people are at the bottom of the income distribution curve; even in un-served areas, there is a diversity of household incomes which include at least some lower-middle income deciles.Thus, there are at least five sources of marginal revenue from rural expansion. These are the following:

- The rural inhabitants who will spend a certain percentage (typically in the range of 3-5 per cent) of their household incomes on telecommunication services;
- Rural institutions – government, schools, clinics and their staff – these are additional to the expenditures of rural inhabitants and are essentially government expenditures; then there are also national or international NGOs;
- Urban inhabitants travelling into rural areas for business or personal reasons;
- Calls originated by urban relatives and correspondents, either in response to “call-me” SMS messages, “beeping” or

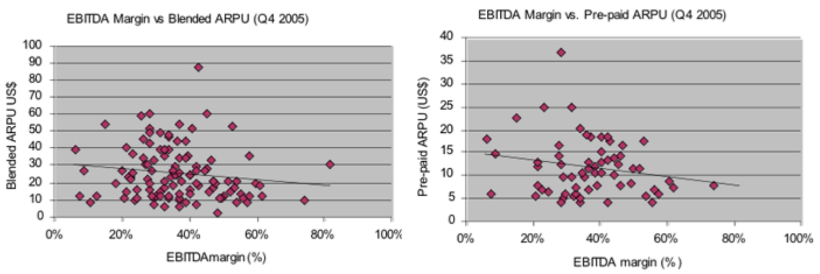
other means of reverse charging used by low income people; and

- Calls originating in the rural areas after the receipt of electronic air-time top-ups for pre-paid phones transmitted from urban to rural relatives, where operators offer such services.

4.2.3.2 LOW ARPUS ARE NOT AN INSURMOUNTABLE BARRIER FOR OPERATORS

Companies operating in a low Average Revenue Per User (ARPU) environment are often as profitable as companies in high ARPU situations. For example, Philippine operators have some of the lowest ARPUs and highest reported Earnings Before Interest, Tax, Depreciation and Amortizations (EBITDAs) in the world, and Indian operators' EBITDAs have increased significantly over the last two years, while ARPUs have reduced. An analysis of 61 operators confirms this as shown below.

Figure: EBITDA margin compared with ARPU



◂ **Figure: EBITDA margin compared with ARPU**

Source: Universal Access – How mobile can bring communications to all, GSMA 2006

Philippine operators have creatively marketed their services with products such as micro-refills (less than USD 1.00), m-banking and related services that are well-suited to securing market share and customer loyalty with low income and rural customers. The Philippine operators, as well as operators in India and many other countries, also have very low tariffs for low-usage customers, allowing their customers to stay connected for less than USD 2.00 per month. The operators have also reduced their own distribution and other internal costs through measures such as "e-Load" (electronic prepaid top-up). A recent benchmarking study of Indian mobile operators has also shown increasing EBITDA levels due to economies of scale and cost-cutting measures over the last three years, as ARPU levels have decreased [1].

4.2.4 REGULATORY MEASURES TO IMPROVE UAS

Section 2.1.1 discusses which specific liberalization and reform measures are recommended before a universal access and service (UAS) programme is implemented and what challenges occur if these regulatory measures are not taken.

Section 1.3.3 demonstrates that a good, enabling regulatory environment leads to an efficient market, which in turn leads to improved UAS, and **Section 2.2** covers in detail how competition promotes UAS. In a broad sense, all key regulatory measures discussed in this ICT Toolkit ultimately improve UAS.Every improvement in the regulatory environment will contribute to reduction in the total cost of ownership of a communications network and to improving service provision or lowering consumer prices. The end result is more viable network expansion. Thus these measures assist the market to expand its frontier and reduce the size of the zone requiring intervention. However, within the broad regulatory topics such as interconnection, licensing, price regulation and spectrum management, there are aspects that demand further attention and options that can accelerate the achievement of UAS.

Section 2.4.1, **Section 2.4.2** and **Section 2.4.3** present options on promoting UAS when awarding main licences, opportunities for UAS when moving to a new licensing regime, and other licence-related incentives.

Section 2.4.4 discusses options for regulating spectrum use that could help rural areas being better served, especially with broadband, while **Section 2.4.5** explains the importance of tariff flexibility for operators, tailoring various tariffs both to customer demand and their corporate requirements to continue network investment.

Section 2.4.6 explores the advantages and disadvantages of geographically asymmetric interconnection rates.

4.2.4.1 DESIGNING LICENCE AWARDS TO PROMOTE UNIVERSAL ACCESS AND SERVICE

Licensing provisions can create a positive investment climate and increase the rate of network development through the application of appropriate, consistently applied regulations and incentives.Operators can, and often do, make major contributions to universal access and service (UAS) under their main licences, either voluntarily, because it makes sense commercially, or through licensing obligations.Although historically, the initial licensing of telecommunications operators has largely been kept separate from the achievement of UAS, there are clear connections between the two exercises of main operator licensing and UAS. The greater the network coverage put in place by main operators, the smaller the need for special UAS initiatives or funding arrangements (discussed in **Section 3.2**) to complete network coverage at a later date.Licensing new operators to provide telecommunications services on a commercial basis is discussed in depth in **Module 3: Authorization of Telecommunications Services** of the ICT Regulation Toolkit. Decisions pertaining to the number of licences, the terms of licences, and the awarding of licences are often matters of national policy. They take into account difficult and conflicting factors, such as the following:

- The number of operators the market is thought to sustain in the medium term;
- Constraints imposed by undertakings to existing licensees; previously promised terms of exclusivity must be respected unless they can be negotiated down or away;
- Political pressures, often exerted especially to support vested interests; and
- The amount of money a licence auction could raise for the government.

Licensing decisions, and the level of interest from potential operators in a licence opportunity, usually rest on assessments of, or assumptions about, the commercial viability and profitability of the opportunity to be licensed. So long as network coverage is clearly beneficial, commercially, to main operators, it is likely to be provided without specific licence obligations. Considering the concept of market gaps (introduced in **Section 1.3.3**), if the regulatory environment is conducive to growth and expansion, main operators close the market efficiency gap without any special incentive or subsidy. However, licensing authorities often specify in invitations to tender, and impose in licence conditions, roll-out timetables for providing coverage in commercially viable areas in order to ensure that it happens as fast as desired.

Reaching beyond the commercially attractive market

To extend main network coverage to the limits of viability or beyond, various approaches may be used, including the following:

- Ambitious roll-out requirements, including some marginally viable areas, may be stated in the initial invitation to tender. So long as the licensing competition allows for extra costs to be reflected in lower bid offers, this approach should still lead to good competition. In practice, commercial roll-out has more often exceeded initial estimates;
- Roll-out requirements may be specified in ways that encourage desired results. For example, instead of saying "200,000 lines or customers must be operational by 2010" (which could be anywhere in the country), the requirement might read, "By 2010, commercial service must be operational in each of the following 50 named districts". This focuses on a presence in chosen areas; and
- Instead of specifying the required coverage and asking bidders to compete on the fee they will pay for a licence (a common practice), the licence fee can be fixed at a moderate level and bidders asked to compete on the amount of coverage that they will commit to provide. This was done in Botswana's initial cellular licensing in 1997 with results that were generally agreed to be successful. More information on the approach adopted is given in the Practice Note Mobile telecommunications licensing in Botswana 1997.

Module 3 of the ICT Regulation Toolkit discusses the merits of different selection methods for licensees, including objective methods (auctions) and subjective methods (beauty contests).Auction design is a complex matter, particularly when the competition has multiple goals, e.g., both raising significant revenues and increasing network coverage. There are no simple prescriptions for designing initial licence competitions that will achieve the best results, however, there is evidence that roll-out targets attached to mobile operator licences, provided they are explicitly stated in the licence competition, are often effective tools of achieving high population coverage. Examples of this can be seen in Morocco, which has coverage that currently reaches 96 per cent of population, and in South Africa, with has 99 per cent population coverage. The Ugandan case demonstrates the efficacy of this strategy, as operators were faced with a serve it or lose exclusivity clause in their licence and chose to serve most of the country [1].The Reference Document Workshop on Licensing of Third-Generation Mobile also considers how different goals, including affordability and UAS, may be balanced. The Practice Note Socio-economic benefits of lower authorization fees in **Module 3** of the ICT Regulation Toolkit, says:By setting licence fees at a reasonable level during the first years of market development, regulators can advance several policy objectives, including:

- The promotion of economic or social goals, such as universal access (UA) - often by requiring a certain extent of network coverage - or service affordability (by regulating retail pricing); and
- The spurring of competition by lowering barriers to market entry, exerting downward pressure on prices and stimulating innovation.

Practice Notes

- **Mobile Telecommunications Licensing in Botswana 1997**
- **Socio-Economic Benefits of Lower Authorization Fees**

Reference Documents

- **Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region**
- **OBA Working Paper Series**
- **WORKSHOP ON LICENSING OF THIRD-GENERATION MOBILE**

4.2.4.2 REVISING THE LICENSING REGIME OR ISSUING NEW LICENCES

With the need to respond to convergence, and moving towards simpler class or general authorizations by issuing technology neutral or even unified licences, regulators have a major opportunity to incorporate universal access and service (UAS) objectives. Any requirements added later are generally accepted in the context of an overall review of the regime or licensing process.It is key that the new licenses balance costs and benefits. In the interests of technology neutrality or simplified authorization regimes, some countries, like Malaysia and Nigeria, have already implemented converged or unified access licences. Tanzania and Kenya are also moving in that direction. Where this happens, a transition mechanism is needed for existing licensees. There is an opportunity here to extend UAS requirements, in return for the greater flexibility offered by the new regime. The new regime can also be a step towards removing old restrictions on UAS licensees.

South Africa has a couple of examples of adding UAS obligations to new licences. ICASA, the industry regulator, granted Neotel, a new entrant operator, licences for providing Public Switched Telecommunications Services (PSTS) and Value Added Network Services (VANS). Neotel is entitled to apply for such radio frequency spectrum as may be required for the provision of its services, and has obtained the spectrum from ICASA necessary for it to provide the various services in its service portfolio, including a 3G licence. As part of its Community Service Obligations (CSO), Neotel has to provide high speed Internet connectivity to 5,000 public schools, Further Education Training Institutions (FETs) and rural medical clinics in South Africa.South Africa's two mobile operators, Vodacom and MTN respectively, made applications for access to the 3G frequency spectrum bands and these licences have been issued subject to the condition that they each provide Internet access to 5,000 public schools and 140 institutions for people with disabilities, including 1,400 terminals to those institutions for people with disabilities.

In Brazil, after the telecommunication sector was deregulated in 1997, the regulator Anatel, established licensing provisions that allowed operators to have the opportunity to obtain additional licensing authorizations that included providing mobile and international long distance services once their Universal Service Obligations (USOs) were reached. For example, by 2004, Brazil Telecom had met its USOs and was able to roll out additional mobile and long-distance call services in southern areas where it previously only had licences for providing local services. In addition, Anatel is pursuing now broadband UAS targets, planning to connect all of its 5,600 municipalities with minimum broadband capacity, as well as creating and connecting 8,500 telecentres and 50,000 urban schools. Anatel used their 3G tender to achieve coverage throughout the country, by matching profitable areas with less attractive ones. For example, Anatel paired Sao Paulo with the poor North-East region, and was willing to accept a lower tender amount (i.e., the government made less money from the auction) in exchange for mobile coverage in all regions. While only 1,836 municipalities currently have mobile services, all municipalities will soon have mobile and 3G services as a result of the 3G tenders.A potential approach to combine unified licences and UAS objectives could be to offer the unified licences at different levels of licence fees depending on whether the operator chooses to accept UAS requirements. This would still allow the operator to choose whether to play or pay , however this approach has not been put into practice so far.

4.2.4.3 OTHER LICENCE INCENTIVES TO PROMOTE UNIVERSAL ACCESS AND SERVICE

Licences as first issued, may not provide optimal support for universal access and service (UAS). This may happen when initial conditions or other factors affecting licensing decisions become inappropriate with the passage of time or because technology advances and cost savings result in changed situations. Either way, the question arises of what is the best scenario for main licensees to work towards universal access UA within their existing licences.Incentives & opportunities through trade-offsIncentives for further network expansion can be provided in the form of reduced contributions to the Universal Access and Service Fund (UASF) or through licence revisions that promote expansion. For example, in its Unified Licensing proposals, the Telecommunications Regulatory Authority of India (TRAI), recommends that a licensee which covers 75 per cent of development blocks in any service area (excluding the four Metro service areas), should be eligible for a reduction in the Universal Service Obligation (USO) fee; such a licensee would pay only 3 per cent instead of 5 per cent. In other jurisdictions, financial penalties have simply been imposed for failure to achieve specified roll-out targets, or the targets have been accepted in return for benefits such as extended exclusivity.Some operators or service providers tend to favour UAS commitments based on incentives that either reduce their contribution to a universal service levy or that can be accepted in exchange for commitments by government to reduce taxes and import duties on end-user equipment or network infrastructure, or to reduce valued added taxes on ICT services. Taxation is a significant hindrance to network and service development in many countries, and taxation on ICT services (e.g., air-time) or phones and computers are more likely to impact lower income users, who are on the margins of affordability, hence such arguments from private industry are very relevant to UAS [1].Non-costly activities or those covered by corporate social responsibilitySome activities by operators support UAS at a marginal cost to them and may be undertaken without explicit financial incentives. For example, installing showpiece multimedia rooms in schools, supporting village phone initiatives (see **Section 3.4.1**) in areas that already have network coverage, and making suitable terminals available for hearing impaired users could all be justified in a corporate social responsibility programme, which benefits the reputation rather than the finances of the operator. During Botswana's consultation on UAS policy it was suggested that operators undertake promotional activities (such as options for serving physically challenged customers) in consultation with the regulator as part of their contribution toward achieving universal service in designated urban and high population areas.Regulators can encourage such activities by publicising their own initiatives and their appreciation of operators' initiatives, by requesting an annual corporate social responsibility report from each operator, or by instituting awards schemes.

4.2.4.4 FREER USE OF SPECTRUM IN RURAL AREAS

Section 2.1.4 provides a general introduction to the issue of spectrum licensing for broadband and universal access and service (UAS). This section continues the discussion related to the use of licence free spectrum allocation in particular for rural areas. For spectrum related topics also see the ICT Regulation Toolkit Module 5: Radio Spectrum Management. The popularity of mobile services and the introduction of new wireless technologies over the past few years have dramatically increased the demand for spectrum. As a result, countries are looking at new ways to manage spectrum use more efficiently. As part of this effort, increased amounts of spectrum are being allocated on a common basis, i.e., to license free use in order to exploit the potential of technologies such as Wi-Fi and WiMAX, to propel the rapid expansion of affordable high-speed access in both rural and urban areas [1].

There are a few cases upon which spectrum costs can be reduced or eliminated for rural network expansion, and in particular for investments sponsored under Universal Access and Service Fund (UASF) competitions, as noted in **Section 2.1.4**. However, not all countries have embraced the idea of allocating spectrum to unlicensed use, for reasons such of revenue loss or potential spectrum congestion. However, these perceived downsides need to be compared with the potential of these technologies to provide more economic and accessible broadband access.

Furthermore, in largely rural areas where congestion is less of a challenge than in urban areas, it is primarily the license fee revenues that are at stake. Potential revenue loss from forgoing licensing fees could be offset by substantial savings (and increased market efficiency) in terms of fewer disbursements of UASF subsidies.Alternatives such as levying small fees attached to the cost of purchasing equipment that are used in unlicensed spectrum, such as Wi-Fi routers, could eliminate the need for a licence to operate in a particular frequency band while still providing revenue to the government [2].In 2004, a study was conducted regarding the regulation and use of 2.4 and 5 GHz bands (frequencies used by Wi-Fi and WiMAX technologies) in Africa, exploring opportunities for a licence exempt wireless policy [3]. The study focussed on the opportunities for Internet development throughout the continent, as well as UAS in rural areas. Interestingly, while Wi-Fi and WiMAX are typically used for urban hotspots and urban broadband, the study found that in over a third of countries polled, technologies using the 2.4 and 5 GHz bands were being used for backhaul network connectivity in rural areas.Key findings of the study were that while some countries did not require licences for those frequency bands, there were increased restrictions on power, range and service use (i.e., data only), and requirements for end-user equipment certification that posed barriers for expansion and innovation.

While there is, of course, a need to guard against interference, and to protect quality of service and consumer rights, the study found that those imposed limits and requirements were usually too restrictive and not up to date with technological improvements and actual problems in the sector, and were rather pre-emptively imposed.The general heterogeneity of regulation of the 2.4 and 5 GHz bands across the African continent is also considered to create confusion and uncertainty among ISPs, investors and technology suppliers and to limit potential for economies of scale. Clearly, regional harmonization and removing unnecessary barriers will increase innovation, expansion and UAS progress.The practice note Ireland's regulation of broadband wireless access in **Section 2.1.4** highlights the approach of ComReg to allow both high emission use of unlicensed bands as well as use of the same for backbone, to reduce the cost of backhaul in rural areas.

4.2.4.5 TARIFF FLEXIBILITY

Many policymakers prefer keeping tariffs low, especially in rural areas, as they know affordability is lower in rural than in urban areas. This follows common practice and policy in many industrialized countries but it is not always transferable to developing countries where operator revenues are smaller and the task to build-out the network to the entire country still lies ahead.To the contrary, this often has the opposite effect of what is desired. If operators are not allowed to charge commercial tariffs in the more costly rural areas, they have little chance of recovering their cost and making a profit. In consequence, they tend to avoid serving rural areas. If they are forced to serve rural areas by obligations, they try to minimize their attention, effort and resources as this is a loss-making operation for them. This results in either very poor services or no service at all.The ultimate objective of universal access and service (UAS) policy is affordable services for all, including rural areas. However, in some countries with very high-cost areas it might be beneficial for an interim period, of three to five years depending on the situation, to allow operators to charge slightly above urban tariffs, as a reflection of their costs. This would motivate providers to build out infrastructure in rural areas. Again, the best evidence that this scenario works, are the many mobile operators in Africa that were free to charge higher tariffs; the combination of tariff freedom (or at least greater tariff flexibility) and competition has allowed mobile operators to grow more rapidly and venture into rural areas.Furthermore, the rural customer often develops innovative cost-minimizing ways of using the network to their advantage once it arrives, e.g., through sharing phones, use of SMS and of call-back or beeping their urban contacts who are willing to pay for the calls.Despite regulators' statuary independences, regulators are sometimes under pressure from politicians and special interest groups to regulate or control prices in competitive markets. Prices for service typically begin higher than many people would like, but this enables operators to achieve their early investment targets and develop the market. Almost without exception, where competition is strong, the need to drive penetration to higher levels (i.e., to ever-lower income users) has led to price reductions with tariff package innovation and low-user options that, as noted previously, are beyond even the expectation of regulators and policy makers. Experience has shown that market efficiency is achieved with a light hand in regulation, with the regulator's main task to ensure a competitive environment where players who are dominant do not abuse their power.Calling Party Pays World experience shows that Calling Party Pays (CPP), combined with tariff innovation at the low end of the affordability curve, enables low-income users to be able to afford service and to use the network creatively and to have access to communications. Many developing countries have changed from Receiving Party Pays (RPP)/ Mobile Party Pays (MPP) to CPP and seen penetration rates rise significantly [1].CPP also has benefits for the operator because, with low-end users' propensity to use SMS and incoming calls as their means of access, they are creating calls in the network that would otherwise not be made at all. CPP also encourages more users to use mobiles for business purposes since they are not burdened with any cost levied on incoming business enquiry calls [2]. This probably explains the relatively slow business user take-up of mobile communications in North America (which does not use CPP) as compared to Europe.

4.2.4.6 GEOGRAPHICALLY ASYMMETRIC INTERCONNECTION

Disputes over interconnection, typically between mobile and incumbent operators or between other players and incumbent operators are perhaps the single most significant regulatory hindrances to rapid enjoyment of the benefits of liberalization. Key principles for interconnection are as follows:

- The terms of interconnection to be based on transparent, public domain procedures;
- Rates and practices to be monitored and enforced by an unbiased and independent regulator;
- Rates to be based on forward looking incremental costs for fixed incumbent operators; and
- There is a special need to account for the costs of network expansion into regional and rural areas during a country's development phase or for very high-cost areas.

Rural users receive more calls than they make, thus the incoming traffic to, for example, a rural wireless base station, may be considerably higher than the outgoing. This becomes a significant part of the business case. However actual per-minute costs for the operator are higher due to lower population density and higher capital and operating expenditures. Some form of geographically de-averaged terminating rate regime may be justified as both a measure to meet the costs of rural network segments, and an economically justified, non-subsidy measure to increase the commercial incentive for operators to invest in rural expansion. Whereas there is broad precedent for asymmetric interconnection rates between fixed and mobile worldwide, and between traditional fixed network urban and rural operators in North America, Chile and Peru, the application of this principle in the mobile industry and on a geographically targeted basis remains limited. As is fully discussed in the Reference Document Telecommunications Challenges in Developing Countries: Asymmetric Interconnection Charges for Rural Areas, the reasons for this are twofold:

- As mobile operators typically still receive higher interconnection rates, there is less need for geographically de-averaged interconnection rates for rural areas; and
- The implementation of a geographically asymmetric interconnection regime adds complexity and entails some challenges.

In order to consider and implement an asymmetric interconnection regime, there should be a strong case outweighing the costs of implementing such a regime. For example, this could be challenging terrain or the requirement of high-cost technology. It might be necessary to create incentives to reach the last and most challenging 3-5 per cent of a country's population, possibly using satellite technology, VSAT or GMPCS. This might be the case in countries with extremely low population densities such as Botswana, Mongolia, parts of the Russian Federation, etc.

Reference Documents

- **Telecommunications Challenges in Developing Countries**

4.2.5 ENABLING REGULATION FOR BROADBAND

Ensuring that broadband services are widely accessible to people, public organizations and businesses wherever they are located is a major challenge for regulators and policy-makers around the world. The relatively high cost of establishing broadband networks has created inequalities between suitably connected urban and developed countries on the one side, rural areas and less developed countries on the other.General good regulatory practice already discussed in this chapter, such as creating favourable frameworks that are incentive based and investment friendly, liberalization, technology neutrality and unified licensing (see **Section 2.1.1**), and providing fair treatment, also apply to broadband regulation, and can help facilitate the deployment of and access to broadband services by a variety of operators and technology innovations.The following issues are of particular relevance to broadband development and regulation:

- Market liberalization and incentives for network deployment, including a discussion on local loop unbundling or access to wholesale products, in **Section 2.5.1**;
- International bandwidth prices, gateway liberalization and national peering and spectrum for innovative wireless broadband provision, in **Section 2.5.2**; and
- Planning for converged services with frameworks for non-traditional business models such as VoIP, including policy measures to stimulate demand, in **Section 2.5.3**;

Promoting national and regional fibre backbone initiatives, open access and infrastructure sharing is also helping broadband development and is discussed in detail in **Section 3.4**.

Reference Documents

- **Building Broadband: Strategies and Policies for the Developing World**
- **Universal Access & Service (UAS) and Broadband Development**

4.2.5.1 MARKET LIBERALIZATION AND INCENTIVES FOR NETWORK DEPLOYMENT

Regulation should facilitate the opening of the market to more operators and types of service provision, including liberalizing restrictions on foreign ownership. For example, with Pakistan's 2004 broadband policy, the government has lifted any restrictions on the number of broadband service providers in the market, and at the same time simplified the licensing process, converting data, ISP and electronic information service (EIS) licences into a single class licence.Regulatory approaches in support of broadband development are generally faced with introducing market liberalization in the context of two main scenarios:

- Pre-existing telecommunications networks; or
- Under-developed telecommunications networks.

Strategies for pre-existing telecommunications networks look at issues of market entry of alternative service providers in an existing market traditionally served by one or more incumbent providers. Developed countries with existing services and providers, promote typically both service-based competition as well as infrastructure-based competition.In developing countries with less developed networks, especially in rural and remote areas, the strategy usually focuses on infrastructure network development through market liberalization and promoting alternative wireless broadband provision.Local loop unbundlingIn some developed economies, broadband has been facilitated by regulating local loop wholesale including full local loop unbundling. This can make sense in developed markets with an extensive and well-developed incumbent fixed network, as it allows new entrant operators access to the end-user without having to invest heavily into network deployment. This encourages service-based competition. However, most developing countries are faced with a fundamentally different situation, where network deployment and growth still needs to be encouraged, and operators still need to recover their investment costs. Unbundled service costs would therefore be higher and a less attractive approach to encouraging service competition. Consequently, for few developing countries would local loop unbundling be the best approach. Instead, regulators in developing countries may need to offer incentives for network deployment, and network-based competition combined with backbone network sharing approaches (where required).Incentives for network deploymentPromoting broadband network deployment in a competitive environment where operators' prime focus and revenue sources is still often in telephony requires a system of incentives to ensure evolution to broadband services. These can include the following:

- Consideration of tax incentives for fibre installation over cheaper methods e.g., microwave for network deployment;
- Determination if market conditions are conducive to establishing duplicate backbone networks or single networks in which competing operators utilize shared bandwidth; if the latter, create open access policies for backbone networks [1];
- Establish licensing allowing for infrastructure sharing and open access to broadband networks; and
- Promote site location of infrastructure network projects (fibre backbone) where they can be accessed by a variety of potential operators and promote open access policies.

An example of incentives that could increase broadband deployment include 3G operators, Telstra and Hutchison in Australia, who share wireless access network facilities to increase network coverage and lower costs for both operators. Another example is the case of the SINGAPORE ONE broadband backbone and cable network that is operated by the government of Singapore as a shared use network with open access and level operating conditions [2].Incremental approach for rural areasIn rural areas where connectivity is a major challenge, incremental deployment plans that introduce broadband through multiple, dispersed projects and programmes can reduce the risk of expensive, nation-wide deployment schemes. While rapid nation-wide deployment is the objective, incremental deployment initiatives can serve as pilot that will provide valuable lessons and information about demand, support requirements, operating costs, etc. for both policymakers and regulators as well as industry and consumers. The Practice Note Two examples of incremental approaches: Tanzania and Macedonia explains this approach further.

Reference Documents

- **Broadband infrastructure investment in stimulus packages: Relevance for developing countries**

4.2.5.2 INTERNATIONAL BANDWIDTH, GATEWAY LIBERALIZATION AND NATIONAL PEERING

Competition in international connectivity (i.e., sub-marine cables) and access to services such as international and Internet gateways, is key to lowering the cost of bandwidth and broadband prices for consumers. Effective interconnection and gateway regulatory frameworks that introduce new models of sharing and collocation, and reduce barriers to existing private, government and international networks is important in encouraging existing and new market entrants to expand into broadband and other services.An example of the process to liberalize the international gateway and secure bandwidth capacity at lower prices is described in the Reference Document *International Sharing: International gateway liberalization – Singapore's experience.* Singapore's Infocomm Development Authority (IDA) required the dominant licence holder to provide a reference interconnection offer (RIO), mandated co-location at the submarine cable landing station, mandated connection services and regulated prices, and co-ordinated the submarine cable landing process, offering a one-stop-shop. In the past, sub-marine cable providers had to approach several different government entities.India's regulator, TRAI, has adopted a similar regulation.With Pakistan's 2004 broadband policy, national and regional peering among local Internet Service Providers (ISPs) is prominent. This is to reduce the reliance on the still costly international IP backhaul. The policy goes even further by promoting the creation of a national Intranet to provide domestic IP services. It is expected that this also spurs the creation of locally hosted content and services.

Reference Documents

- **Broadband Policy December 22, 2004**
- **Gateway Liberalisation**
- **TRAI Consultation on Access to Essential Facilities**
- **TRAI regulation on international telecommunication access to essential facilities at cable landing stations, 2007**
- **Trends in Telecommunication Reform 2006**

4.2.5.3 PLANNING FOR CONVERGED SERVICES AND STIMULATING DEMAND

Regulatory approaches in support of broadband network development should take into consideration the eventuality of a convergence of multiple services (e.g., telephony, data and broadband) over IP networks. Approaches for co-existence of pre-existing services such as telephony and new competing services such as VoIP need to be considered and integrated in regulatory strategies as well as the evolution from non-IP networks to converged networks. High demand for new services such as VoIP and cost effectiveness of utilizing multiple network topologies and spectrum bands in service delivery of existing services (e.g., international calls), will be drivers for increasing demand for and deployment of broadband networks. Effective regulatory mechanisms need to be put in place to manage issues such as interconnection, use of spectrum and co-existence of traditional and new services.

Flexible allocation and technical uses of broadband spectrum

Effective spectrum management for BWA allows for a variety of technologies to be used to provide broadband and related services. Measures to consider in facilitation of favourable spectrum allocation include:

- Considering allocating certain spectrum freely on a licence-exempt basis. This will encourage broadband demand and network deployment as has been employed in many countries in WLAN applications using Wi-Fi; and
- Including measures in spectrum licensing that allow for technical flexibility in experimenting and extending spectrum capabilities.

Harmonized policies and approaches for VoIP and industry

The popularity of inexpensive VoIP services is creating demand for broadband network deployment and shared use of these networks. However, inconsistent regulation of VoIP services around the world have created conditions which in some cases undermine and in other cases favour providers of existing services. This has led to outright banning of VoIP services in numerous countries. Regulatory frameworks are needed that address key concerns of stakeholders through enhancing viability and fairness for co-existing industries.The following measures could be considered in regulatory approaches:

- Regulatory frameworks used for telephone services are not well suited for application to VoIP providers and need to be adapted to the specific situation;
- New charge rate structures need to be identified as rates based on call termination and origin points become less relevant in VoIP;
- Complementary frameworks for interconnection agreements between circuit and IP based networks are required;
- Development of strategies that promote incremental change and adaptation;
- Identification and classification of VoIP services; and
- Development of transitioning approaches to full IP-based world.

Increasing public awareness and stimulating demand

Given the high costs of deployment of broadband networks, especially in rural and remote areas, the government needs to assist development by increasing public awareness and stimulating demand. For example, regulatory agencies could work in partnership with other ministries in promoting the development and extension of e-government services, which in turn stimulate demand for broadband services. E-government services can improve citizen's opportunities and communications services for citizens, especially those in poor, marginalized segments of society who lack any other access to critical information, services, and opportunities. Approaches to promote broadband development include:

- Supporting local, relevant, Internet content in local language;
- Lowering the cost of end-user terminals through import duty and other tax reductions and possibly subsidizing broadband equipment in schools;
- Educating citizens about the benefits of broadband while further developing Internet skills;
- Providing a legal framework for e-commerce and other applications; and
- Ensuring that consumers have enough information on providers and pricing options as well as available technology.

The Practice Note Malaysia's broadband plan – stimulating the private sector gives details on how to include the promotion of broadband development in a national strategy, especially in under-served areas.Finally, regulators need to ensure that consumers and the public interest are represented in the policy development process. Consumers need to have input into the process so that broadband strategies are in tune with public demand for broadband services.

Practice Notes

- Malaysia's broadband plan – stimulating the private sector

Reference Documents

- Trends in Telecommunication Reform 2006

4.3 OVERVIEW OF APPROACHES TO UNIVERSAL ACCESS AND SERVICE

Chapter 3 summarizes the main approaches that policy makers and regulators use towards achieving universal access and service (UAS) targets.

In Section 3.1, the historical context of universal service (US) policy is outlined with a review of traditional, non-competitive (administrative) approaches that have been used primarily in developed countries over the past few decades. Traditional, non-competitive methods are not relevant to developing countries and are discussed to provide context only.

Section 3.2 introduces the form of dedicated initiative gaining ground in liberalized markets - competition for subsidies from Universal Access and Service Funds (UASFs).

Section 3.3 considers the importance of non-government and community-based initiatives in the development of sound UAS policy, including village phone programmes, community networks and public Internet access strategies.

Section 3.4 describes the importance of an open access policy to key infrastructure such as backbone and international gateways, as well as options and models for shared network infrastructure.

Section 3.5 describes some other approaches and initiatives towards promoting UAS, including the experience of co-operatives and rural or regional licences for telecom provision in rural areas. This section also discusses scenarios for which these models might be best suited, including for broadband development. It also gives an overview of local or community radio in various countries and lessons learned.

Reference Documents

- Broadband infrastructure investment in stimulus packages: Relevance for developing countries
- Universal Access & Service (UAS) and Broadband Development

4.3.1 TRADITIONAL INCUMBENT OBLIGATIONS

This section describes the recent history of universal service (US) and universal service obligations (USOs), drawing primarily on experience in developed countries. While not generally applicable to developing countries, the background of US and USO is important for understanding recent approaches and policies, as covered in subsequent sections. The concept of US existed pre-liberalization and its characteristics and changes are discussed in Section 3.1.1.

In relatively mature network environments, once targets have been chosen, (e.g., defined penetration targets for underserved areas, or the provision of public payphones in certain locations), and it has been determined that market forces alone cannot assure the achievement of the target, the regulator will likely make industry fulfil these targets. Methods of designating a US provider after market opening are discussed in Section 3.1.2.

Section 3.1.3 presents methods of allocating US funding.

Section 3.1.4 covers a method of raising funds for US through access deficit charges.

4.3.1.1 UNIVERSAL SERVICE AT THE TIME OF MONOPOLY

Monopoly thinking is largely irrelevant for today's developing countries. A multitude of providers and investors provide great opportunities for latest technologies and network growth, but the consequences of history live on in the current situation of some developed countries, in the literature, and in some people's mindsets. In countries where liberalization is delayed because of political or legal obstacles, continuing to use traditional incumbent obligations should be considered only as temporary and interim measures, if at all.Before liberalization, there was usually a single network operator in an area (or country); this operator had to fulfil whatever social obligations were required, particularly when these organizations were government departments. Universal service obligations (USOs) were often not explicit but were seen as part of the organization's general public service mandate. Specific recognition of any losses was rare and unlikely to be objectively supportable because there would be no suitable accounting information. When any losses were recognised, they were expected to be met by internal cross-subsidies. No unfairness was perceived because social obligations were in society's interest and the organization's customers, who ultimately bore the cost, represented most of society.When liberalization was being considered, many incumbent operators initially used their social roles to help secure preferred arrangements for the new regime. When a fight against liberalization was lost, incumbents often argued in favour of access deficit charges or shared funding of USOs. This was often more to burden their new competitors than to gain significant, direct benefits for themselves [1]. Generally, the obligations were preserved and made explicit for the first time. There was little debate about the content of the obligations, and none about who should bear them: the incumbent was the only candidate. The obligations were often just a statement of existing practice. One such statement is found in the Practice Note *The residential service obligations of the incumbent in New Zealand in 1993* . In a liberalizing market, imposing USOs on the incumbent operator alone is contrary to the objective of creating a level-playing field. However, some developed countries have used administrative USO designation, as discussed in Section 3.1.2, but the trend is now to more competitive procedures. USOs are often used by the incumbent operator as a reason to delay re-balancing tariffs, agree to fair interconnect agreements and provide access to its national backbone and international gateway at cost-based market prices. A liberalizing market moves away from forced obligations towards a regime where the cost of universal access and service (UAS) provision is shared proportionally among all industry participants and all players have an opportunity to participate in the provision of UAS, typically through a competitive mechanism.

Practice Notes

- **The residential service obligations of the incumbent in New Zealand in 1990**

4.3.1.2 ADMINISTRATIVE USO DESIGNATION AFTER MARKET OPENING

Shortly after market opening, developed countries often introduced administrative, non-competitive procedures for designating a company to fulfil a universal service obligation (USO). These procedures are used where there is only one candidate capable of fulfilling the USO, despite the sector being open to competition, because new entrants are still far from national service provision. Typically, only an incumbent was considered capable, as it often was already providing near-total fixed-line coverage. Recognising this likelihood, the EU requires USO designation procedures to be “efficient, objective, transparent and non-discriminatory…” but not necessarily competitive. Where an open tender is not used, the EU prefers the designation to be:

- Open, in the sense that both the specification of the obligation to be fulfilled and the proposal of the designated provider are publicly available;
- Subject to public consultation;
- Broken down into components (geographic or functional), so that more than one company can be designated; and
- Of moderate duration.

Some EU countries have opted to make the operator with significant market power (SMP) in the retail access market, the universal service (US) provider. With more mature liberalized market, the EU is moving toward more competitive designation procedures, led by new member states. Estonia broke new ground in 2006, by being the first member state to designate through an open tender procedure, an alternative operator as its US provider. This is the Finnish company Elisa, rather than the incumbent.Administrative procedures may sometimes be appropriate in developing countries when the overhead of organizing competitive procurement is not justified. This could be the case if:

- The amount of work to be done is small, and one candidate is obviously well-placed to do it (e.g., a cellular company serving one or a few villages in a coverage hole);
- Local participation is a major element, and there is only one credible local participant (e.g., a local organization running a telecentre); and
- There are few potential suppliers and genuine competition among them is unlikely (e.g., if the opportunity is open only to a duopoly of existing licensed operators).

Administrative procedures may also be preferred if the country lacks the capacity to organize and run a fair, open competition. *Guidelines for administrative procedures* Guidelines for administrative procedures should be based on the principles of *transparency* , *objectivity* and eventual *contestability* . The procedures must include the following:

- Specification of the task to be fulfilled, with concrete and realistic goals, including the time in which it must be fulfilled;
- A proposal by the organization that is to fulfil it;
- A review and verification that the proposal is of the required standard; and
- A contract between the regulator (or other awarding agency) and the fulfilling organization, that clearly states what

is to be done and which provides recourse in case of inadequate performance. A contract would also spell out any financial arrangements and limits of compensation for the operator, if any.

Contestable USOs Between 2001 and 2004, Australia had an experimental period of contestable universal service obligations (USOs): though Telstra retained the obligations, other companies could offer or compete to undertake them and receive the subsidies in specific areas, in place of Telstra. No other companies actually came forward with offers, but the experiment was seen as a valuable demonstration that USO subsidies received by Telstra were fair. A summary of the experience and lessons learned is provided in the Practice Note *Australia and contestable USO provision*.

Practice Notes

- **Australia and contestable USO provision**

4.3.1.3 ADMINISTRATIVE ALLOCATION OF UNIVERSAL SERVICE FUNDING

As soon as funding is available for providing universal service (US), it becomes more interesting to providers. With funded US provision, it is possible to award service contracts and funding by competitive tender as discussed in **Section 3.2** and in more detail in **Chapter 7**. But where networks are already well developed and the obligation is primarily to maintain existing facilities rather than to install new ones, the incumbent will often be much better placed to fulfil the obligation than any new entrant could possibly be. In these circumstances, administrative procedures for allocating universal funding have been developed. Administrative procedures exist, for example, in the USA, Canada, Australia, and France.

Estimating the costs of universal service provision

All procedures for administrative (versus competitive) payment of compensation to operators, which receive or accept universal service obligations (USOs), are based on calculations of the costs that the company incurs in fulfilling USOs. Usually, these are net avoidable costs. An EU study [**1**] provides a full explanation of the relevant economic theory and its application, in which:

- "Net" means that the benefits that the company receives from fulfilling the obligation are subtracted from the costs. These benefits include revenues directly attributed to the obligation, such as revenues paid by customers who are connected because of it. Sometimes they also include indirectly attributed revenues, such as those for inbound calls to the subsidised areas. Sometimes they also include intangible or intrinsic benefits, such as those listed in the Practice Note *Potential advantages in being a USO provider*. These are difficult to estimate but may be significant; and
- "Avoidable" means that costs will only be taken into account if they would not be incurred without the obligation. For example, if a remote customer is served from an existing exchange, the incremental cost of connecting him to the exchange is an avoidable cost, but the cost of the exchange itself is not avoidable.

Calculating relevant costs and benefits for USO funding purposes is a major undertaking. Cost calculations in telecommunications are never clear-cut, they involve elements of judgement and attributions that are to some extent arbitrary and estimated. Because large inter-industry transfers may be involved, it is important to get these calculations as accurate as possible. The choice of the costing methodology to be used is important and ultimately must be practical and acceptable to all parties. All the countries mentioned in this section have elaborate cost models for USO costing, which require specialised expertise to run them. These models also rely on the industry to provide well-founded data input. In turn, these data often require highly-developed accounting systems, which the companies would not put in place for purely commercial reasons. See endnotes [**2**] from France and [**3**] from Korea.

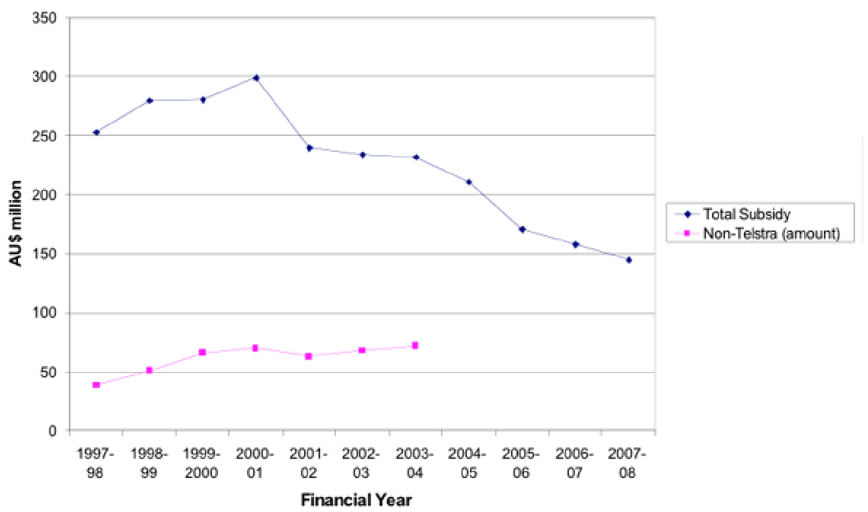
Reasons for current low use of administrative USO funding

The difficulty of estimating costs acceptably is one reason why few regulators in Europe have implemented this system, even though the Universal Service Directive allows them to do so if they judge that the cost has become an unfair burden on the designated provider. Some regulators have estimated that the intangible benefits of USO provision (such as brand recognition, call revenue to low USO clients, positive publicity and marketing), though of uncertain size, are great enough to outweigh the tangible net costs. In any case, under this regime, typically USO providers are incumbents with high market shares of the fixed line market (often well above 80 per cent). Since contributions to shared US funding are proportional to market share, the additional financial support that the US provider would receive would likely be a small proportion of the calculated net loss. This may well be less than the overhead cost of running a shared fund, leaving aside the cost of calculating the amount of compensation that is due. Recently, where mobile operators have secured a much larger share of the total market and reached almost total ubiquity, the question of US is now subject to redefinition. Internet and broadband development also requires the redefinition of US and how to achieve it, requiring likely a competitive allocation. For this and other reasons, the old order of estimating the cost and allocating responsibility for USOs to operators, remains an unfeasible or uninteresting proposition in the most advanced European countries.

The United States is currently reviewing its US funding system for high-cost areas. Over the past decade, total high-cost funding has tripled to USD 4 billion per year, and an emergency cap is now likely to be applied to limit further growth. As part of the review, the Federal-State Joint Board is considering introducing auctions, based on the experience of developing countries, but modified to suit the United States' conditions. This will determine the amount of funding that would be available. Many commentators believe that auctions are better than administrative approaches for this purpose [4].

Australia carried out a review in 2004, which led to a decision to base future US funding on estimates rather than on detailed modelling. The estimates are derived by applying cost element trends, generally an annual reduction of between 5 per cent and 10 per cent, to previously modelled cost totals. The figure below shows how the total subsidies are now being lowered. It also shows the growth in the proportion of the US subsidies coming from outside the main USO provider (Telstra); when last measured, this proportion had risen to 30 per cent. For more detail, see the reference document for the Australian case below.

Figure: Universal service subsidies in Australia



◂ **Figure: Universal service subsidies in Australia**

Source: Data from ACMA **www.acma.gov.au/WEB/STANDARD/pc=PC_2483** and DCITA

Practice Notes

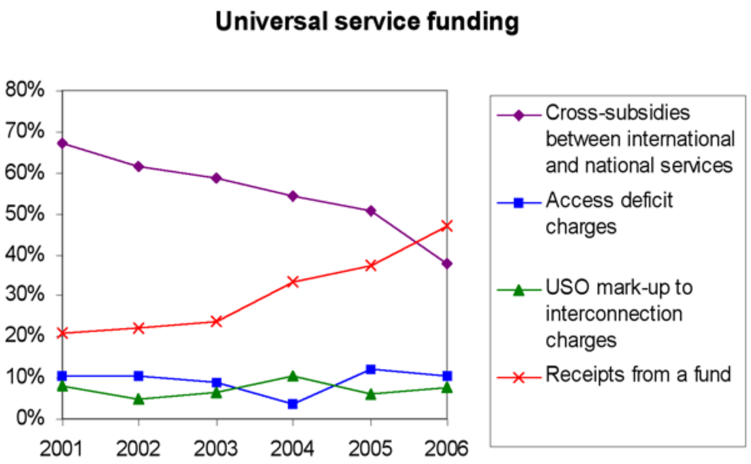
- **Potential advantages of being a USO provider**

Reference Documents

- **Review of the operation of the Universal Service Obligation and Customer Service Guarantee**

4.3.1.4 ACCESS DEFICIT CHARGES

Another traditional approach to universal service (US) funding has been access deficit charges. The term access deficit, is defined as the loss made by a telephone company on providing access lines if this is regarded as a stand-alone business. It is the difference between the fully allocated costs of providing access lines and the revenues attributed to providing access lines. Typically, this is calculated as regular line rentals plus installation charges.The figure shows the small proportion of countries that still use this funding method in the last six years.



◂ **Figure: Prevalence of different approaches to universal service funding**

*Source: Data from ITU World Telecommunications Regulatory Database*Note: Number of surveyed countries vary from year to year.

The need for tariff rebalancing to reduce access deficits

In the past, fixed line monopolies commonly set line rentals well below any reasonable estimate of the relevant costs. They recovered costs primarily through international call charges, which were commonly set well above cost. This charge structure was popular, especially during the mass market phase of network growth, when many middle-income people were subscribing to the phone for the first time. Higher regular charges would have deterred many of these people from signing up, but as new phone users, they were not yet used to making a lot of calls and could live with high call charges. New competitors usually targeted the high-margin markets of business customers as well as long distance and international calls first; this meant that the incumbent risked large losses unless it rebalanced its tariffs to be more in line with underlying costs. It was therefore necessary to raise line rentals to remove the access deficit while lowering call charges so as to compete with new entrants. Tariff rebalancing of this kind has taken place in most countries at varying speeds. It naturally favours users who make more calls and may lead to higher costs for people who make fewer calls. Slow rebalancing may be seen as necessary for political reasons, where a large number of voters risk ending up with higher bills. An approach favoured in some countries, has been to rebalance faster, while protecting specific small groups of low users with special low rentals.During rebalancing periods and while access deficits remain, some incumbents have successfully argued that new competitors should contribute towards funding the deficit. The resulting access deficit charges (ADCs) have usually been added to interconnection charges for call origination or termination on the incumbent's network, in recognition of the benefits that the competitors receive from that network.ADCs are now generally regarded as a poor idea because of the wrong incentives that they create [1]. They are being phased out in most countries where they were previously adopted. For example, in India, TRAI, the regulator, after a consultation, announced in 2007 a cut in the total revenue raised by ADCs from USD 800 million to USD 500 million, and stressed that the ADC regime has always been intended to have a limited life (from 2003 to 2008).

4.3.2 COMPETING FOR SUBSIDIES FROM UNIVERSAL ACCESS AND SERVICE FUNDS

This chapter presents a summary of key aspects of the competitive mechanism used to distribute subsidies from Universal Access and Service Funds (UASF). UASFs may go under different names of Universal Access Fund, Universal Service Fund or some other designation. Some examples of UASFs are:

- Peru's FITEL (Telecommunications Investment Fund);
- Uganda's RCDF (Rural Communications Development Fund);
- Mongolia's and India's USOF (Universal Service Obligation Fund); and
- Nigeria's USPF (Universal Service Provision Fund).

Almost all such funds have been created in emerging markets and developing countries, in the context of liberalized markets, to provide financial assistance for the following:

- Meeting regional and rural service targets for telephony and Internet services;
- Supporting key users, such as schools and health clinics to access the Internet in regional and rural areas;
- Supporting ICT projects by commercial and development organizations that provide national and local content, services and applications that stimulate Internet take-up and usage; and
- Supporting various activities related to regionally balanced network and service development, such as Internet

Exchange Points and regional Internet points of presence (POPs).

Section 3.2.1 describes the first generation of competitive UASFs that emerged in Latin America and which initially focussed on fixed-line service provision. **Section 3.2.2** presents the next generation of UASFs that take into account the wireless revolution and needs for Internet and backbone development. All UASFs use a reverse auction or minimum-subsidy auction (lowest subsidy demanded wins) mechanism. This mechanism, also known as Output-Based Aid (OBA), is defined as a strategy for using explicit performance-based subsidies to support service delivery in cases where the market is not expected to reach, but where policy concerns justify public funding or redistribution. OBA subsidies are provided to support the provision of services, for example, in rural areas where the cost of service provision combined with limited revenue potential might render service provision commercially unviable. A key requirement for OBA is that a one-time smart subsidy results in service provision that is ultimately self-sustaining and commercially viable. **Section 3.2.4** discusses UASFs' performance to date. OBA is now often the preferred method used to distribute one-time subsidies to network service providers in order to meet roll-out targets for voice and Internet services in certain designated remote areas and communities. The methodology is described in detail in **Chapter 6**, and **Section 3.2.3** discusses the advantages of the competitive UASF approach.

4.3.2.1 FIRST GENERATIONS OF COMPETITIVE UASFS – FIXED LINE SERVICES

The first generation of emerging market UASFs to distribute subsidies based on the principle of competitive tendering, were established in Latin America in the 1990's. The finance was made available under a reverse auction or minimum-subsidy auction (lowest subsidy demanded wins). These competitions were held in 1995, soon after the establishment (in 1994) of Chile's Fondo de Desarrollo de las Telecomunicaciones.
The Chilean case, and ones that followed soon afterwards, were unique in the sense that they were also used as a one-stop mechanism to enable potential new entrants to compete with the incumbent operator for universal access (UA) licenses in areas that were historically, poorly serviced but for which a subsidy was offered. The services provided were primarily fixed network payphones, using wireless access or satellite (VSAT) technologies, and were located in places that were at the time, far from areas expected to be serviced by mobile operators. The Practice Notes ***Chile: Fondo de Desarrollo de las Telecomunicaciones*** and ***Peru: Experience of the FITEL programme*** give insight into the details and lessons learned in the early stages of UASFs.

Five Latin American countries quickly licensed rural operators through such funds. The following table summarizes the funding activities of the first three funds. Several other funds were established (though not all became operational), e.g., Brazil, Argentina, Dominican Republic, Ecuador, Guatemala, Nicaragua and Venezuela, and can be seen in a Regulatel report on UASF funds [**1**].

Country	Name of Fund / Program Focus	Period	Localities Served	Maximum Subsidy Available (mUSD)	Subsidy Granted (mUSD)	Subsidy per Locality (USD)
Chile	Fondo de Desarrollo de las Telecomunicaciones (Government Budget)	1995-97	4,504	24.2	10.2	2,256
	Telephony	1998-99	1,412	14.4	9.8	6,919
	Telephony	2000	143	1.9	1.8	12,727
	Telecentres	2002	293	n/a	5.0	17,065
	Internet in rural schools	2004	667	n/a	6.5	12,727
	Fiber backbone	2007	n/a	n/a	2.7	n/a
Peru	Fondo de Inversión en Telecomunicaciones (FITEL) (1% Operator levy)	1998-2000	213	5.1	5.1	23,937
	Telephony	1999-2003	2,170	50.0	12.1	5,575
	Telephony	2000-2003	2,520	59.5	30.7	12,163
	Telephony	2001-2004	1,614	12.9	11.4	7,061
	Internet access	2006	68	1.43 (Pilot)	1.43	21,029
	Broadband	2007	1,050	9.0		
	Internet access, public telephony, residential telephony	2007	3,010 (Total)	18.6	15.1	5,104
			2,840 (Internet)			
			1,535 (Telephony)			
Colombia	Fondo de Comunicaciones (Compartel) (Operator levy & Government contribution)	1999	6,745	70.6	36.0	5,361
	Telephony	2002	3,000	47.0	15.0	5,033
	Internet	1999	670		7.0	9,781
	Community Access Centres					
	Internet	2000	270		8.0	30,242
	Community Access Centres					
	Broadband and Public Institutions	2004-2005	3,000 schools		102.7	27,213
			624 city offices			
			120 hospitals			

◀ **Table Summary of First Generation Latin American UASF Funds**

Source: *ITU-infoDev ICT Regulation Toolkit – UA Module*

As the above table shows, two of the early funds received finance directly from government contributions, while two used a levy on operators (one fund used both government contribution and operator levy). Other early funds, such as Guatemala's, also secured finance from radio spectrum auction fees as well as operator levies. On average, the amounts of subsidy actually bid and granted for the telephony competitions in the first years, were less than half of the maximum subsidy offered by the funds. This was a benefit that resulted from the competitive mechanism used and the fact that competitions offered a chance for new entrants to secure their first operating licence and radio frequency allocations. However, there was a wide range of experiences, from zero subsidies in some of the early Chilean competitions up to almost 100 per cent of the offered amount in later rounds. While Internet access can undoubtedly be beneficial for communities, it should also be noted that later Internet access competitions resulted in much higher subsidy investments per community, and although data on offered subsidy amounts is not available, the reduction resulting from the tendering process is believed to be much less. This is also the case in all other subsequent UASF competitions elsewhere primarily due to the lower level of financial sustainability that can be achieved on Internet services. The numbers of initial Internet service users are typically lower than for telephony; a smaller proportion of the market can afford to own personal computers, take-up is slower and Internet services for the poorer parts of the country are generally considered to be a higher investment risk. More work is required in each country to develop sustainable models for public Internet access that entice people to use their services.

Practice Notes

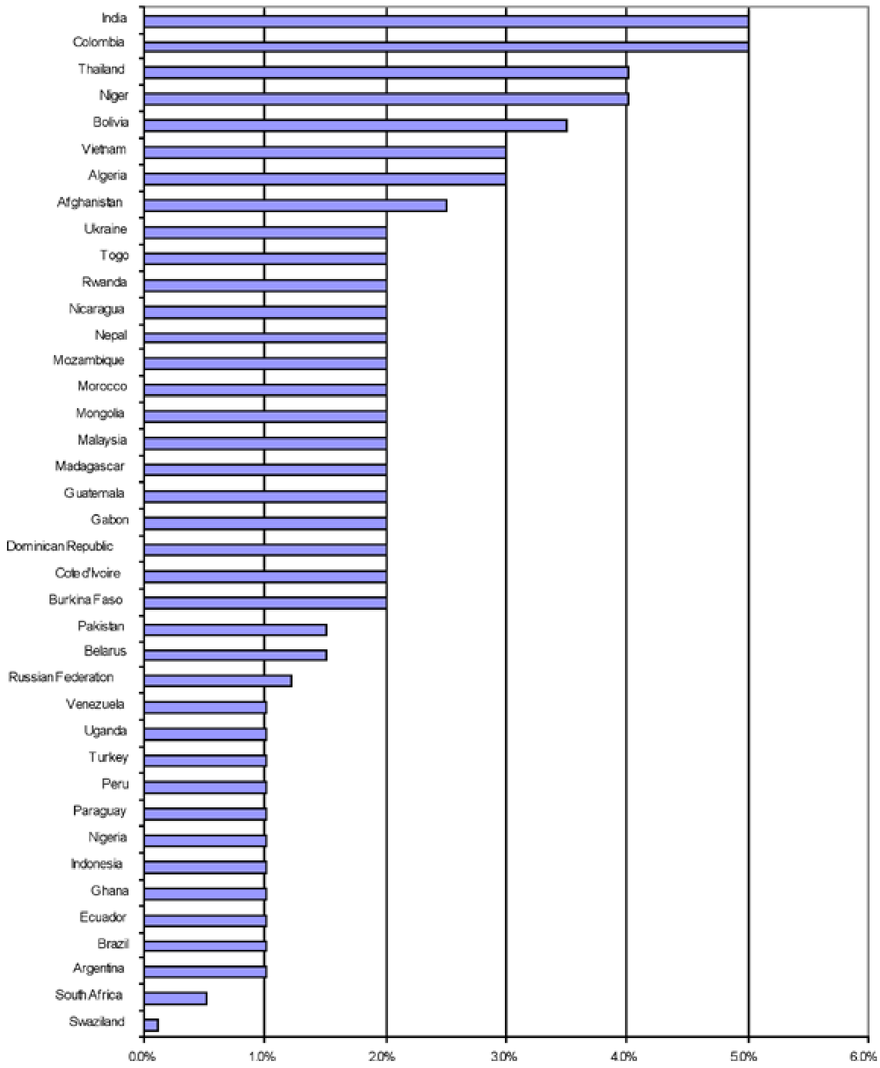
- **Chile: Fondo de Desarrollo de las Telecomunicaciones**
- **Peru: Experience of the FITEL payphone programme**

4.3.2.2 SECOND GENERATION OF UASFS IN EXISTENCE TODAY

Following the Latin American experience, a second wave of Universal Access and Service Funds (UASFs) occurred in Asia and Africa. Nepal (1998) and Uganda (2000) pioneered the concept, and several others, including Mongolia, Pakistan, Botswana, Burkina Faso, Malawi, Nigeria and Mozambique, are following in their footsteps. This is often with technical assistance from the World Bank or other international donors. The UASF concept has spread to approximately 46 countries by end of 2007 [1].Many of the latest UASF initiatives listed above are following Uganda's lead by holding technology neutral competitions, which are increasingly being won by mobile operators with existing licenses. These UASFs, as well as the early Latin American funds, are also applying their resources to the financing of Internet Points of Presence (POPs) in rural districts, telecentres and cyber cafés, school connectivity, and other ICT initiatives. Research indicates that at least 39 countries have already set operator levies as the main means of accumulating resources to their fund. These levies range from less than 1 per cent of operator revenues in South Africa, to 5 per cent in India and Colombia, and 6 per cent on certain revenues in Malaysia [2]. See figure below, Existing UASF Operator Levies. A few funds, notably those in India, Malaysia and the Russian Federation are still distributing the largest share of their resources to fixed line operators and some, notably India and Malaysia, initially used their funds as sources for distribution of access deficit awards to incumbent operators. However, as noted in **Section 3.1.4**, this practice is now disappearing. The Indian and Malaysian funds appear to be moving their focus onto mobile expansion, while all funds, including the Russian Federation's, fund Internet POPs and ICT development as well.The Practice Note Uganda's Rural Communications Development Fund showcases this country's best practice approach.

◀Figure: Existing or Planned UASF Levies

Source: ITU-infoDev ICT Regulation Toolkit – UA Module



Practice Notes

- Uganda's Rural Communications Development Fund

4.3.2.3 ADVANTAGES OF UASFS AS COMPARED TO OTHER APPROACHES

A Universal Access and Service Fund (UASF) that adheres to best practice can provide a transparent means of allocating subsidies for the achievement of service targets in unviable areas.Fuelled by a few unfortunate and poor cases, there are some understandable concerns amongst operators over the principle of UASFs. Some operators express a preference for alternatives such as accepting reasonable rural build-out targets in their licence or negotiating specific rural universal access and service (UAS) targets in exchange for relief from UASF levies or taxes, a "pay or play" regime. However, there are certain potential advantages of UASFs if they are well-run, as described in **Chapter 5**.

These advantages include the following:

- **Transparency and Fairness**
  As stated previously, a UASF that adheres to best practice provides a transparent means of allocating subsidies for the achievement of service targets in unviable areas. The alternative of mandating targets in exchange for relief from UASF levies or taxes, runs the risk that it would be difficult to allocate fair targets for different operators in a competitive market. Furthermore, there is unlikely to be equity between fixed and mobile operators, both of whom should be contributing to UAS, unless subsidies are allocated competitively and in a technology neutral manner. The allocation of targets to operators also requires equal prior agreement and collaboration with government by all operators in order to be effective. Ease and cost of management and emphasis on least-cost solution A best-practice

UASF requires reasonable government targets based on national socio-economic goals and sound knowledge of the demands of the market and of general industry costs and trends. The targets and the maximum allowable subsidies are set independently, using published principles. Even if some operators have different technological or operating approaches from one another, the principle applied is one of technology neutrality, that is, efficiency and least-cost solution to the achievement of the targets. The alternative process for negotiating fair and equal contributions through a "pay or play" regime in a competitive environment is unlikely to be as simple. The valuation of the contribution of each operator towards UAS would require the regulator seek confidential financial information (revenue, capital and operating expenditure) from each operator, which would not be welcomed. This would be akin to the administratively heavy approach taken in traditional price regulation, or by some very high-cost and patently inefficient previous generation UASFs.

- **UASFs provide "pay or play" in practice**
  With a UASF least subsidy tender, no operator is forced to participate in the competition. On the output side, it is entirely voluntary, thus operators who are not interested in serving rural areas or providing public access are free to opt out, though they do have to contribute to the fund. The UASF can be a way of requiring that the industry at large finance the achievement of UAS, while only operators interested in expanding to rural areas will tender for the subsidies. The successful operators will, in fact, have a portion of the funds they contributed and maybe more, returned to them.UASFs can bring finance into the sector & reduce the cost to operatorsUniversal Access and Service Funds (UASFs) present a mechanism for government, or donors such as the World Bank, to contribute financially to universal access and service (UAS) in a liberalized market, without getting directly involved in less-efficient forms of project ownership or management, as in the monopoly era. This has resulted in a considerable amount of seed finance being contributed before the build-up of equity through operator contributions in some smaller markets.

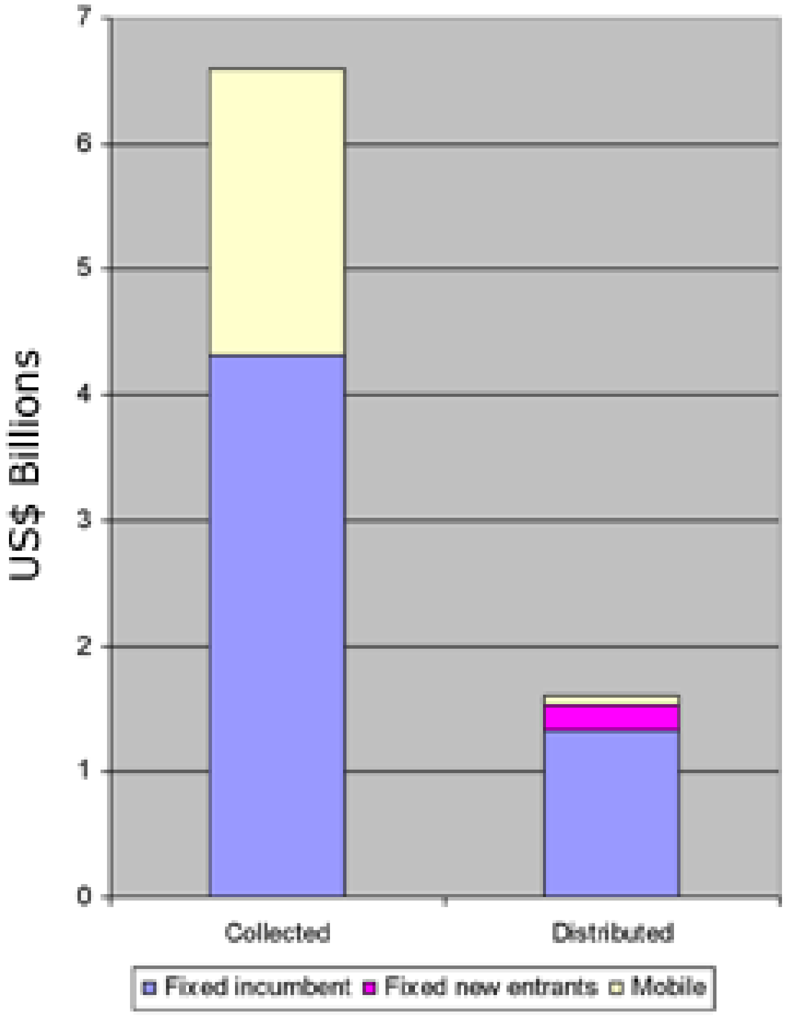
  Examples of some USAF mechanisms are as follows:

  - In the first of such UASFs (Chile), the government contributed the whole amount and no levy was made on operators;
  - In Uganda, a World Bank contribution of over USD 7 million resulted in a much more rapid roll-out of the Rural Communications Development Fund (RCDF) programme than would otherwise have been possible. As a result, the leading GSM operator received subsidies amounting to more than its contribution to date. By 2007/2008, a similar contribution in Mongolia will result in similar benefits to the country, to operators and, of course, to the rural communities served;
  - and In Botswana, the regulator pledged part of its own finance collected from regulatory fees to a future UASF and the government is considering providing the finance for the first competitive UAS project.
- **The public interest is explicitly served**
  The process of good governance typically requires an explicit determination of objectives and targets, a process of consultation, buy-in by all stakeholders, and satisfaction by consumer representatives that various power bases are balanced for the public good. This has been achieved reasonably well in the case of the best-practice UASFs currently in operation that held public tenders. It would be difficult to achieve the same level of confidence through a trade-off negotiation with operators, unless the UASF administration could clearly demonstrate the basis of the balance of interests and fairness achieved, with a high degree of transparency. This would, as previously stated, run the risk of incurring a heavier and more intrusive administrative bureaucracy.The concept of virtual funds exists since several years, however no country has implemented a virtual UAS fund. The advantage seen in virtual funds is mainly that the actual money of operator levies does not need to move into - and then later out of - a fund to the recipient, eliminating the need for actual fund management. A virtual fund would simply be an accounting system that records each operators' annual UAS levy. Against the levy, operators could set the costs of special UAS projects. But this still requires some independent cost accounting to ensure operators allocate their costs fairly and comparably. If a virtual fund is used with a competitive bidding mechanism, it could be challenging as the likely scenario could arise that one operator who lost in a competitive bid has to pay part of their UAS operator levy to the winning bidder.

4.3.2.4 PERFORMANCE OF FUNDS TO DATE

Best practice and a review of the performance of the largest Universal Access and Service Funds (UASFs) would indicate that the amount of levy should be calculated to meet only realistic and achievable targets and to be within the capacity of the fund's administrative apparatus to manage and monitor the distributions. A total of 15 funds in developing markets that are operational, had collected a total of approximately USD 6.2 billion from operators, beginning in the late 1990's (but mostly since 2001 and 2002) [1]. 78 per cent of the total collections (USD 4.8 billion) came from two countries (India and Brazil), 9 per cent (USD 548 million) from Malaysia, and 2 per cent (USD 111 million) from Peru. The remaining 12 countries totalled less than 12 per cent (USD 725 million). The 15 funds have also received a relatively small additional contribution of USD 62.8 million from government and international donor sources. However, the latter came primarily from just three countries [2], thus the majority of resources have been contributed by industry.

◂ Figure: Performance of 15 Developing Country UASFs



By 2006, these 15 funds redistributed approximately USD 1.62 billion to the sector for universal access and service (UAS) projects; this represents just 26 per cent of the total collected. This was distributed in the following way:• 81.0 per cent to incumbent fixed line operators;• 11.7 per cent to new entrant fixed line operators bidding specifically for UA service;• 4.6 per cent to mobile operators; and• 2.7 per cent for ICT projects of various kinds.To date, the impact of these UASFs on UAS and progress towards it has been very mixed. One criticism levelled at USAFs is that they have contributed little to mobile expansion or penetration at the margins of those operators' commercial viability, even though mobile is typically the most effective means of reaching rural areas. Cases which stand out against this trend are Colombia, Mongolia, Uganda, and to a limited extent, Malaysia. Some funds experienced legal limitations to disburse funds, as their mandate had been defined too narrow, e.g., allowing funding only for pilot projects, etc.The primary characteristics, best practices, strategic planning and pitfalls of UASFs, in particular, the means of balancing resources with disbursements, and institutional concerns, are described in detail in **Chapter 5** to **Chapter 7** of this UAS Module.

4.3.3 NON-CENTRAL GOVERNMENT ACTORS IN UNIVERSAL ACCESS AND SERVICE

This section considers the role of private sector, non-government and local community (or municipal actors) in universal access and service (UAS). In most cases, these participants play a developmental role and, as such, represent bottom-up rather than top-down policy driven initiatives. However, non-government and local community participants are considered here because, to greater or lesser degrees, they have become significant contributors to the objective of reaching underserved populations and of bringing communications and improved livelihoods to the poorer segments of society.It is not practical to attempt to include all possible non-government linkages to UAS because of the risk of creating confusion and reducing the impact of UAS policy, or indeed the responsibility of policy makers and regulators to establish and lead UAS policy. However, various trends are clearly significant and should not be ignored.

These are:

- Micro-finance and private entrepreneur led village phone initiatives, are discussed in **Section 3.3.1**;
- Community and municipal broadband networks, presented in **Section 3.3.2**; and
- Internet public access, telecentres, and cyber cafés experiences summarized in **Section 3.3.3**.

4.3.3.1 VILLAGE PHONE PROGRAMS

One approach to universal access (UA), which springs from the user side of the network—even though the first international case and several current initiatives involve leading mobile operators—is the village phone concept. This has emerged in several forms around the world, sometimes organized by a Micro-Finance Institution (MFI), sometimes by a private enterprise, or sometimes by the operator with financial partners.

The village phone concept began with the launch of the village phone programme in rural Bangladesh in 1997 as an initiative of the Grameen Bank. The Grameen Bank provides impoverished village women with financial support to develop sustainable income generating activities. In 2006, Muhammad Yunus, the founder of the bank, and the Grameen Bank itself, were jointly awarded the Nobel Peace Prize "for their efforts to create economic and social development from below."

Women clients of the Grameen Bank who show the initiative to become local Village Phone Operators (VPOs), receive training and are loaned funds to purchase a mobile phone set-up (phone with special in-built pricing software) suitable for rural areas, as well as airtime credits. Through the network of VPOs, vending affordable airtime denominations and facilitating individual calls, residents enjoy better access to communication services.

The success of the programme at generating sustainable business and social empowerment opportunities for women, and high performance in the recovery of loan disbursements, led to the replication (with variations) of Grameen's initial Bangladesh model, in the African countries of Nigeria, Uganda and Rwanda.

Essential featuresAt the core of a generic village phone programme is a viable business model for local entrepreneurs (women and increasingly men) to provide telecommunications services to their community. The entrepreneurs are offered a telephone operator business kit consisting of a mobile phone, external antenna (in the African cases), business management materials, a marketing poster, and usually some introductory training via the telecommunications service provider alone or in partnership with supporting organizations, which include microfinance entities, banks and non-government organizations (NGOs).

The entrepreneurs then buy discounted pre-paid airtime credits for resale at a profit and thereby offer an affordable public mobile phone service to their communities. They can typically also sell airtime top-ups for other mobile network private subscribers. Earnings from the business are then used to pay off the initial investment (typically in less than a year) and provide long term income for the entrepreneur.

For local residents, VPOs provide affordable access to the mobile communication services, where the cost of mobile handsets, hardware and account subscriptions have otherwise limited people's ability to use the existing telecommunications services. By establishing widespread communication access in impoverished areas, the village phone approach has been shown to empower the poor by enabling them to improve their livelihoods and generate income through reducing the opportunity cost of communication. The participants experience enhanced networking opportunities and access to knowledge, which is increasingly available through the text transmission services.

Various benefits of the village phone modelAs pointed out by the World Resources Institute in their NextBillion initiative to support widespread social entrepreneur opportunities to the poor, "Low-income populations have clearly benefited from access to mobile phones, which ease access to jobs, to medical care, to market prices, to family members working away from home and the remittances they can send, and, increasingly, to financial services." [1].

The village phone model facilitates delivery of core services and market expansion of the organizations involved, and this benefiting also governments, regulators, telecommunications companies, micro-finance institutions (MFIs) and development organizations. A village phone approach allows telecommunications providers to increase sales of airtime to a greater number of new users, as well as widely extending their service infrastructure to all clients (e.g., VPOs selling airtime, facilitating calls, product information, etc.) without the prohibitive costs of formal staffed facilities.

Operators active in village phone-type programmes also find that further market share can be leveraged through branding of the service via an expanded presence of dispersed VPOs [3]. MFIs can also expand the reach of their services and empower clients with increased access to important communication resources and information that can be used to improve productivity and opportunities. For national governments with responsibilities for telecommunication infrastructure and regulation, a village phone approach can assist in meeting national universal access (UA) goals for optimal community coverage.

Key roles and alternative modelsKey organizational roles and responsibilities of this model include the following:

- **Finance/Development Organization** – Responsible for providing and managing financing, capacity development for potential client operators and expanding reach of VPO model as viable livelihood strategy. Traditionally, microfinance organizations such as Grameen Bank, are involved in this role;
- **Telecommunications Provider** – In charge of mobile network infrastructure, responsible for being compliant with regulatory and licensing issues, and supply of airtime credits for programme use. In Bangladesh, this role is carried out by Grameen Phone Company;
- **VP Company** – A distinct company usually created by the telecommunications provider to manage the village phone program, finances, partner liaison and expansion of the program. An example of a VP company is Grameen Telecom; and
- **VP Operator (VPO)** – An individual who participates in a village phone program and is established as a communication services business for the community where he/she lives. In Bangladesh, this refers to women clients of the Grameen Bank who are established in a business selling mobile phone services – call by call.

As demonstrated in the case of the village phone implementation in Uganda spearheaded by the mobile operator MTN, an alternative operational model has resulted in implementation successes beyond planned expectations; significant expansion and adoption of VPO businesses are occurring without formal intervention and loans from microfinance organizations. Details regarding the village phone implementation approach utilized in Uganda and implications for alternative village phone models are included in the Reference document *Review of Replicating Village Phone from Uganda and Bangladesh.*

Regulatory response to Village PhoneThe integration of a village phone approach in efforts to realize national universal access and service (UAS) goals requires complementary regulatory and operational structures to facilitate integration of policy with the dynamics of the competitive telecommunications market and required standards for quality of services.

For example, appropriate village phone tariff regimes should price services within reach of the intended beneficiaries while not undermining other telecommunications service providers' market. In general, regulators can be confident that the players involved can make use of existing competitive tariffs without intervention beyond that which may be required to monitor competition and ensure a level playing field and minimal dominance by the strongest operator(s).

These are the tangible actions that policy and regulatory bodies can facilitate for village phone programs to thrive within, and complement, UAS programmes:

Policy and regulatory bodies can establish specific funding mechanisms or categories for village phone initiatives (for example in collaboration with financial institutions or under the universal access and service fund (UASF) programme) that supports any one or more of the following:

- assessment of village phone activities;
- training and capacity development;
- programme evaluation;
- start up financing options for VPOs; and
- working capital for village phone operators; and
- Regulatory bodies should streamline tariff and regulatory requirements appropriate to the scale of VPO service provision. Typically, VPOs make use of bulk discount tariffs available from the telecommunications operator, which enable them to retail their service at a profit while offering the end users an attractive price for calls compared to the price of calls under private subscription.

The future of Village Phone programmesThe village phone program in Bangladesh is experiencing a decline in profitability due to a combination of two factors:

- Increased numbers of VPOs: starting with 32 VPOs in 1997, the number reached almost 280,000 in 2006; this increased competition among VPOs is squeezing the profit margins to a minimum; and

- Increased affordability of mobile phones for individuals, leading to a decline of demand for public access village phones.

Bangladesh's village programme might become a victim of its own success and the success of the market. It and other programmes will only remain relevant for the future if they are able to integrate value added services into their offering, which could include, for example, mobile banking, mobile data, Internet and broadband services.

Reference Documents

- **Replicating Village Phone from Uganda and Bangladesh**
- **Village Phone Direct Manual: Enabling microfinance institutions to bring affordable communication services to the poor**

4.3.3.2 COMMUNITY AND MUNICIPAL BROADBAND NETWORKS

This section introduces and summarises community involvement in universal access and service (UAS) and provides an introduction to community networking and pre-conditions for success. There has always been overlap and interaction between UAS initiatives and ICT for development (ICT4D) initiatives. UAS initiatives have been primarily concerned with access to telecommunication infrastructure and services whereas ICT4D have focussed on the use of computers and the Internet to support development. The focus on community involvement is typically more prominent with ICT and broadband initiatives, also in developing countries.

Reasons for community involvement in UAS projects

Communities have a role to play in UAS for the following reasons:

- Some available low-cost communications technologies can work on a neighbourhood scale and are not too technically demanding, e.g. WiFi and VoIP, with free and open source software (FOSS);
- There is a recognition of the critical role local leaders have in tailoring ICT facilities and services to local needs as well as the importance of community ownership of ICT programmes, which is vital in working towards sustainability;
- Communities have a growing awareness that poverty is a complex phenomenon, stemming from a lack of power as much as from a lack of money, and that grass-roots initiatives, which build local competence and confidence, contribute significantly to poverty relief; and
- There is a rising popularity of development of multi-stakeholder partnerships, in which the public sector, the private sector and other interested parties work together, each contributing finance, skills or other resources. For good results, end-user communities should usually be development partners.

Community-based ICT supply is a recent trend, however there are a few established examples to turn to in order to assess success factors. Often, these examples are small-scale initiatives. Some are referenced in the Box Community networks in developing countries.

Organizing for community involvement to spread access to ICTs

Different types of organizations play a role in community ICT involvement, often in partnership with one another. They include the following:

- Formal co-operative societies have been in existence for rural telecommunications provision in the USA for a long time. Experience in the developing world has shown this to be largely impractical for voice communications at least, as they cannot be heavily subsidised as in the USA, which is also a high-income country. However, other forms of co-operatives or unions, such as in the agricultural producers' co-operatives, might become important sponsors of ICT and broadband networks. Several examples already exist, including the Peru co-operative mentioned below;
- Local governments such as municipalities (councils of small towns) with their own sources of finance;
- Schools and colleges, which may in turn be publicly or privately owned and operated and which are potential sponsors of telecentres and content initiatives;
- Private entrepreneurs and small businesses, sometimes with characteristics of social enterprise (with explicit objectives to contribute to local development as well as to make a profit);
- NGOs (often national or even international, rather than local, or in receipt of international funding). The Jhai Foundation in Cambodia is a good example of an organization with broad objectives that has attracted international support and developed a robust, cheap PC and communication system; and

- Community based organizations (CBOs) made up of groups of local residents who come together, often under the aegis of an NGO, for regular contributions to a savings account, mutual support and development efforts.

The Regulatel study of UAS programmes in Latin America identified ten specific initiatives of special interest or examples of good practice. Of these, at least seven include important elements of community participation. These include:

- A co-operative in the Chancay-Huaral valley, Peru, partly financed by users and run entirely by locals, which has an emphasis on training young people to operate and administer the network;
- Ruralfone, a small GSM enterprise in Brazil, staffed with locals and privately yet profitably run on low-cost principles which are similar to those advocated for Tanzania in Scanbi-Invest's report Profitable Universal Access Providers; and
- Non-commercial telecentres such as the LINCOS of Costa Rica and the Dominican Republic, generally run with financial support from governments (sometimes through Universal Service Funds).

Community networks in developing countries

The following provide some examples of active, successful community initiatives that influence or coordinate UA policy:

- Mahavilachchiya, Sri Lanka **http://www.mahavilachchiya.net** – a wireless mesh network linking home computers to the Internet. Initiated by a local teacher and now supported by ICTA, the official organisation for e-Sri Lanka;
- Myagdi District, Nepal **http://www.nepalwireless.net** – a wireless network linking scattered villages in a mountainous region. Led by Mahabir Pun, a teacher, who attracted international volunteers to help him;
- Air Jaldi, Uttaranchal, North India **http://drupal.airjaldi.com** – a collaboration between local NGOs and the University of California at Berkeley, providing fast wireless mesh connectivity to over 2,000 computers spread throughout several different institutions;
- Akwapim, Ghana **http://www.wirelessghana.com/node/3** – ten nodes over a 20 km range, offering connectivity to schools, businesses, and community activity centres throughout six towns in the mountainous Akwapim North district; and
- Agrarian information system in Chancay-Huaral valley, Peru **http://www.huaral.org/** – this links 14 telecentres; an indigenous information system in Chuquisaca, Bolivia, serving a population of 1,500; described in Annex 3 of Regulatel report at: **http://www.regulatel.org/miembros/ppiaf2.htm**

Pre-conditions for success of community networks

Although such networks now have growing chances of success, the community network solution can apply only to some developing world communities. Pre-conditions for success include the following:

- A minimum critical size – for example, a typical community network based on WiFi technology requires a population of around 15,000 with annual income per person of USD 500 to support itself [1]. As technology costs reduce further, this critical population will also shrink, still, many communities will be too small to support successful community networks;
- Communal consciousness or some level of organization enabling the population to function as a community, express its shared needs, and act in its own interests is necessary for community networks to succeed. This might be more likely, for example, in a self-contained rural settlement than in a peri-urban, or fringe settlement of the same population size, where there are people who have migrated from different parts of the country, who work in a nearby city and who may have less social cohesion than a rural village;
- Local leadership and, preferably, a core of committed people with a certain level of education and technical skills;
- Access to external technical and managerial support, especially if these skills are lacking locally; and
- A supportive political and regulatory environment that promotes community networks can help enormously.

Plainly, the above pre-conditions for community network success are much more likely to be met in more prosperous societies, particularly where household income is much higher; the minimum critical size of community can then correspondingly be much smaller. Currently, unserviced or grossly underserved poor communities do have an advantage in that the community network can capture most, if not all, telecommunications revenues, rather than sharing them with existing telecommunications operators and other competitors. However, community networking is growing faster in developed countries, bringing broadband connectivity for the first time to many rural and remote areas and often providing free publicly accessible broadband in urban areas (e.g. community hotspots, municipality broadband networks, etc.). The desire for universal broadband access in developed countries (that are already close to universal telephone and narrowband Internet access) is leading the push for community initiatives.

Reference Documents

- **Community-based Networks and Innovative Technologies**

4.3.3.3 PUBLIC AND COMMUNITY INTERNET ACCESS, TELECENTRES AND CYBERCAFÉS

Community telecentres started in Scandinavia as "telecottages" in the 1980s and have since spread to many other developed and developing countries. A telecentre is a place where the public can access and use telecommunications. The term can mean anything from a single public phone shop to a fully equipped multimedia suite with dozens of individual workstations, office equipment and services, meeting rooms and related facilities. Although some exceptions exist, the term most commonly refers to a facility where the public can access the Internet and ICT services, as opposed to purely voice telephony services. While phone shops are invariably a potential component of universal access and service (UAS) telephony projects, ICT telecentres have also become part of UAS programmes and finance. Telecentres can be run commercially (often very successfully), primarily as cyber cafés with some non-commercial features, or they can be run primarily for community benefit as non–profit or locally subsidized facilities. In the latter case they are usually known as community telecentres or multi-purpose community telecentres. Telecentres may also be known by many other names, such as nanasala in Sri Lanka, community e-centre in Malaysia, and so on. This section provides an overview, through the experience and perspectives of several telecentre programmes, and commences with early cases proceeding to current knowledge.

Lessons of the first telecentres in developing countries

Three common lessons from early telecentre experience included problems with:

- Gaining sufficient high speed, quality and timely access to a communications circuit that would allow users to have an Internet experience that is relevant, worthwhile and which will engender ongoing interest in ICT and capacity development. This challenge led the planners of Uganda's rural communications development programme to focus on providing high speed Internet Points of Presence in district centres, where demand is most likely to exist and key users might emerge, ahead of focusing on telecentres. In several places, commercial cyber cafés emerged once Internet access was made available. These businesses could provide the experience as well as technical resources to support community initiatives or assist vanguard institutions such as schools, hospitals, community broadcasters and government offices. The practice of focusing first on Internet POPs has now become standard practice in many of the new generation of Universal Access and Service Funds (UASF) described in **Section 3.2.2**;
- A fundamental lack in the quality of business management and technical skills that are required to identify and understand user demand, run a telecentre facility successfully, keep records, provide service and support users. Development practitioners and policy makers now focus on this problem, along with developmental expertise, to ensure an optimal and complementary response to the availability of both network access and UAS funding; and
- Commercially run telecentres, as well as NGO or donor financed telecentres, struggle with sustainability. Often the cost of maintaining, upgrading and replacing equipment is underestimated, while service revenues are over-estimated. ICT services generally have a slower take-up rate than voice services, especially in rural areas and developing countries where more uptake barriers exist, such as general literacy and computer literacy.

Perspectives on how to approach telecentre development

These are issues to consider when developing a telecentre:

1. Telecentre planning needs to take into consideration a range of possible funding options and models that fulfil sponsors' objectives *; and

Source: Commonwealth of Learning, Chapter 1 in Telecentres: case studies and key issues, 2001.

Diverse telecentre funding models

- Demand-driven models — Many early community telecentres started with over-investment in equipment, services and applications without proven demand; smaller telecentres or cyber cafés—commercial or community and non-profit based—expand and grow from modest beginnings if and when demand and affordability allow this. Good Internet access is essential.
- Commercial models — Telecentres planned and run on a commercial basis and managed by local entrepreneurs, are

capable of developing business plans and management systems. Commercial operators can establish a network of telecentres through the involvement of national telecommunication firms, Internet players or other technically competent organizations.

- UASF funding for telecentres — The prime funding policy instrument can provide smart subsidies (ideally limited to the range USD 15-25,000 on a matching basis) for small, manageable commercial telecentres in rural areas to help offset large start-up costs, or may be used to subsidize telecentres on an ongoing basis in areas that are beyond commercial viability.
- Other funding options for telecentres — Small loans and seed finance are two examples of options that international aid agencies and organizations can offer. Small loans (e.g., up to USD 15,000) can be made to local entrepreneurs or phone shop operators wishing to start a telecentre business and purchase computer equipment and other advanced ICT equipment to establish small privately owned and operated telecentres, and seed finance can be provided on a matching basis for qualifying national or regional private sector players wishing to establish or extend a larger-scale telecentre operation into rural areas.
- Contracting telecentre facilities — International development NGOs and institutions, and local governments, can be major users of telecentre facilities and services if they involve the telecentre in, for example, educational outreach, rural development, public governance or health programmes. Rather than attempting to implement these facilities themselves, contracting a commercial or semi-commercial telecentre to provide certain public services brings the agencies cost-efficiency gains, while at the same time providing these businesses with additional revenue.
- Multi-sector support: International development NGOs or agencies, that focus on any sector's development which uses ICT, can align themselves with a national telecentre initiative and can sponsor services and applications that are not self-supporting, though developmentally useful, while the profitable services are commercially run and managed.

1. Identify success factors and best-case characteristics of telecentres. The UNESCAP Guidebook, based on the Malaysian experience, provides an example in the box below.

Source: *Guidebook on Developing Community E-Centres in Rural Areas: Based on the Malaysian experience*, UNESCAP, 2006

Success factors for community e-centres (CeCs) in Malaysia

- Focus on people, organization, content, and processes rather than on the technologies;
- Research the actual needs and socio-economic goals of the community;
- Provide ICTs and services via the CeCs which are relevant to community needs;
- Find local champions who can motivate and mobilize the community;
- Community participates capitalizing on local strengths and resources in the development (planning, implementation and operation, evaluation, monitoring) of the CeCs;
- Sound business plans and sustainability models ensure CeCs' continuing existence and growth;
- On-going monitoring and evaluation of CeCs' performance;
- Foster and develop smart partnerships (government, industry, NGOs, and community) for strategizing and translating CeCs' goals into action; and
- Continue to train and educate the CeCs' personnel and community.

Lessons from many years of telecentre experience, are condensed into key characteristic of "Telecenter 2.0" (Second Generation, 2.0):

Source: adapted from APDIP e-note 14, Roger Harris 2007.

Characteristics of mature telecentres (Telecenter 2.0)

Policy Government policy recognizes the role of ICTs in poverty reduction. Telecenter 2.0 is an instrument for achieving national e-inclusion, which goes beyond mere access to technology and addresses the underlying socio-economic disparities of the poor and under-served.

Regulations Telecentre 2.0 operates in a deregulated telecommunications environment, in which increased competition is encouraged and licensing requirements are relaxed. This will significantly contribute to successful telecentres. A Universal Access and Service Fund (UASF) assists with infrastructure development in poor rural areas considered un-commercial.

Partnerships Telecentre 2.0 is formed and/or operates within a national alliance. Although there is no single dominant model of Telecenter 2.0 ownership or operation, all implementations fall under a form of multi-stakeholder participation that includes government, NGOs, civil society organizations, the business sector, academia and practitioners. Each partner in the national alliance, in conjunction with the communities that they work with, evolves its own model.

Funding Telecentre 2.0 is funded and sustained by a mix of investment, subsidy and its own revenue. Government pays for services that benefit the poor, just as it does with services that benefit all citizens regardless of income, such as libraries, education, transportation and health care. At the same time, local investors are mobilized by the opportunity to make profits. Telecenter 2.0 is not donor funded.

Content and Services Telecentre 2.0 provides/handles Internet content that is relevant to local needs and which promotes local development. Content and services are produced largely within the partnership arrangements of the national alliance.

Staff Telecentre 2.0 is staffed by local people with skills in community development. It is probable that the staff includes women. Local staff members are able to organize community discussions and focus groups that reveal the informational needs of the community, which the telecentre can provide. Local staff is able to promote the use of the telecentre for business development and other schemes that benefit the community.

Evaluation Telecentre 2.0 programmes are evaluated; the results indicate the extent to which local development has been stimulated, and in which women, the poor and other under-served groups are well represented. The results of the evaluation are used to advise further development of the programme of which it is a part.

Networked Telecentre 2.0 belongs to a national and/or international network of telecentres, which facilitates the sharing of experiences and resources. Personnel meet regularly at district, regional and/or national gatherings in which they learn from each other and resolve problems of common interest.

Details on specific telecentre initiatives in developed countries are summarized in the Practice Notes *The Western Australian telecentre network* and *Canada's Community Access Programme.* For experiences in developing countries the Practice Notes *Colombia's Compartel programme* and *FITEL's telecentre experience in Peru* discuss two examples that involve Universal Access and Service Funds (UASFs).

Practice Notes

- **Canada's Community Access Program (CAP)**
- **Colombia's Compartel programme**
- **FITEL's telecentre experience in Peru**
- **The Western Australian Telecentre Network**

Reference Documents

- From the ground up.
- Guidebook on Developing Community eCentres in Rural Areas

4.3.4 OPEN ACCESS, SHARED ACCESS AND ICT BACKBONES

This section outlines the trends and options for improving access to, and construction of, broadband backbone networks as well as models for infrastructure sharing.

These options include:

- Opening networks of monopoly or dominant operators to competition and wholesale service provision, as discussed in Section 3.4.1. Non-discriminatory access to incumbent networks in developing countries is vital. The enforcement of open access is a pre-requisite to further progress in network development and universal access (UA) even if requiring incumbent operators provide open access, or any access to wholesale customers, might deter some commercial investors during a privatization process. The extent to which investor discouragement would happen on a more general basis, is central to discussions in the EU about Next Generation Networks (NGNs) [1];
- How Universal Access and Service Funds (UASFs) can enhance backbone network development, is described in Section 3.4.2. Until recently, backbone networks have not necessarily been considered part of a UA programme, but with the increased importance of broadband, the funding for backbone enhancement is now increasingly, and quite reasonably, expected to come from UASF resources.
- Emerging alternative network options, specially constituted network operators and network operators in a consortium, which are discussed in Section 3.4.3, Section 3.4.4 and Section 3.4.5; and
- Infrastructure sharing aims to extend networks to areas where service provision is commercially viable if several operators share the costs of infrastructure such as towers, is discussed in Section 3.4.6.

These options support UA and remove barriers to ICT development or market efficiency (See also Section 1.3.3); Section 3.4.7 presents the funding options available for backbone initiatives.

Reference Documents

- Best Practice Guidelines on Infrastructure Sharing

4.3.4.1 INCUMBENT NETWORK ACCESS

One way of fostering competition is to ensure that new entrants can use the infrastructure of existing operators. These new entrants, such as ISPs and other network operators, then become wholesale customers of the existing operators. The new entrants and the existing operators might compete with one another for the same retail customers, setting up a scenario where existing operators might seek to discriminate against the new entrants and act in favour of their own retail arms. The regulator needs to prevent discrimination to make service-based competition effective. This regulatory intervention is often most critical to ISPs that may feel that the incumbent is both overcharging for the national backbone and acting in an anti-competitive manner in its retail pricing for Internet customers.Incumbent operators may lack interest in serving wholesale customers on a non-discriminatory basis and may point to the investment made in network facilities and the economies of scale and scope due to their vertically integrated operations. Incumbents may even have genuine technical difficulties in avoiding discrimination because of their vertically integrated operations.Under good regulatory practice, operators should be prevented from discriminating against wholesale customers that are also their competitors, especially in cases where incumbents have monopoly or dominant powers or have used public funds in constructing their networks.

These are the ways a regulator can ensure fair and non-discriminatory functioning of the market:

- **Interconnection and price regulation** – The regulator can enforce wholesale access and regulate the prices operators are able to charge (e.g., for E1 and sub-E1 transmission bandwidths, or for local loop facilities). Ideally the prices are based on costs (cost plus). However, even defining how costs should be calculated (and calculating them), e.g. using bottom-up Long Run Incremental Cost (LRIC) models, requires time and effort. Until the operator is able to demonstrate its incremental costs in an acceptable manner, the regulator must resort to other approaches. The regulator sometimes imposes international benchmarks, based on interpretation of best practice and similar country cases, or requires wholesale prices to be based on retail prices (retail price minus).
- **Accounting separation** – This can be used to make the operator with significant market power (SMP) identify costs and revenue streams for unbundled products and services and sell them on a non-discriminatory basis. It has been practised for many years in conjunction with interconnection and price regulation;

- **Functional or operational separation** – This can be used to make the wholesale arm of the operator treat the retail arm of the operator just like any other wholesale customer. The retail arm must use the same systems and processes as other wholesale customers, and the retail arm cannot receive information from the wholesale arm about other wholesale customers. This can be difficult to achieve because the operator has typically integrated systems and processes constructed over many years. Many issues need to be considered such as the impact on investment incentives, before functional or operational separation can be required and it is therefore considered a last resort [**1**]. Nonetheless, because separation of accounts and interconnection and price regulation are not always sufficient, functional separation is gaining some international interest The UK has adopted functional separation in the access networks for local loop unbundling, and backbone transmission, and Sweden, Italy and Poland are likely to follow. (It is sometimes also called structural separation, but here this term is used for an even more interventionist way of preventing discrimination); and
- **Structural separation** – This involves turning the operator's wholesale and retail arms (or, sometimes, the network and service parts of the operator) into separate, independent companies. This scenario presents all the difficulties of functional separation as well as the problems and costs that arise when a large company demerges. Structural separation also tends to be associated with the view that the wholesale company should have a monopoly. When this happens, the wholesale company may well behave in the unresponsive manner characteristic of many incumbents. Both Mongolia and New Zealand (by the incumbent as a preferred alternative to functional separation) have proposed structural separation. The Practice Note *Structural separation explained and applied* provides a useful background to recent trends towards separation in OECD countries, covering its benefits, risks and limits. Where network operators are less powerful or privileged in relation to their wholesale customers, regulation will be less necessary. In principle, if wholesale customers can take their business to several, equally strong, competitive network operators, wholesale customers are less likely to suffer from discrimination, and the regulator is better able to monitor the market. The regulator then needs to intervene only under exception circumstances or in cases where one or more operators appear to be abusing a dominant position.

Practice Notes

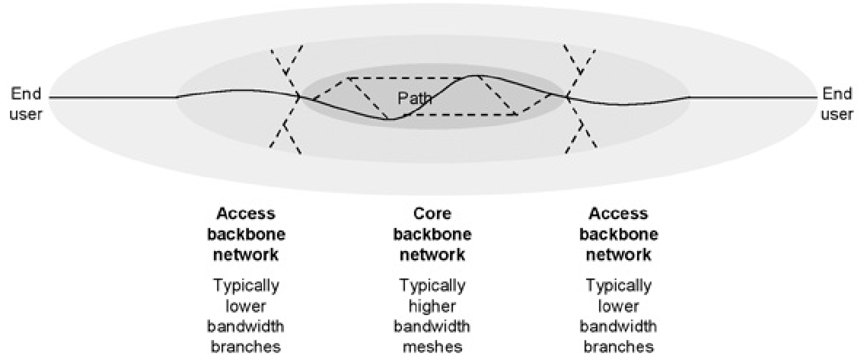
- **Structural separation explained and applied**

4.3.4.2 BACKBONE NETWORK ENHANCEMENT

A challenge that must be faced when considering backbone network enhancement, is that there is more than one motivation driving the demand and investment in main transmission facilities; these are basically network reliability/redundancy and capacity. Policy makers and regulators cannot act in isolation from these or imagine that even an expensive new investment in a third party network operator would be fully utilised or beneficial unless the present and future needs and economic motivations of the existing operators are fully understood and taken into account. Links that are closer to the centre of a network carry more traffic. Failure of these links is therefore more serious than failures further out from the centre. The links nearest the centre are therefore typically made redundant, so that if one link fails then an alternative route between its end points can be used instead. The following distinctions between backbone and access networks should be made:

- The core backbone network (often called the core or backbone network) comprises a mesh of links with at least two routes between any two major nodes. Many incumbent operators' networks incorporate alternative routes, sometimes showing a Figure 8 structure (i.e., two separate national ring routes) linking the key switching and traffic points. In a mobile network also, the redundant links or rings are those between the key mobile switching centres (MSCs) or linking the network's base station controllers (BSCs) to the main MSC. The investment decisions related to these links are very commercial in nature and rarely, if ever, are influenced by universal access (UA) policy or funding; and
- The access backbone networks (often called the aggregation of distribution network), which include the connections to small communities and retail customers, typically comprise a large number of branch links. Typically, access backbone networks connect to a single base station or small fixed network switch (e.g., in a small town or rural area). Many mobile base stations may be connected to a BSC by a non-redundant link. Since the economics of these links may be less certain or marginal, investment decision may be influenced by the availability of UA funding.

The distinction between core and access backbone networks is illustrated in principle in the figure below, although there may be many exceptions and nuances to this simple representation in individual network cases.



◂ **Figure: Schematic physical network connectivity**

Incumbent fixed network operators often have fibre in their backbones, or at least between main cities and switching centres. Amongst mobile operators, a stronger business case can be made for choosing microwave links rather than for optical fibre links, especially where towers are already installed and can be utilised for base stations. For this reason, some policy makers consider the backbones of mobile operators to be less relevant to broadband traffic. However, chances are that bandwidths are sufficient for current demand and can be economically enhanced when justified by sufficient external demand. Also, many mobile operators are bound to upgrade their backbone networks for expected 2G and 3G service large-scale up-take by consumers. Typically, investment decisions relating to the core backbone network may well relate to introducing redundancy rather than increasing capacity. However, a motivation based on universal access and service (UAS) requirements might focus on increased bandwidth capacity, so that other operators and Internet service providers can be more readily accommodated. Large increases in capacity may be commercially justified only after data services are very well established. In summary, because the motivations for UAS and broadband build-out do not usually coincide with operators' motivations, the availability of subsidy may not necessarily influence the timing of core backbone network investments. However, access network extensions, which are more often easily identified with UAS targets, will always have some limited backbone extension associated with them, and the availability of subsidy for them is more influential on the operators' decisions.It is normal for UAS tenders to include open access requirements on access backbone links so that service providers, other than the initial subsidy recipient, have use of the facilities. This has been for example the case in Nigeria, Uganda and Mongolia. Such forms of mobile infrastructure sharing are increasingly becoming an accepted norm, as noted in **Section 3.4.6**.

4.3.4.3 EMERGING ALTERNATIVE NETWORK OPTIONS

In some countries, several complete or partial backbone networks may exist as well as those of the incumbent. All of these can be considered part of the country's backbone resource. The following are relevant:

- Competitive network operators (usually the mobile operators) might have built optical fibre links and/or microwave links to avoid relying on connections leased from incumbent network operators. This has been the case for mobile operators in several African countries; most developing countries have at least one mobile operator that possesses an extensive network. Mobile network operators tend to start with microwave links (which can conveniently use many of the towers for base stations), but turn to optical fibre links when capacity requirements grow. This pattern is strong in Nigeria [1]. In fact, in many countries the backbone networks of the mobile network operators are now more extensive than those of the incumbent network operator, even if they do not use optical fibre links in their core networks until justified by their own internal economics [2];
- Some specialised network operators might have constructed optical fibre links or microwave links purely to sell transmission and other network capabilities to service providers and to large companies. In developing countries such network operators are unusual, though there are examples of them of in Kenya [3] and Malawi; and
- Electricity, gas and railway companies increasingly have optical fibre links for their own purposes (or rights of way that permit them to provide optical fibre links), which typically carry important but rather small amounts of traffic. These links could be made available for public traffic if regulation permits. In Algeria, the state-owned oil and gas extraction company, and electricity and gas distribution company, have a joint venture to sell their excess transmission capacity [4]. But because these optical fibre links have usually been designed to satisfy internal company requirements, not national requirements—railway coverage, in particular—geographical limitations to these links may limit the contribution to existing telephony networks to very few routes. Nonetheless, as noted in **Section 1.6.3**, at the very least, electricity supply and telecommunications can be co-ordinated, as power poles and ducts can carry optical fibres with low marginal costs.

Encouraging and allowing companies to make their networks available for wholesale and public retail business is an important step in enhancing backbone networks because it increases competition and stimulates investment. There might be a need for safeguards, to prevent cross-subsidy, especially when the companies are dominant in their own main markets. However, mobile network operators in particular, may not feel that they would benefit from selling transmission and other network capabilities to potential competitors. In this case, regulators may consider open access regulation to ensure that backbones do become available.

4.3.4.4 SPECIALLY CONSTITUTED NETWORK OPERATOR

Special backbone network initiatives – as opposed to the creation of open access to existing networks – have become a focus for possible universal access and service (UAS) programming over the last few years. Proponents of such initiatives believe that the main operators will not have enough backbone to match the country's needs and demand for ICT bandwidth. Considering the challenges and complexities involved, special backbone network initiatives require very careful evaluation as to whether or not this is a worthwhile option for an individual country. A separately owned network operator must be constituted so not to compete with, or discriminate against, its customers. It is controlled by the investors that contributed the funds, possibly with other stakeholders including community interests. Having a specially constituted network operator is most appropriate when the network being managed is being constructed using funds independent of any existing network operator. Section 3.4.4 and **Section 3.4.5** discuss alternative ownership and operating modes, which might be more appropriate in certain situations. Typically, broadband networks developed with public funds, are required to operate by specially constituted network operators and to offer open access, e.g., different Internet service providers may use the broadband links. The Practice Note *Public intervention to support broadband deployment in the EU* gives examples of where this has been done. The Reference Document The Alberta SuperNet: An Axia Breakthrough Solution to removing the Digital Divide refers to a Canadian initiative where an open access backbone network has been commissioned to reach all communities above a certain size, and which is managed by a private sector company under contract. In such cases, the backbone network may ultimately be transferred to the funders under a build-operate-transfer or build-transfer-operate arrangement.

The challenge for such projects is to determine whether the motivation and economic justification for the backbone projects is:

- To increase basic network reach into new regional or rural areas that are, to date, not reached (but that may be increasingly served by mobile operators);
- To increase bandwidth capacity on main routes, thereby encouraging and enabling advanced ICT applications and independent Internet points of presence to grow (this will gradually take place as demand is proven); or
- To support the growth of existing and future competitive operators who might consider the non-availability of an independently owned, open or shared access backbone to be a constraint.

Building a new national backbone is unlikely to be justified by capacity requirements alone, although it may be justified if the existing networks have extremely limited network coverage, organizational capability, and commercial acumen or management capacity. On balance, these situations are terminating where policy environments are truly liberalized, and encourage competition and investment. Hence other alternatives discussed in previous and following sections might, in the end, prove to be more realistic.

Practice Notes

- **Public intervention to support broadband deployment in the EU**
- **The Alberta SuperNet experience**

Reference Documents

- **The Alberta SuperNet**

4.3.4.5 NETWORK OPERATORS IN A CONSORTIUM

Within consortiums, network operators might still compete with one another, but they will work together in a consortium for a specific backbone or other initiative of common interest. The consortium has limited functions—typically to serve the aggregated demand of the network operators—so it does not inhibit competition.The consortium is formed and funded privately by certain network operators, with government as a potential partner, and network capabilities being managed by the consortium might be open only to participating network operators, resulting in the risk of restricted market access and market dominance. This scenario differs from having a specially constituted network operator as outlined in **Section 3.4.4**. If there is to be open access to the network facilities, which is preferable, other operators must be able to join the consortium on fair terms. These terms would include admitting all network operators on payment of fees related mainly to the resources that they require or contribute.An Internet eXchange Point (IXP) is an example of several investments already managed by a consortium. There is an introduction to the practicalities of setting up such an IXP in the Reference Document Via Africa: Creating local and regional IXPs to save money and bandwidth. The consortium might have a less formal structure. A good description of the structural choices that need to be made is at **www.euro-ix.net/ixp/startingixp/** and a fairly formal management structure (for an IXP in the UK) is described in the documents at **www.linx.net/govern/**. An IXP might also act as a trade association representing Internet service providers to the government and the public (as KIXP in Kenya), or to the providers of international bandwidth in order to secure buying power and economy of scale. The consortium does not necessarily pose a barrier to market entry and success of non-members, as there can be alternatives to joining the consortium (such as bilateral peering and transit arrangements). Long distance transmission cables: A network operators' consortium is also a way of funding the construction of national or regional long distance cables, both overland and undersea. The members of the consortium may have major shareholders in common, as in Russia for example [1]. Sometimes though the consortium mandate is not to provide open access and subsequently enjoys a monopoly or duopoly position, effectively preventing other network operators from entering the market.

Reference Documents

- **Via Africa**

4.3.4.6 CURRENT AND EMERGING FORMS OF MOBILE NETWORK SHARING

In many countries that have mobile operators as the dominant service providers, at least one mobile operator may have a near-ubiquitous national transmission network that has potential usefulness beyond the narrow needs of mobile service provision. This network could include the provision of digital backbone facilities from widely dispersed POPs for ISPs. Even if the existing capacity is limited for broadband, an upgrade to provide broadband may be significantly more economic than a completely new network. In mobile networks, infrastructure sharing might include some physical resources (such as towers and buildings), whole transmission links, or sharing coverage areas (so that different network operators provide equipment in different areas with the understanding that retail customers of the other network operators would be allowed to roam there). Because of the cost savings, infrastructure sharing may be a pre-requisite for receiving Universal Access and Service Fund (UASF) support into new areas. This is seen in several recent UASF subsidy competitions where bidders were required to provide sufficient bandwidth capacity and access to radio towers on any new backbone link financed by the subsidy.

Bidders also had to guarantee non-discriminatory open access (on commercial terms) [1]. A Reference document providing a typical Request for Proposal (RFP) and technical specification for this requirement is provided in **section 7 of this Module, Competing for UAS Subsidies**. In some countries obtaining construction permits for masts, ducts and buildings can be difficult for a variety of reasons, from the purely bureaucratic to environmental policy perspective. Certainly, sharing towers and buildings is often considered desirable for environmental or aesthetic reasons. There might be advantages for regulators requiring that network operators have sharing agreements in place so that these forms of infrastructure can always be open to other network operators, thereby making second and third applications for permits unnecessary. The government and regulator of India, engaged in a comprehensive economic analysis and industry consultation regarding the potential need and benefits of mobile infrastructure sharing. The regulator, TRAI, published its recommendations on infrastructure sharing in April 2007 [2]. An overview of the underlying analysis and outcomes of the initial subsidy competitions are provided in Practice Note "**Sharing Mobile Network Infrastructure in India**".

Another option is to allow national roaming, where coverage is shared. This is for example the case in India: India has auctioned mobile licences on a regional basis (called circles) and national roaming is crucial for customers travelling outside of their providers' licensed area. However, where roaming call charges are relatively high, this might not serve customers well. The scenario of operators continuing to generate revenues from expensive calls may act as a disincentive to network expansion unless regulation is enacted to limit retail call charges and enforce coverage obligations. However, in scenarios where one network operator is more dominant, national roaming may give the less powerful network operator an opportunity to compete in areas it has not covered itself yet.

National roaming might be only required for a limited period of time until networks are more evenly built-out. In several countries, e.g., Austria and Australia, national roaming has been used to support market entry by a 3G network operator that had no 2G network – the 3G network operator has the right to negotiate temporary national roaming agreements covering access to the 2G networks of the network operators that have both 2G and 3G networks. Without such agreements, the 3G network operator would have very limited coverage. With these types of agreements, the 3G network operator can have national coverage but can be motivated to enlarge its own coverage by the potential economies of scale. The Practice Note **"Debates about National Roaming in the EU"** discusses this incentive structure.

Practice Notes

- Debates about National Roaming in the EU
- Infrastructure Sharing in India – An Imperative for Sustained Growth
- Mobile Sharing in the European Union
- National Roaming
- Sharing Mobile Network Infrastructure in India

Reference Documents

- Commission Decision of 30 April 2003 relating to a proceeding under Article 81 of the EC Treaty and Article 53 of the EEA Agreement
- Commission Decision of 16 July 2003 relating to a proceeding under Article 81 of the EC Treaty and Article 53 of the EEA Agreement
- India -- TRAI's Recommendation on Infrastructure Sharing
- O2 (Germany) v. Commission

4.3.4.7 FUNDING OF BACKBONE INITIATIVES

Like universal access and service (UAS) itself, a national backbone, whether it extends and connects existing networks or is a separate new network, may need to be a candidate for non-commercial funding. This funding may be through a variety of financing mechanisms (Government funding, Universal Access and Service Fund (UASF), public-private partnership (PPP), etc.). The options for funding backbone initiatives are similar to those for funding UAS in general. They include the following:

- **Part of obligations in UAS licences or other regulatory instruments.** Network operators obliged by winning UAS tenders to provide UAS into new areas must extend their backbones to reach certain areas. As noted in Section 3.4.6, this is illustrated in several recent UAS subsidy competitions, where the bidders were required to provide sufficient bandwidth capacity and access to radio towers on any new backbone link financed through the subsidy, and to guarantee non-discriminatory open access (on commercial terms) [1]. A Reference document providing a typical Request for Proposal (RFP) and technical specification for this requirement is provided in Chapter 8 Competing for subsidies.Depending on the case, these may be minor branch links or quite significant sections of transmission route; or even include core network enhancements. The Nigerian Universal Service Provision Fund is a case where several transmission links of up to 200 km in length, together with customer services – Internet POPs and local access for voice services – are being financed competitively by UAS subsidies .
- **Allocations from public funds.** Network operators could request and receive funds to make their backbones reach certain areas. When more than one network operator competes for funds for the same area, objective methods (auctions) or subjective methods ("beauty contests") can be used to decide between them. Public funds might not be earmarked only for telecommunications, e.g., universities and other technical institutions may have operating functions and applications that require substantial data traffic and might seek funds from agencies that are specifically concerned with education or even just with National Research and Education Networks (NRENs). These funds are not usually intended for creating physical infrastructure though they might be suitable for buying capacity on existing networks.

The Reference Document More Bandwidth at Lower Cost provides recommendations on how universities can work together to obtain more capacity at lower costs, through demand aggregation and other planning actions, which create economies of scale indirectly affecting the cost of UAS.

Reference Documents

- More Bandwidth at Lower Cost

4.3.5 OTHER APPROACHES AND INITIATIVES PROMOTING UAS

In addition to the main approaches and initiatives for universal access and service (UAS) presented and discussed in the previous sections, there are some other approaches, models and experiences, that might be less known. This Section summarizes these approaches. While not widely spread, co-operatives are providing communications services in some rural and remote areas. Moreover, there are considerations in the development community, whether co-operatives might be the model to deliver broadband to rural and poor areas.

Experiences to date, success factors and prospects of the co-operative model are discussed in **Section 3.5.1.Section 3.5.2** discusses some examples from various countries, presenting key challenges of rural and regional operators, but also provides the context in which a regional or rural licence strategy could be successful and beneficial, also for broadband.

Section 3.5.3 is dedicated to reviewing experiences with local or community radio stations. Rural radio is not only important for UAS to broadcasting services, but it can also play an important role in spreading the benefits of Internet access.

4.3.5.1 RURAL CO-OPERATIVES

There are a handful of countries with co-operative models for telecommunications services – Argentina, Bolivia, Poland and the United States of America. It is important to note that all these co-operative models began operating before the introduction of cellular technology, when fixed lines were the norm. For example, most of Argentina's approximately 300 co-operatives have been operational since the 1960's. Co-operatives emerged primarily in rural and remote areas where existing national carriers clearly were disinterested in serving those areas because they were considered unprofitable. Many of the Argentinean co-ops are in small, isolated communities in the south (Patagonia) where the two operators at the time, had openly expressed they did not want to serve those communities. Even in the United States, independent telecom providers serve less than 5 per cent of the United States' phone subscribers; 225 co-operatives are a sub-group of independent telecom providers. However, while representing a very small percentage, in these cases rural co-operatives are important to reach and serve these small communities.Poland is an exception to the fact that co-operatives typically serve areas no other operator is interested. In Poland, a new telecommunications act (1990) created 44 local licence areas to compete with the government-owned incumbent operator TPSA. Not all of these local areas were rural areas only though, they included urban and semi-urban areas. Some of the local licence holders were co-operatives, set-up with the assistance of the National Telecommunications Cooperative Association (NTCA) and USAID of the United States. Typical subscriber size is around 8,500. Two co-operatives are known to be still operational and profitable and have added additional services such as Internet, broadband, radio and TV. Looking at the co-operative experience, the following factors allowed co-operatives to be sustainable and in some cases even profitable:

- Providing multiple services – many co-operatives in the United States also own cable TV or cellular subsidiaries, while the Polish co-operatives added Internet service, broadband and in some cases radio and TV. Argentina's co-operatives often provide other services such as water and power, and in 2007 they have been authorized to provide mobile telephony service;
- Favourable interconnection agreements or subsidies – Poland's co-operatives have been established with substantial donor funding and managed to negotiate reasonable interconnection agreements with the incumbent fixed network operator. In the United States the rural operators, including co-operatives, receive subsidies for serving high-cost areas – in 2006 alone, this amounted to USD 4.1 billion;
- De-facto monopoly position – historically, most co-operatives started out as the sole telecom provider in their serving area, which meant that they captured all potential demand and did not need to operate under competitive pressure. With the advent of expanding cellular technology, the sole-provider position is often severely eroded;
- Medium-income countries and service to households – countries with co-operatives are low-middle income (Bolivia), upper- middle income (Argentina and Poland) and high income (United States). Co-operatives provide service to households and they would not be sustainable in communities where only a minority can afford private service; and
- Infrastructure and resource sharing – as many co-operatives also provide other services such as power and water, they have invoicing, accounting and collection mechanisms, and human resources already in place, reducing overhead costs. The sustainability of co-operatives is further increased through management often working without any payment.

Whether co-operative models have a role in future universal access and service (UAS) policies depends on various factors and specific circumstances of the country considering these models. Co-operatives are considered by some as potential model for providing broadband services to communities. A recent example in the United States is the Mid-Atlantic Broadband Cooperative (MBC), created in 2003 by a group of regional leaders whose purpose was to revitalize the regional economy of Southside Virginia. In 2004, MBC created a plan to build over 700 miles of new fibre-optic infrastructure and own the facilities and infrastructure. The project started with USD 6 million in grant funding from the US Department of Commerce Economic Development Administration (EDA) along with additional funding of USD 34 million from the Virginia Tobacco Commission (VTC). Today, the 700-mile fibre network is operational. MBC is an established wholesaler of broadband services, providing the infrastructure necessary to attract businesses to rural Virginia. MBC and the VTC are funding last mile pilot projects in five different Virginia towns. Businesses and residents throughout Virginias are benefiting from MBC's initiative [**1**].Some factors e.g., the sustainability issues discussed above and other factors are elaborated in regards to community networks and community involvement in Section 3.3.2. It appears that co-operative models might be preferable for communities or areas not served by commercial providers (who are not enticed by subsidies through a Universal Access and Service Fund [UASF]) or in areas that are served extremely poorly. Co-operatives might not be appropriate if there are viable alternatives within the market and with commercial providers.

4.3.5.2 REGIONAL OR RURAL OPERATOR LICENSING

Rural or regional licensing emerged in Latin America in the mid-1990's as a result of the first generation of universal access and service funds (UASFs), as described in Section 3.2.1. These often used VSAT or fixed-wireless technology. The main challenge of these rural operators today is the encroachment of cellular operators competing with them in areas where they had once been the only service provider. Also, in some remote communities served by VSAT, the operating and maintenance costs outweigh the revenue received and subsidies bid for. It was known, even before mobile phone expansion, that some of these rural operators are not commercially viable [1]. A later example of rural operators can be found in South Africa. Starting in 2002, the Universal Service Agency focused on funding newly awarded Underserved Area Licensees (USALs), previously called SMME – Small, Medium and Micro Enterprises. As the name implies, these operators are licensed to provide voice and data services in under-served rural districts with less than 5 per cent fixed tele-density. Out of 27 potential licence areas, seven USALs have been receiving grants of SAR 5 million each upon licensing from the Agency and commitments of interest-free loans of up to SAR 10 million over the first three years. Several of the USALs have moved to offering service by reselling mobile services from one of the established mobile operators. The main challenge of the USAL concept is that it has been designed with a fixed-line market environment in mind and then has been overtaken by increased liberalization measures implemented by the government, improving the overall sector environment and speeding market expansion including by mobile operators, but granting less protection to the subsidised USALs. Some of the challenges for smaller rural or regional operators can be summarized to be the following:

- **Purchasing power** – big equipment vendors might give little attention or support to a small operator, and prospects of volume discounts are slim;
- **Attracting finance** – rural and small operators are typically challenged to raise finance, as their business case might be only marginally profitable and investors might have less confidence and appetite. Thus, some of the early rural operators where actually subsidiaries of VSAT or rural telecom equipment vendors;
- **Attracting human resources** – given a choice, skilled staff and management might be less attracted to small rural operators preferring to work in larger centres;
- **Economies of scale** – the cost of standard elements for a communications service provider, e.g., billing software, are proportionally higher than for a national operator, though software advances, new technologies and customisation might mitigate that;
- **Negotiating interconnection agreements** – smaller operators are in a less powerful position and are not a priority when negotiating agreements with bigger national operators; and
- **Competitive pressure and increased liberalization** – smaller operators are less able to withstand the competitive pressure once the larger national operators expand over time into the least served rural areas i.e., there is no level playing field between an operator holding a national licence and an operator with only a rural licence. Therefore, rural operators typically require a higher degree of regulatory protection, which often complicates the regulatory regime as special tailored regulation is required for rural licensees and goes against the grain of increased liberalization.

Venezuela is an interesting example where regional licences were introduced without a minimum subsidy auction. Due to the fixed-line incumbent CANTV's inability to meet its rural obligations, three regional rural operators were licensed in the mid-1990's, each in a different region of the country. The existing operators were not allowed to tender for licenses. The operators were required to initially meet rural roll-out targets before being permitted to expand their services into urban areas. The regional operators were required to provide service in rural areas – including public phones and fixed or mobile lines – not covered by CANTV. Over a five-year period after receiving the licence there were operator specific build-out targets for the rural operators ranging from 17,000 to 42,000 lines. Only a small number of main lines had actually been rolled out by the end of 1999. Later, to make the rural licenses more attractive, licenses permitted the operators to offer fixed access, long-distance, international, mobile and multimedia services. In 2006, the two regional operators Digicel and Infonet (both GSM), were bought by Digitel, the third regional operator, to create a national GSM operator. Data on the actual success of these regional licences is limited. In general, rural telephony and Internet penetration in Venezuela is still considered low. Lessons to be drawn from this experience, also in light of possibly adopting a rural or regional licensing strategy for broadband development, are:

- There is an inherent market tendency for rural or regional operators to become national operators, either by being bought by a national operator or their own drive to grow and become a national operator. Thus, regional or rural operators might be a temporary phenomena; and
- Introducing regional operators can be an effective tool for introducing new entrants and more competition. If a regional licence is focussed on less well served areas and coupled with the incentive of being converted into a national licence within a reasonable amount of time, it can have the triple results of:
- increased service in previously un-served areas,
- increased competition, and
- a period of time to prepare and adapt to increased competition for the existing player(s).

4.3.5.3 COMMUNITY RADIO AND LOCAL RADIO

Community radio or local radio can play an important role in a universal access and service (UAS) policy and programme, especially if the UAS policy covers broadcasting services as well. While there are no fixed definitions of what UAS means in the broadcasting field, there is a certain consensus on what its key dimensions are. These include:

- Reach – UAS requires nation-wide service to be provided to the entire population, including the rural and remote population. Typically, public broadcasters are mandated to provide national broadcast reach. Private broadcasters do not necessarily need to reach the entire nation (though it is beneficial) as long as the population has also access to other local broadcasting media.
- Affordability – This relates to the affordability of the actual broadcasting receiving device (e.g., a radio or TV). In many developing countries, rural citizens can only afford radio receivers as TV sets are often too expensive. Considerations and discussions about TV access on a community basis do exist, and there are promoters of multi-media community centres that include TV (e.g., UNESCO).
- Local media, plurality and diversity – This is the strongest dimension of UAS in the context of broadcasting. It is considered essential to ensure that all citizens have access to a local radio station as a forum for local debates and cultural expression. It is important that local media provide a diversity of content and plurality of information and opinions. Because of its higher costs and greater technical needs, local television is far less of a UAS priority.

Thus, in terms of UAS for broadcasting, the following are main requirements:

- Nation-wide service by the public broadcaster and/ or private broadcasters; and
- Access to a local radio station (community or private with public service obligations).

Consequently, many countries believe that local community radio stations are essential. In the developed world, Germany, France, Canada and the United States, all have specific policies for rural broadcasting and community/ local broadcasting stations. The Practice Note *Different local radio models in France* gives an example of a local radio policy. Peru, Bolivia, Colombia, Venezuela, Argentina and Ecuador are all countries that have good broadcasting legislation for rural, indigenous, educational or community radio. In Africa, some of the countries with the best policies for rural radio include Mali, Benin and South Africa. The Practice Note *Rural Community Radios in Mali* give an African example of community radio. Local or community radio stations are even more important in conjunction with Internet access. In many cases, successful use of the Internet for development requires community intermediaries which can overcome issues of illiteracy, lack of ICT training and language barriers of the Internet. Local rural radio, which has Internet access, is emerging as one such successful intermediary because it is accessible, affordable and cheap to produce. Further, radio is a mass and an oral medium that promotes community interaction and social communication processes. Radio and Internet can benefit from each other in the following ways:

- Internet resources for radios to exchange information and programming, such as InterWorld Radio, providing access to a huge range of journalists' reports on a variety of topics; and
- Radios using the Internet to provide a variety of information to their listeners; a well-known example is the UNESCO-supported Kothmale Internet Project in Sri Lanka.

Definitions

In South Africa, a "community broadcasting service" is defined in the Broadcasting Act 4 of 1999 as a broadcasting service which:

- Is fully controlled by a non-profit entity and carried on for non-profitable purposes;

- Serves a particular community;
- Encourages members of the community served by it, or persons associated with or promoting the interests of such community, to participate in the selection and provision of programmes to be broadcast in the course of such broadcasting service; and
- May be funded by donations, grants, sponsorships or advertising or membership fees, or by any combination of the aforementioned.

In France, in addition to local community broadcasting, the regulator, Conseil Superieur de l'Audiovisuel (CSA), distinguishes between three types of local radios:

- Community local radio;
- Commercial local radio service without national programming; and
- Commercial local radio service that also broadcasts national programming.

Whether or not the local station is a community station, an important part of its mandate is to provide a local forum and it is therefore desirable that it be locally owned and that it meet certain obligations regarding community access and local production. Without these obligations, they could be 100 per cent repeater stations for programming coming from the capital, at the expense of local access.

Funding and sustainability

There is a range of funding options for local community radio stations. Most often, community radios finance themselves through a combination of national and international donations, advertising, sponsorship and membership fees. However, in developing countries membership fees are very rare. Examples of funding models that have been mandated by government policy include the following:

- In Colombia, the Universal Access and Service Fund (UASF), Compartel, is managed by the Ministry of Communications, and has a joint programme with the Ministry of Culture and a special government fund for Development Projects known as FONADE. The fund provides partial financing for community radios under a programme called "Comunidad". Currently, Compartel has financed between two to six community radios in approximately 25 departments of Colombia. Compartel receives its money from a levy mainly targeting telecommunications operators, though commercial broadcasters must also pay into the fund. The Practice Note *Colombia's universal access to community radio* gives more details about Colombia's model. However, Colombia's specific programme for community radio is an exception among UASFs. The UASF in Peru is only occasionally funding pilot projects that have some community radio element, but are focussed on the Internet. Ghana's UASF, GIFTEL, is authorised to fund community media projects that combine Internet and community broadcasting;
- Other governments, such as South Africa and Mali, provide no particular financial support to the community radios, thus they have to finance themselves. In some poor communities in South Africa, this policy is creating problems as the people do not have the advertising expenditure to support a community radio station. While Mali has over 300 community radios, a number are struggling. This situation is complicated even more in instances where old equipment needs to be replaced;
- France has a special fund for local community broadcasters, which is sourced by a special tax levied on radio and TV advertising expenditures and paid by advertisers. Qualified stations can receive partial funds to assist with the initial installation, to subsidise some of their operational costs and to subsidise equipment purchases. However, the community radio stations must fulfil certain criteria which determine if and how much funds they receive, and meet specific criteria for accepting the funds. These criteria include the community stations' capacity to secure some local funds, and the quality of their programming. Conditions include a ceiling of 20 per cent of advertising of their total annual turnover, and broadcasting four hours of local programming daily;
- In some countries (e.g., the United States, Chile, Mexico and Brazil), governments impose restrictions on community radio stations in regards to advertising. These restrictions are either absolute, such as no advertising allowed, or there may be a ceiling, such as no more advertising above a certain limit (see the France example above). Botswana is unique in that the acceptance of national and international donations by community radio stations, are only allowed in the first years of the organization's establishment. Lastly, restrictions can be content-related, such as no sponsorship from political parties or only local advertising; and
- In South Africa, community radio stations receive preferential tariffs from Sentech, the signal distribution company, based on a review from Sentech, itself, and the Department of Communications. Previously, community stations were not using Sentech because they could not afford it and had reverted to their own signal distribution. This resulted in inadequate coverage. More details about the South Africa experience is contained in the Practice Note

Rural community radio in South Africa.

In conclusion, some partial funding of local community broadcasting stations is clearly beneficial, and can be sourced from both government funds and a small levy on advertising revenues. However, it also seems important that community stations should be required to raise some funds themselves and apply for funds. These terms are necessary since not all stations may need support. Moreover, the inclusion of application criteria would establish some minimum quality controls in the distribution of assistance. It is proposed that the criteria should not necessarily involve judging the content of programming, but rather focus on indicators such as:

- The amount of local programming;
- The amount of support the radio station receives from the local community it serves; and
- The amount of community participation and/or involvement in the programming.

In addition, it appears crucial that community stations, while being non-profit, should have the opportunity to generate their own funds by as many means as possible. Restrictions on their ability to generate revenue, if imposed, need to be carefully selected. An example of a positive restriction would be the limiting of political party sponsorship during non-election periods.

Enabling support, especially through regulation

The review of various case studies of community radio clearly indicates that enabling support and good regulation for local community radio stations is important for their success. Key features of good regulation and enabling support are as follows:

- Waving or limiting payment for radio spectrum to a minimum e.g., paying USD 20 annually for frequency allowance (Colombia, Mali);
- A special support office within the Ministry of Communications dedicated to assist community ratio stations (Colombia);
- Simplified procedures for obtaining community radio broadcasting licences (Colombia, Mali), including the elimination of unnecessary engineering studies;
- Making technical expertise available to community radios (considered in Colombia);
- In South Africa, France and Mali, development of national associations of rural community stations which are dedicated to supporting and lobbying for rural community stations. Also, they are often better able to attract national and international funding for training programmes etc.;
- No licence fee requirements (Mali);
- Clear regulation from the outset - in South Africa, the Independent Broadcasting Authority issued community broadcasting licences starting in 1994 but only clarified the regulatory framework for these licences in 1997, which caused many community stations to operate in uncertainty and on temporary licences;
- Sufficient capacity of the regulator to handle community radio applications (South Africa); and
- Sufficient licensing length - initial temporary licences such as those in South Africa are clearly not advised. In France, community stations receive licences for five years, and can apply for renewal after five years.

Practice Notes

- **Colombia's universal access to community radio**
- **Different local radio models in France**
- **Rural community radio in South Africa**
- **Rural community radios in Mali**

Reference Documents

- **Community radio social impact assessment**
- **Making waves**

4.4 UNIVERSAL ACCESS AND SERVICE POLICY

This chapter addresses all aspects and considerations related to developing a universal access and service (UAS) policy. It is intended as a practical guide to the various steps that need to be taken in the process of policy formulation. It covers three main themes of UAS policy formulation and implementation:

- The framework, context & institutional considerations of UAS policy, including its relationship to broadband policy is discussed in **Section 4.1**;
- The UAS policy development process, including consultation, finance and economic analysis which is described in **Section 4.2**; and
- Legal and regulatory modifications that are likely required for UAS policy implementation are discussed in **Section 4.3**.

The chapter provides an overview of the various considerations, steps and analyses that go into developing a UAS policy. **Chapters 5**, **6**, **7** and **8** of this Module discuss most of the issues in more depth and also provide greater insight on how to implement a UAS policy.

Reference Documents

- **Toward universal access to broadband in Australia: a case study**
- **Universal Access & Service (UAS) and Broadband Development**

4.4.1 UNIVERSAL ACCESS AND SERVICE POLICY FRAMEWORK

Section 4.1.1 makes the case that since both developing countries and developed countries typically include both universal access and universal service provisions, the term universal access and service (UAS) policy should therefore be used as the generic policy name. Before developing the specific UAS objectives, targets and strategies, the overall policy context and relationship of UAS policy to other policies should be examined. This is discussed in **Section 4.1.2**.

In particular, **Section 4.1.3** deals with the relationship of UAS to broadband policies.Discussion as to whether to integrate a UAS policy within the communications sector or ICT policy, or to opt for a separate policy document is provided in **Section 4.1.4**.

Section 4.1.5 discusses the question of which agency should develop UAS policy and which organization should be responsible for implementing the policy.

Section 4.1.6 concludes with the provision of suggestions on the structure of a UAS policy and the key principles of best practice.

Reference Documents

- **Toward universal access to broadband in Australia: a case study**
- **Universal Access & Service (UAS) and Broadband Development**

4.4.1.1 SCOPE OF POLICY

As more and more countries include both concepts of universal access and universal service in their policies, it makes sense to use the generic term universal access and service (UAS) policy. In the past, developing countries typically focussed mostly on universal access (UA), meaning community and publicly shared access, as UA was the appropriate and most feasible target. However, since the maturation of mobile communications, which extended services further throughout the country and lowered access barriers to take up, many developing countries might realistically target universal service (US) for telephony in urban areas. Furthermore, in addition to UA targets in rural areas, the objective of increasing rural penetration can be set. An example of this is Ghana. In its National Telecommunications Policy of 2004, Ghana has set the objective to achieve a universal service penetration of 25 per cent of the total population, and of 10 per cent in rural areas, by the year 2010, as summarized in the Practice Note UAS Policy of the Republic of Ghana. At the same time, while targets for Internet and broadband service provision typically need to be more modest and focus on public access (e.g., telecentres and cybercafés) and can thus be called universal access targtes, increasing private penetration and promoting universal service can be part of the overall policy objective. The trend towards implementing Internet points of presence in semi-urban and rural population centres allows for individual uptake, often first by businesses and institutions. Strategies often include support to early adopters such as schools and colleges. Increasingly, UAS policies include backbone provision as an element of their policies, often to extend the existing national backbone to more remote locations as required, to add a second tier backbone that increases the capillarity beyond the main routes or to upgrade capacity to broadband. In the more developed world which previously had universal service as its policy goal, the onset of broadband has led to re-use of the term universal access. It is often recognized that universal availability of broadband services and affordable access to those services may not necessarily yield universal service-like household penetration for many reasons, at least in the medium-term, even though the provision of affordable access is an important goal. Also, although many middle-income countries, as diverse as Malaysia, Botswana and Saudi Arabia, may not yet have achieved UA in all rural areas, it is reasonable that they contemplate the achievement of US within the time frame of their policies.

Thus, this chapter speaks of UAS policies. Some countries also reflect both concepts in the name of their policy, executing agency or fund, as seen in the Practice Note Table of Ministries, Policies and UAS/UASF Executing Agencies.

Practice Notes

- **Table of Ministries, Policies and UAS/UASF Executing Agencies**
- **UAS Policy of the Republic of Ghana**

4.4.1.2 UAS POLICY IN CONTEXT

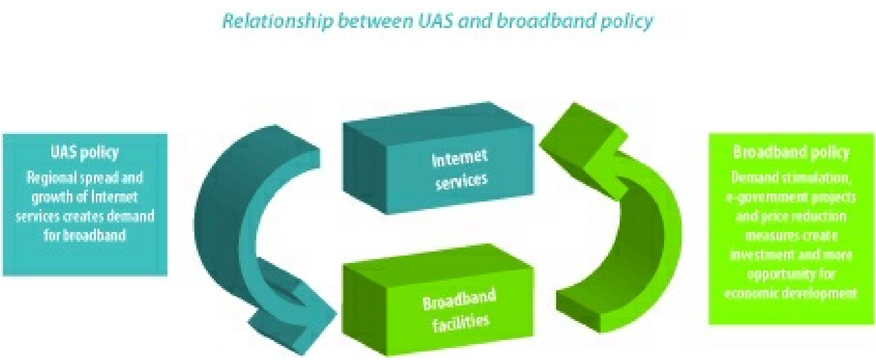
Most countries have a telecommunications, communications or electronic communications policy. Some countries are broadening its scope and calling it an Information and Communications Technology (ICT) policy, including broadcasting and IT [1]. Some countries with a telecommunications policy may also have a separate national ICT policy or strategy, or an information society policy. In addition, some countries have separate broadband policies, which stand alone in addition to the telecommunications or ICT policy [2]. Telecom or communications policies typically focus on the industry, its networks and services, and the role of regulation to ensure fair competition between providers as well as consumer interests. These policies typically cover a wide range of topics, including:

- Basic principles and objectives;
- Liberalization;
- Competition;
- Technology and convergence;
- Regulation;
- Interconnection; and
- Pricing and consumer rights.

National ICT policies typically concern themselves with readying the country, its economy and society for the information society. This usually cuts across various sectors, including education and health, finance, small and medium business and government (e.g., developing e-government capacity and services). In developing countries two other key elements of ICT strategy are often human resource development (including enhancement of education and training) and fiscal measures (e.g., reduced import duties on computers, network equipment and software).Telecommunications and ICT policies often have a component that relates to universal access or service. Telecommunications policies typically set the objective of providing affordable communications to all citizens and to achieve regional equity, or balance, in the development of networks and services. There are often specific sections addressing universal access or service (UAS). National ICT policies may also specifically address methods of promoting equal access, serving remote and rural areas and reaching disadvantaged population groups (e.g., women, the elderly, certain indigenous people).A UAS policy therefore sits under the umbrella of the larger communications and national ICT policy. If it is a separate policy document, it is typically more detailed and includes specific strategies and implementation arrangements to achieve UAS. When most of the main principles, the importance of communications to socio-economic development, and equal access, have already been addressed in the communications sector policy, the UAS policy tends to focus on mechanisms for funding UAS and the main measures and instruments used to achieve the policy goals. This includes the vision, objectives, structure, and administrative or operational practices of a Universal Access and Service Fund (UASF) if that funding mechanism has been chosen.

4.4.1.3 RELATIONSHIP TO BROADBAND POLICY

Universal access and service (UAS) policies and broadband policies influence each other. UAS policies promote the regional spread of Internet services and stimulate demand, which in turn can increase the demand for broadband. On the other hand, broadband policies use a range of regulatory and fiscal options to reduce costs (e.g., international gateway liberalization) and facilitate broadband network investment, which in turn facilitate better access at lower prices. The figure below illustrates the interplay between UAS and broadband policy.



◂ **Figure: Relationship between UAS and Broadband Policy**

Source: ITU-infoDev ICT Regulation Toolkit - UAS Module

Several countries have separate broadband policies. These include Chile, India, Jordan, Malaysia and Pakistan. The purpose of having a broadband policy generally springs from the perception of government that acceleration in the growth and geographical spread of broadband-capable networks can facilitate enhanced Internet and ICT services and implementation of Next Generation Networks (NGNs).

In other countries, where broadband is well advanced in general, the boundaries between a UAS policy and broadband policy can be blurred, and in some cases the two policies are merged. The reason is that UAS becomes all about broadband once telephony targets have been achieved. For instance, Chile has a new Information Society Universal Access policy, which encompasses the broadband policy and the Universal Access and Service Fund (UASF). Some other governments are also considering the use of UASF resources to increase the reach of broadband networks and services into regional and rural areas that are beyond market-reach. However, issues of financial sustainability and the regulatory environment required for broadband to thrive commercially must be addressed first. It is generally recognized that the commercial justification of broadband itself depends on the growth in demand of enhanced speed Internet and also on the deployment of e-government and e-commerce services that are broadband dependent. Since there is a debate about which should come first – the network capacity or the demand – some governments are increasingly thinking about the policy challenge of how to encourage or facilitate more ubiquitous deployment on national IP backbones (especially optical fibre systems), especially into lower population areas, such as to the rural district centres and broadband access networks.

Country examples The pre-amble to India's broadband policy published in 2004 recognizes and highlights the two sides to the broadband issue:

Recognizing the potential of ubiquitous broadband service in growth of GDP and enhancement in quality of life through societal applications including tele-education, tele-medicine, e-governance, entertainment as well as employment generation by way of high speed access to information and web-based communication, government has finalized a policy to accelerate the growth of broadband services.

Demand for broadband is primarily conditioned and driven by Internet and PC penetration. It is recognized that the current level of Internet and broadband access in the country is low as compared to many Asian countries. Penetration of broadband, Internet and Personal Computer (PC) in the country was 0.02 per cent, 0.4 per cent and 0.8 per cent respectively at the end of December, 2003. Currently, high speed Internet access is available at various speeds from 64 Kbps onwards and presently an always-on high speed Internet access at 128 Kbps is considered as broadband [1].

There are no uniform standards for broadband connectivity and various countries follow various standards.Government envisions an accelerated growth in Internet penetration and PC as the success of broadband would largely be dependent on their spread [2]. The following statement from Pakistan's broadband policy highlights the regulatory, content and fiscal measures required to enable broadband take-up:Broadband lessons from the world marketsCountries with high penetration of broadband users such as the Republic of Korea, Japan and Canada have all implemented conscious policies for the growth of broadband in their countries. These policies have included growth enablers such as price reductions for the use of infrastructure, unified licensing for service providers, the government's setting of strict annual broadband penetration targets, content and e-commerce development incentives and lowering of the price and tax barriers on the broadband terminal equipment. The resultant growth and high penetration of broadband has contributed significantly to the social and economic standing of these countries. Realizing the social and economic benefits of broadband, other countries such as India and Egypt have also recently issued similar strategies for the growth of broadband in their countries [3].

It seems therefore recommendable for countries to formulate specific and stand-alone national broadband policies, that address the whole range of available options and measures that can elevate broadband infrastructure development and facilitate content and service development in key sectors such as education, health, business and finance which in turn stimulate and encourage broadband uptake and usage. UAS policies then can complement the national broadband policies, by addressing areas and customer groups that are beyond the market and require special (financial) intervention to gain access to basic broadband services (e.g. the minimum acceptable speed of what is considered broadband at the time). Measures for rural expansion The desire to accelerate broadband facilities into rural areas is the added driving force that makes a national broadband policy relevant to UAS policy.

The possibilities for financing broadband infrastructure to reach beyond the market include:

- The use of government finance as direct investment through public-private partnerships (PPPs);
- The use of frequency auction receipts by government to finance open-access national broadband networks, managed by an independent management company; and
- The use of UASF resources as a smart subsidy under competitive tendering for supply of infrastructure.

However, as noted above, a broadband policy typically includes several other measures designed to reduce costs and prices, stimulate the use of enhanced services, and give incentives to service providers. Thus, a UAS policy can complement a national broadband policy. Broadband expansion to rural areas is only usefully included within a UAS policy if the fundamental barriers to its deployment – regulatory, commercial and demand based - are addressed at the higher level of a national broadband policy that deals with creating an enabling environment (see also Section 2 on Sector Reform).

Reference Documents

- **Building Broadband: Strategies and Policies for the Developing World**
- **Toward universal access to broadband in Australia: a case study**
- **Universal Access & Service (UAS) and Broadband Development**

4.4.1.4 INTEGRATED OR SEPARATE UAS POLICY

There are three possible scenarios for a universal access and service (UAS) policy document:

- The UAS policy is incorporated within either the communications or ICT policy and UAS concepts and objectives are well fleshed out;
- The UAS policy is a separate policy document where the communications or ICT policy pre-exists but contains only brief references that require expansion; or
- The UAS policy is formulated as a stand-alone policy but written into regulations, giving greater force and details to the more general UAS references contained in a communications or ICT policy.

Any government in the process of renewing its communications or national ICT policy has the option to integrate the UAS policy into it. Helpful considerations in deciding whether this is desirable or not, might include:

- Are there political considerations which might make it desirable to have a stand-alone, prominent UAS policy;
- How large an issue is UAS? If a large part of the population and country is already served, UAS might not need a separate policy and can be sufficiently addressed within the communications or national ICT policy with the help of regulation;
- How long is the UAS policy document? A long UAS policy might justify a separate policy document; and
- How well defined is the UAS funding mechanism?

In some cases, even if the first three conditions favour incorporating UAS into the main sector policy, the fourth, funding, is often sufficiently crucial to justify a separate UAS policy. Saudi Arabia and Pakistan are good examples of countries where the UAS policy is almost wholly focussed on the objectives and practices regarding the UAS Fund. These policies are provided in the reference documents, The Universal Access and Service Policy and Universal Service Fund Policy. Alternatively, UAS funding mechanisms can be implemented through special regulations. Nevertheless, it is possible that a new UAS policy and regulation may require changes in legislation, discussed in **Section 4.3**.

Reference Documents

- **The Universal Access and Service Policy**
- **Universal Service Fund Policy**

4.4.1.5 UAS INSTITUTIONAL FRAMEWORK

Related to the questions surrounding where to locate a universal access and service (UAS) policy, are the following questions:

- Who should develop and draft UAS policy; and
- Who implements UAS policy?

Who should develop and draft UAS policy? Typically, a UAS policy is developed by the ministry responsible for communications (or in countries without a ministry by the entity responsible for communications), often with significant input or even responsibility for drafting by the regulator. That ministry might of course be constituted in one of several ways:

- Telecommunications;
- Electronic communications (including broadcasting and other media);
- Information and Communications Technology (or Communications and Information Technology)
- Infrastructure, including transportation;
- Combined with industry or science and technology; or
- Combined with another sector such as economic affairs.

Ministries other than the one responsible for telecommunications and ICT (e.g., education, science and technology, economic planning, finance, municipal and local government) are also usually considered to be stakeholders. For example, one or more might have a seat on the Board of the Universal Access and Service Fund (UASF). However, their involvement in the UAS policy development and drafting is usually one of contribution to a consultation process rather than as an actual sponsor of the policy. Consultation is strongly recommended as a part of UAS policy development. The telecommunications and ICT industry, as well as non-government organizations (NGOs), should also be part of the UAS consultation process, as discussed in Section 4.3.6.Who implements UAS policy?UAS policy may be implemented by the country's National Regulatory Authority (NRA), the ministry responsible for telecommunications and ICT, or an independent agency established to manage and administer the UASF. Each is considered below.RegulatorMany countries opt to have the independent NRA responsible. This is a sound approach for many developing countries because:

- The regulator typically has the required industry sector expertise, and skilled technical, economic and financial staff;
- The regulator has a degree of independence and is perceived to be one step removed from politics; and
- The regulator has established relationship and credibility with industry that is often the main partner in implementing UAS policy.

There is a trend towards multi-sector regulation, including broadcasting. Under this scenario, the same reasons apply for it being responsible for UAS implementation.MinistryIn a number of countries, the ministry responsible for communications implements UAS policy (e.g., Colombia, Guatemala, India where the ministry manages the UASF). This has the apparent advantage that the agency responsible for policy is taking responsibility to carry it out. However, the main disadvantage is that since the UAS policies sometimes include special financing instruments (e.g. a UASF) for which the main contributors are the industry (either through a levy or use of frequency receipts), government is not perceived as being far enough removed to be an independent administrator of the finances, especially if the government has any ownership interest in the industry. Operators may view the additional collection of a UAS levy by a government ministry as representing another form of taxation, or they may perceive that the funds could be too easily taken into the general budget account. On balance, international practice indicates that government as UASF administrator is not the best approach. Independent UAS AgencyA few countries have opted to establish a separate agency. South Africa [1], Pakistan [2], Ghana [3] as well as the United States and Canada have established separate UAS agencies. Peru and Nigeria have independent banks or trusts as the financial managers for a UASF, even though the regulator in Nigeria has the planning and secretariat role while the Peruvian fund is under the Ministry for Transport and Communications. While a completely separate agency elevates the status of universal access and service and creates at least the appearance of even greater independence, it comes at a higher cost as well as with increased complexities of co-ordination. The Practice Note Table of Ministries, Policies and UAS/UASF Executing Agencies provides a tabular summary of the practice in this regard for a representative sample of countries.

Practice Notes

- **Table of Ministries, Policies and UAS/UASF Executing Agencies**

4.4.1.6 BASIC STRUCTURE AND KEY PRINCIPLES OF UAS POLICY

Whether it is a fully integrated policy document or is limited mainly to the financing aspect of universal access and service (UAS), a UAS policy should adhere to policy formulation standards, processes and formats. Although these may be unique to each individual country, as a general guide the following elements are usefully addressed in the policy. The structure of existing UAS policies do vary quite substantially. A suggested general outline of main sections, which reflects best practice for policy formulation, is as follows:

  - Introduction & background;
  - Status of the telecommunications and ICT sector;
  - Vision, policy direction and objectives;
  - (Optional) Key challenges and barriers;
  - Strategic mechanisms for the implementation and funding of UAS;
  - Implementation arrangements;
  - Principles of operation of the chosen instrument(s), for example
    - Universal Access and Service Fund (UASF);
    - Mandatory service obligations issued with new licences;
    - Competing for subsidies;
    - Regional operators;
    - Infrastructure sharing;
    - Etc.
- Monitoring, evaluation and review.

This outline is expanded in Practice Note *Model outline for a UAS policy* which includes features found in most countries' UAS policies and which suggests a general standard for policy structure. Because of the options available and varying context from country to country, any outline used as a model has some overlapping or country-specific content which can be eliminated, adapted or relocated elsewhere in the document.In terms of policy approach and strategies, a balance is required between providing policy direction and guidance while allowing some flexibility during implementation, i.e., during the design of the UAS programme, targets and schedules. It is helpful to formulate core principles and values within the policy, while the aspects related to execution and targeting of these principles and values remain flexible. An example of principles that are considered best practice is described in the Practice Note *Key principles and approach to UAS policy implementation*.

Practice Notes

- **Key Principles and approach to UASF policy implementation**
- **Model Outline for a UAS Policy**

4.4.2 UNIVERSAL ACCESS AND SERVICE POLICY DEVELOPMENT

Developing a universal access and service (UAS) policy generally begins with these essential questions:

  - Who is the lead ministry or entity developing the UAS policy (see **Section 4.1.3**);
  - What is the main purpose for developing the UAS policy? (e.g., social harmony/ regional balance; economic growth; global competitiveness; reduction in rural to urban migration; poverty reduction); and
  - What are the UAS aspirations (e.g., there can be different emphases on telephony, Internet and broadband – while all three might be desired, the main focus could be any of them).

After determining the scope and primary concepts of the UAS policy, there are several stages and procedural elements involved in developing the policy, which are described in this section:

  - Sector review – establishing the current status quo, barriers to growth, potential solutions and UAS strategic options (**Section 4.2.1**);

- Policy formulation – setting specific objectives, time-bound targets and strategies to achieve those goals (**Section 4.2.2**);
- Regulatory measures – their priority over other government interventions and their ability to reduce costs of implementing the UAS policy (**Section 4.2.3**);
- Financial analysis – identifying the required financial resources to implement the policy (**Section 4.2.4**);
- Economic appraisal of UAS options - using strategic socio-economic considerations for policy development, and micro-economic analysis to decide on priorities and sequence within a UAS programme (**Section 4.2.5**); and
- Consultation – several stages of consultation with various stakeholder groups to solicit input, feedback and develop broad buy-in (**Section 4.2.6**).

Policy development is likely to require a few iterations. For example, input from consultation can result in adjustments or changes to the draft UAS policy before it is finalised.

Reference Documents

- **Universal Access & Service (UAS) and Broadband Development**

4.4.2.1 SECTOR REVIEW AND MARKET ANALYSIS

Formulating a universal access and service (UAS) policy begins with a realistic assessment of the current status of the sector's services reach, in order to be able to chart a roadmap of where the country wants to go in regards to ICT and UAS. A key questions is:

- What is the country's status quo in terms of universal access and what progress has been made towards universal service? In particular, what areas and population groups do not have access to ICT services?

A number of activities and methodologies can be used to provide the underlying data and analysis necessary for the development of UAS policy. These are as follows:

- Background study and database: This is a brief desk study that summarizes the geographic, demographic, socio-economic and cultural composition of the country. Ideally, the data base and analysis should be broken down to the smallest local administrative level for which it is feasible to collect data. This is often at the district level, but in populous countries, or ones where data is freely available, data to sub-district level is desirable. Household income and expenditure data is especially useful; details of the desk study are discussed in Section 7.1.1.
- Telecoms and ICT sector review: This encompasses an inventory of existing infrastructure and services around the country, but also includes a review of the policy and regulatory environment for ICT, and possibly even the investment and business environment. Usually, the best approach is to interview the ICT industry players directly who will provide data on current network services and reach, as well as future plans, views on market trends, and their opinions on universal access (UA), rural communications and progression towards universal service (US).
- Coverage and GIS maps: The information gathered from reviews and studies can be represented with coverage and GIS maps. However, because the ICT market is evolving rapidly, data can quickly be out of date. The focus of the ICT sector review should be to enable a policy formulation based on an understanding of the current situation and near future developments; it does not require absolute accuracy. It is nevertheless, helpful to set up a process and structure that allows for regular reviews (e.g., annually) of the ICT sector and of UAS related data.
- International review: Policy makers benefit from researching and discussing current best practice and trends for UAS, especially of countries that have comparable characteristics and challenges.
- Demand studies: These are particularly valuable as they gather information from the intended beneficiaries of the UAS policy in regards to their actual UAS needs. By investigating affordability, crucial information is gathered to model the subsidy requirements for various UAS objectives. Details are discussed in Section 5.2.

The above approaches and methodologies provide a good foundation for developing UAS strategy and policy. The analyses will highlight required targets, strategies and solutions to achieve UA and a country's progress towards US.

4.4.2.2 POLICY FORMULATION

After the sector review process has provided a foundation of data, analysis and initial viewpoints from various stakeholders, decisions on the following key questions need to be made:

- Which services (e.g., telephony, Internet, broadband but also directory assistance and access to emergency numbers) should be included into the universal access and service scope (see also **Section 1.1.5** and **Section 1.1.4**);
- Which specific **targets** for each of the services should be set;
- What **main groups** should be targeted (e.g., rural population, urban poor, people living in socio-economic depressed areas);
- What other **special targets** are advisable e.g., schools, libraries, hospitals, etc.(see also **Section 1.1.2** and **Section 1.1.7**);
- What **timeframe** should be set for certain targets to be achieved and what timeframe will the UAS policy cover;
- What **approach** should be used and which **strategies** employed, covering
    - Estimating cost of achieving set targets and whether public funding (subsidies) is required;
    - Who will provide the funding and how is it collected;
    - Who will deliver the services (e.g., operators and service providers, NGOs, entrepreneurs, etc.); and
    - How will those entities be selected.

- **Future proofing:** How will the policy be adjusted to reflect market changes over time?
- **Who** is going to take the lead in the implementation (including coordination and monitoring) of the UAS policy?

The following table [1] provides an illustrative example, comparing the status of services and UAS targets in different types and sizes of localities.

Table: UAS programme current status and targets										
Geographical category	Current status and target dates									
	Existing fixed or mobile network reach	UA Telephony (fixed or mobile) 100% public access		US Telephony Hshld penetration to reach above 75%		Internet Point of Presence & Public Access Centre (one per community)		Internet access to all schools	
		Current status	Target date	Current Typical	Target date	Current status	Target date	Current status	Target date
Urban centres	100%	100%	n/a	67%	2009	n/a	n/a	80%	2009
District Centres	100%	100%	n/a	50%	2010	50%	2010	30%	2010
Villages above 5,000	90%	80%	2009	33%	2011	20%	2012	10%	2012
Villages above 2,500	80%	70%	2010	25%	2011	10%	2014	5%	2014
Villages above 1,000	75%	60%	2010	20%	2012	None	2016	2%	2015
Villages above 500	60%	40%	2011	20%	2013	None	2020	None	n/a
Villages above 250	50%	30%	2012	Low	2016	None	2021	None	n/a

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

The elaboration of urban and rural locality classifications and the population-specific targets typically are established through the development of a strategic programme.A simple way of stating policy objectives is illustrated by the UAS Policy of Saudi Arabia, which sets overall targets for UA and US within specified timeframes. These are as follows [2]:

Table: UAS policy targets in the Kingdom of Saudi Arabia (2006)		
Service	Target dates from commencement of UAS Programme	
	Universal Access [Public access at all mandatory service locations]	Universal Service [Available private service within 5 days of demanding in all mandatory service locations]
Telephony	3 years	5 years
Internet	5 years	7 years

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

International and regional goals and in-country focus Internationally relevant for universal access and service (UAS) are the World Summit on the Information Society (WSIS) objectives, and the Millennium Development Goals (MDG), discussed in Section 1.5, as they allow countries to develop their own UAS goals in context with global aspirations. Also, regional organisations and their formulated goals for UAS might be helpful benchmarks for countries. For example, the association of regulators of information and communications for Eastern and Southern Africa has developed policy guidelines for UAS. The Connect Africa Summit that took place in Rwanda in 2007 adopted five goals to bridge the digital divide in Africa. The

ASEAN countries have a working group on universal access and the digital divide and adopted a declaration on Enhancing Universal Access of ICT Services in ASEAN in 2007. The Caribbean community (CARICOM) has also developed a joint agenda for connectivity that includes UAS plans and a Universal Access and Service Fund (UASF) if needed. [3]

However, UAS goals need to essentially be tailored carefully for each country, meet the local requirements and be feasible. Also, in many countries, UAS targets ultimately need to be presented in detail since the network reach and current service status may vary significantly from region to region within a country and thus programme development and targets may need to be set regionally. Having said this, UAS policy itself will usually be limited to making general statements about regional equality, ubiquity and reaching rural areas, in addition to the macro targets as given in the previous example. Strategic approachesIn addition to targeting universal access to specific services and increased private service, some UAS policies may include complementary measures or objectives, such as ICT training, content development, and Internet national traffic switching, which are designed to improve the UAS environment and user capacity. The following example from Uganda's Rural Communications Development Policy shows a carefully balanced strategy that has proven to be successful [4]:

Table: Elements of Uganda's Rural Communications Development Policy 2001

Expenditure activities	Proportion of subsidy investment (Per cent)
Public telephony infrastructure	40
Technical enhancement packages (e.g., mounting pole, transmission line and antenna) to enable simple handsets to operate as public access telephones in weak signal areas	3
Internet POPs and wireless access in all district centres	12
Internet Exchange Point (IXP) initiative	1
Internet access and telecentre / ICT projects for vanguard institutions (One per district)	10
ICT start-ups and training (including support of ICT in one school per district)	20
Rural post franchise support costs	8
ICT training capacity investment	3
ICT awareness and ICT content creation projects	3
Total	100

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Specific measures to improve penetration and reach universal serviceThe strong position of mobile communications in developing countries has enabled policymakers to include penetration and universal service targets first for main urban centres, then into smaller regional towns or district centres and smaller communities in a progressive fashion. Guidelines for universal service elements of the UAS policy, targeting households in areas with strong network presence [5] may be as follows:

- A private phone (fixed or mobile), connected to a network service with a selection of tariff options and, in particular, options of usage affordable [6] to households in the lowest decile (10 per cent) of income of the population;
- The service should include access to at least basic data service, with the minimum acceptable speeds determined from time to time by the regulator;
- Information and customer support services should be provided by the operator free of charge;
- The service should include directory service, accessible by dialing a publicized number and provision of information on telephone numbers of (at a minimum) government, businesses and social infrastructure offices connected to the fixed line network. Mobile numbers should also be included where made available by the listed entities;
- Services should provide free phone calls to the area's emergency services (police, fire and health) in the caller's area; and
- Services should advertise options and features to enable customers with sight and hearing impairments and other disabilities to access and make use of the service.

In addition, rural penetration targets should be published. For example, in 2006 Pakistan set an overall target of achieving rural penetration of 6 per cent of its population by 2010, in addition to the targeting of underserved regions for network expansion and specific village-level telephony and Internet UA service targets [7]. Several countries, notably Algeria, Egypt, Tunisia and Nigeria, have national programmes and initiatives to boost PC penetration. The main approach is to negotiate discounts for the price of the PCs used in the programmes, and offering low interest loans and pay-back schemes for households and other beneficiaries to be able to purchase a PC. The Practice Note Programmes to boost household PC penetration summarises the programmes of the above mentioned countries. Future proofing Services and targets need to be selected carefully. This is a challenge, as targets need to be feasible, as well as forward-looking and future-proof, so that they are still valid and appropriate during the lifetime of the policy and are not superseded by market developments. Most policies are designed for a five to ten year horizon, while a UAS programme sets targets for one to three years. The policy itself should allow for a process of review and update so that it may adjust targets.

Practice Notes

- **Programmes to boost household PC penetration**

Reference Documents

- **Funding and Implementing Universal Access: Innovation and Experience from Uganda**
- **Output-based aid in Uganda: Bringing Communication Services to Rural Areas**

4.4.2.3 THE PRIORITY OF REGULATORY MEASURES

As discussed in **Section 1.3.3**, best practice addresses the market efficiency gap first through improved sector reform and regulation, and optimization of the investment and business environment and prioritizes the enabling of commercial solutions. This reduces the financing required for a universal access and service (UAS) programme that implements a UAS policy. Because of the rapid development of the telecommunications and ICT industry, commercial solutions may be more sustainable and arrive faster than policy makers are able to anticipate when designing policy. Policy makers and regulators need to be careful not to waste time and resources planning interventions for areas and basic services that would be better served without intervention. Before implementing interventions involving special finance, for example from operator levies, government budget or frequency or licence auction receipts, for universal access and service, it is best to focus on:

- **Regulatory measures** that create an environment more conducive to competitive network expansion or infrastructure sharing;
- **Fiscal measures** that will make communications service and hardware more affordable to low-income users; and
- **Enabling** activities, such as promotion, advertisement and capacity building that highlight the opportunities available to people, communities and organizations to take advantage of the services offered in the competitive market.

It is conceivable that a UAS policy sets objectives and asks the industry to achieve them voluntarily and will only implement special measures such as a UASF or new licences with UAS requirements, for example, if the market makes insufficient progress towards achieving the UAS objectives.In summary, minimizing the cost of the UAS policy and programme is achieved through the removal of regulatory and other barriers to the commercial expansion of the market. This in turn reduces the portion of population and geographical areas that must be supported financially. UAS policies can include the objective of removing regulatory barriers to market expansion and efficiency in order to improve the provision of UAS.

4.4.2.4 FINANCIAL CONSIDERATIONS AND ANALYSIS

Financial analysis plays a role in universal access and service (UAS) policy development and implementation. Its role in policy development is considered in this section. A fuller treatment of financing universal access and service is provided in **Chapter 5**.In the past, financial considerations related to UAS were often concerned with calculating the costs of UAS provision, using methodologies for calculating net cost (capital and operating costs minus income) and accounting for intangible benefits of a universal service provider. Traditional financing approaches such as cross-subsidization and access deficit charges are replaced by more competitive mechanisms that leverage private investments and sometimes involve universal access and service funds (UASF), where finance is largely provided by the sector itself. With competitive mechanisms, detailed cost calculating is no longer required, and replaced by cost modeling to establish a maximum subsidy ceiling for operators to provide certain UAS services; UAS services are specified including details such as a maximum retail price and quality of service standards. The actual subsidy costs (which in practice might be often lower than the ceiling set) are then determined through a competitive process (see also **Section 3.1**, **3.2** and **Section 7** of this Module).The three main questions related to finance in UAS policy are:

- What is a financially feasible UAS policy, i.e., what is the limit?
- Where should the financial resources for a UAS programme come from; and

- How much finance is required to implement the desired UAS policy and programme strategy?

Other, more detailed questions such as who is responsible for managing the available finance, and rules and mechanism for disbursing funds and their effectiveness are discussed in **Chapter 5** and **7** of this UAS Module. Realistic targets Policy development needs to consider the desired outcome and the financial resources available in order to arrive at a feasible strategy. Countries benefit from having realistic objectives and targets that can be financed without strain, and which they have the capacity to manage. If policy makers set UAS goals and targets, which for example are so ambitious that to achieve them, would cost perhaps 5 per cent or more of the sector's annual revenues to subsidize, it might be unrealistic to set these goals. But a programme that costs only 1 per cent of the sector's revenues is more realistic, as long as the programme administrator (e.g., the UASF) has the necessary management and staff to administer the projects. Sources of UAS financeUAS programmes are generally financed by the following sources:

- Government general budget; in a minority of cases, including one of the first funds, Chile's Fondo de Desarrollo de las Telecomunicaciones;
- An annual regulatory levy, as a percentage of annual revenue, on all or certain classes of licensed operators;
- Various other regulatory sources such as the proceeds of license competitions, frequency spectrum auctions and fees; and
- Once-only contributions from government, financed by loans or grants from international donors such as the World Bank or other international aid institutions, contributing seed finance to assist UASF start-up in the early years.

The majority of UASFs are financed through annual operator levies, although the legal instruments (e.g., the Communications Law) establishing the fund might typically name all potential sources, or be worded in an open fashion to allow for all possible sources. As noted in **Section 3.2.2**, operator levies typically range from less than 1 per cent of operator revenues (e.g., in South Africa) to 5 per cent in India and Colombia and 6 per cent on certain qualifying revenues in Malaysia. UASFs are discussed in-depth also in **Section 3.2**, **5.2** and **5.3**.

However, a stronger case could be made that the funding should, if possible, be more balanced between the first three financing sources. For example Guatemala's FONDETEL uses part of the proceeds of radio frequency auctions and licence competitions to finance UAS programmes. Auction proceeds are paid by various industry players for a national resource. It typically is simply added to the government budget, but it might be more appropriate to use this money particularly for ICT development, such as to fund UAS or special measures for broadband development (e.g. increasing PC ownership or equipping schools with computer labs and broadband access). As described in **Section 5.4**, a large number of other sources, including international donors, non-government and corporate, are also involved in financing and supporting telecommunications public access, and ICT projects and applications. These often encompass applications that cut across several sectors of the economy, from education to commerce, health and governance. These investments often contribute most to awareness, market stimulation and capacity building, and so support progress towards UAS. Finance required to implement UAS programmesMost often required finance for a UAS programme is estimated in the context of a UASF. However, countries without a UASF might also find it helpful to review the considerations below to determine appropriate operator levies for a UASF. There are two ways to estimate the appropriate level of UASF contributions for each country. These are as follows:

- ***Policy-driven approach –*** Determine what scale of subsidy programme would be required to meet the country's policy objectives and time-bound universal access and service (US) targets. The total cost and subsidy estimates are compared to the total sector revenues. The percentage of total sector gross or net revenues calculated by this method becomes the high level estimate; or
- ***Market-driven approach –*** Determine from a survey or assessment of operator and other stakeholder opinions, as well as from international benchmarks, what operators would accept or could afford as a reasonable contribution. Then develop the UASF programme to match this.

For many reasons, a hybrid and iteration of these methods recommends itself. The main reasons are:

- Levies based solely on a top down approach may be a political wish list which is not rooted in the reality of what can be achieved, or should be attempted, in a given time frame; However, if the government is willing to add to the finance from the sector or use frequency and licence auction proceeds, a more ambitious programme could be implemented.
- The top down approach with a large and ambitious programme could require a larger than realistic bureaucracy, in the form of UASF staff and programme management, which is costly and is not supportable by the industry alone; and

- The initial estimate of programme cost can be quickly outdated due to the sector's fast pace of development, resulting in much less UASF subsidy required than first thought.

International experience of UASFs indicates that there are no developing countries which have been able to disburse more than 2 per cent of sector revenues in their UASF programme. This might be a helpful guide for countries to size their own UAS programme, even if they do not choose to use a UASF. **Section 3.2.4** illustrates that in the major countries that levied 5 or 6 per cent, despite having established sophisticated UASF organizations, less than half of the revenues collected have been redistributed to the sector through subsidies. **Section 5.3** discusses challenges of disbursing funds as well as best practice of efficient fund management.

4.4.2.5 ECONOMIC APPRAISAL OF UAS OPTIONS

Detailed economic analysis is typically undertaken at the stage of universal access and service (UAS) programme development, often to determine project priorities, and is less important at the UAS policy development stage. However, broad economic considerations are important in the policy formulation. As discussed in **Chapter 1**, countries develop UAS policies based on the premise that access to basic and advanced telecommunications and ICT services have a wide-ranging socio-economic rationale. This recognizes the importance of telephony and ICTs as enablers of growth and equality in the country, and competitiveness on the world stage. However, some projects may deliver different types and levels of benefit more than others, or deliver the benefit in different parts of the country, all of which are reasons why UAS programme and project selections need to be made carefully and priorities set between the available options. UAS implementing agencies need to consider and analyse the economic impact and relative value of the UAS strategic options, programmes or projects, make selections or set priorities in the context of national economic growth, developmental impact (including poverty alleviation), commercial viability, regional balance and related economic concerns.Key factors that are considered in the implementation stage of UAS policy include:

- The total population reached by each project or potential investment;
- The expected impact and poverty reduction effects, as compared to the vision and objectives of the policy;
- The regional benefits and equalization in socio-economic terms;
- The commercial viability and sustainability of a programme;
- Leveraging of private participation in the UAS programme;
- The subsidy cost per beneficiary; and
- The benefit to cost ratio or Social Net Present Value.

These factors and the economic analysis methodologies used to evaluate them and to set programme and project priorities, are described in **Chapter 6**.

4.4.2.6 CONSULTATION

Consultation is a significant part of all policy and regulation development and is considered best practice in universal access and service (UAS) policy development as well. There are several stakeholders that should be consulted during the development of a UAS policy. These potential contributors are:

- **Government ministries** that have a close interest in UAS and need to be involved. Typically, these are the ministries responsible for economic affairs, agriculture and rural development, science and technology, education, health and finance. For example, part of the UAS policy could encompass fiscal measures (e.g., reduction or elimination of important duties on UAS related technology) that require support and buy-in from the finance ministry. Another example is collaboration with the Ministry of Education to ensure that schools targeted for Internet access under the UAS policy are well prepared for the new opportunities through ICT training for teachers, computer labs and ICT teaching material.
- Industry – typically, communications operators and service providers are the key partners in implementing the UAS policy, providing the UAS services, and often are the main contributors to a UASF. Strategic decisions concerning the proposed UAS targets, required industry levy, available technologies, and the use and management of a Universal Access and Service Fund (UASF) if chosen, including the subsidy strategy, cannot be made in isolation. It is best to hold industry consultations on objectives and targets early in the planning process. The UAS policy development process is also an opportunity for regulators and industry to dialogue on the functioning of the market and how regulation can help to provide UAS commercially.
- Parliament – there may be a special committee that focuses on communications, or at least one or several parliamentarians, including opposition members, who are interested. The inclusion of opposition members on

committees might increase the chances that any required amendments to the law are passed faster.

- Beneficiaries of the UAS policy – usually these cannot easily be consulted directly (other than through a field demand study). Thus various entities representing the beneficiaries in a broader sense could be consulted, such as:
  - Non-government organizations (NGOs) that work with the disadvantaged and poor;
  - Civil society organizations;
  - Local government representatives in under-served areas;
  - Consumer protection organizations; and
  - Organizations representing a large population group in underserved areas such as farmers' organizations, tea and coffee growers, etc.

Stakeholder involvement is crucial for the support of the UAS policy and its success. If a UASF is chosen to be the mechanism that will finance the UAS policy implementation, then stakeholder consultation is important for establishing credibility for the fund and its management. If new licences are to be issued (e.g. service- and technology-neutral ones), and used as the main UAS instrument by attaching UAS requirements, as has been done successfully in South Africa and Brazil, then existing licencees need to be involved to strike a feasible balance between the new licences' financial benefits for operators and the cost of attached UAS requirements. Consultation and involvement ensures that industry will buy-in to the new programme and will voluntarily contribute the finances required to support it. Consultations can be made through public workshops, smaller working groups or a more formal consultation process where a consultation paper is produced, to which written inputs are requested. Consultation with stakeholders varies in its intensity – with some stakeholders, consultations serve as a mechanism for keeping stakeholders informed and up to date, while other stakeholders (typically the industry) need to be involved through more active discussions and working groups. Also, there are different stages of when to consult – some stakeholders provide valuable input at the beginning of the process while others may have more to contribute once a specific UAS policy proposal, that is refined through the stakeholder input, is presented to them. Each country has to determine what mix of consultation is most suitable to the process, but it is important that the following recommendations be taken into consideration.A formal public consultation process is helpful close to the end of the policy's development, but before the draft UAS policy is finalized. This allows the industry and other stakeholders to respond to proposed elements of the UAS policy. This consultation can include the proposed financing mechanism, proposed targets, and the management structure of the proposed instruments to achieve UAS (such as a UASF). It is best practice to share demand study data with industry, from areas where UAS projects are proposed, so that maximum knowledge is available ahead of any competitive tendering. Operators will typically conduct their own demand assessments as well. In some consultations, different views regarding demand, customer affordability, construction and operating costs will be presented. This dialogue should be part of a healthy ongoing consultation or working group process, since government and industry are partners in how to reach marginal and remote areas, and will determine what finances will be required.

4.4.3 LEGAL MODIFICATIONS AND REGULATIONS

Once a universal access and service (UAS) policy is developed, legal modifications and further regulations are often required in order to implement the policy. Typical issues that need to be addressed are the following:

- The legal basis for the chosen financing instrument: collecting a UAS levy from operators and service providers (licensees), using frequency and licence auctions proceeds to finance UAS, developing a new licensing regime with attached UAS requirements, or infrastructure sharing, or any other chosen instrument;
- The legal instruments to apply selected financing or implementation mechanisms (e.g., set up of a Universal Access and Service Fund (UASF), authorize its management and fund disbursement, new licensing regimes and draft licences);
- Detailed guidelines on UAS policy implementation, UASF objectives or objectives of any other chosen UAS strategy; and
- Detailed regulations, guidelines and principles of the UASF management and operation, if a UASF was chosen.

The precise amount of required legal revision or additional regulation may vary significantly from country to country depending on how much detail might already be contained in existing law, and on the country's legal tradition. The range of options and minimum requirements are provided in this section.

4.4.3.1 LEGAL AMENDMENTS

As discussed in **Section 4.1.2** elements of a universal access and service (UAS) policy can be contained in a telecommunications law or other related law, in related policies (e.g. ICT, broadband, IT, etc) and in implementations strategies and detailed regulations, in addition to the UAS policy document itself. It is possible that amendments to existing laws may be required when developing and implementing a UAS policy, or in spelling out the details of a UAS provision that already has some legal basis or is mentioned in policy. The following makes no distinction between countries that may have some previous mention of universal access or universal service (albeit inadequate) and those that do not. In both cases, legal amendments or new legal instruments could be required to enact a new or updated UAS policy, such as to establish or operationalize a UASF, design a new licensing regime, create infrastructure sharing legislation, develop specific public-private-partnership projects, etc. Required amendments might have to comprise or address the following:

- Legal concept paper to describe the new policy environment or objectives, and the legal instrument(s) or revisions to be enacted to institute or revise the provisions for UAS (or specific terms chosen by the government for these concepts). This paper is typically required to precede or accompany the new legal drafts;
- Definitions of UAS. Ideally the law should give the regulator (or implementing agency for the UAS policy) the power to revise the UAS definition from time to time in terms of what services are included, etc., based on certain principles;
- Additions to the power of the regulator, or chosen implementing agency, to implement the UAS policy;
- The legal basis for the chosen financing instrument: collecting a UAS levy from operators and service providers (licensees), using frequency and licence auctions proceeds to finance UAS, developing a new licensing regime with attached UAS requirements, or infrastructure sharing, or any other chosen instrument; and
- If a UASF is to be established, its sources of funding and its intended use, how it is constituted, managed and administered and who should be accountable for it.

Depending on the legal customs and traditions of a country, these legal amendments might be quite general, or conversely, specific and detailed. If the law is more general, many of the specifics can be articulated in more detail within regulations. The advantage of working with regulations rather than detailed and specific law is that regulations can be more readily modified, as they can be passed by a line ministry or the cabinet, while laws typically have to pass Parliament. Thus, key principles, crucial elements and approaches are usually placed into the law to ensure that the UAS policy direction and intention is not fundamentally changed. Smaller implementation details go into a specific regulation, and can be modified if experience shows there is need to vary the approach. While the law ideally contains the overall objective of UAS, specific targets, procedures and timeframes are best not included, as these can change over time and might need to be reviewed and modified periodically. Specific targets and timeframes are better contained in the UAS policy and, in more detail, in an implementation strategy document, sometimes also called master plan.In summary, assuming a legal revision is required to enact or change a UAS policy and establish the chosen financing or implementation instrument, the requirement for legal change is usually two-fold, namely 1) a legal amendment to add or revise the scope of the UAS policy, and 2) the legal instrument to establish and grant authority to the chosen financing and implementation mechanism.

4.4.3.2 DETAILED REGULATIONS

Detailed regulations are typically required, irrespective of whether a new or revised law is necessary, for the implementation of a universal access and service (UAS) policy.The following describes the issues which must be covered by regulatory documentation, once the design of the UAS policy has been decided upon:

- Detailed network and service objectives for the regulator or agency to implement the UAS policy;
- Detailed institutional implementation arrangements such as establishing a specific UAS department or directorate within the regulator, or establishing a separate implementing agency;
- The functions to be fulfilled in developing a detailed UAS programme– e.g., defining and zoning areas of the country to determine those which are served, unserved, commercially viable, non-viable, setting strategy, determining priorities, designing projects, monitoring outcomes, etc.;
- Guidelines, principles and procedures of the UAS implementation, any supervisory or monitoring board, or consultative committee (whichever style of direction is chosen);
- Responsibilities such as UAS programme approval, official sign-off on UAS disbursements, and other detailed accountabilities;
- Details on plans for UAS programme annual reports, their implementation, success and challenges, progress towards the UAS objectives and their public dissemination;
- Provisions for periodic reviews of the UAS policy, objectives, strategies and the regulation in case changes in

the market or policy-environment require updates.

In case a Universal Access and Service Fund (UASF) is to be established, the following additional regulations are typically required:

- Detailed rules on process and eligibility for UASF disbursement;
- Specific financial regulations, including the holding and investment of UASF funds, eligible costs and expenses, limits on operational and administrative costs, and financial control, reporting and independent auditing; and
- Detailed accounting rules for operators in order to establish the correct UASF licensee levy.

Section 5.3 Institutional issues: Managing and organizing a UASF describes in detail the various issues, options and requirements from a financial and organizational perspective.Depending on the country's context and legal and regulatory traditions, the above details could also be contained in any of the following regulatory documents, which could in effect be equivalent except in name. These documents are:

- UASF administrative rules and guidelines;
- UASF executive guidelines; and
- UASF manual of operating procedures.

Typically, rules and guidelines are binding regulatory documents, though as stated in the previous section, they can be revised through regulatory decisions or the preparation of succeeding regulations. A manual might have considerable overlap with some of the contents of regulations listed above, but it may be a more practical guide, containing details on staffing, selection of UAS projects for those implementing the policy and administering the fund. An example outline for this kind of document is provided in Practice Note Outline Manual of Operating Procedures.

Practice Notes

- **Outline for manual of operating procedures for UASF**

4.5 FINANCING UNIVERSAL ACCESS AND SERVICE

This chapter addresses issues related to the financing of universal access and service (UAS) and of related ICT infrastructure and service development.

As explained in **Chapter 3**, prior to the onset of market liberalization, the traditional or administrative approach to meeting UAS objectives was to place certain universal service obligations (USOs) onto the dominant incumbent operator. If losses were incurred from the USOs, it was expected that the operator would finance them through cross-subsidization from profitable network services (e.g., long distance and international), through access deficit charges applied to other operators, or through complicated universal service compensation schemes. Donors and multilateral international financial institutions were often prepared to finance investments into rural areas which were assumed to have low or negative financial returns. Today, this approach is unlikely to be used; in most developing countries, no one expects incumbent operators to accept USOs any more. Furthermore, since the mobile revolution, rural service expansion has become more attractive commercially, while even the broadband capabilities of mobile and new wireless technologies offer new possibilities for extended service reach. But some form of funding has to be found to finance gaps which still exist between the market's commercial boundaries and the targets UAS policymakers may wish to reach.

This chapter commences, in **Section 5.1**, with an introduction to the *general trends in ICT development and UAS financing*, showing the breadth of policies and measures which are either financial in nature or have a bearing on financing and investment for extension of ICT services. The model of a mainly industry-financed Universal Access and Service Fund (UASF) using the principles of Output Based Aid (OBA) to finance investments targeted under UAS policy has become a well-known financial instrument for developing countries.

As noted in **Section 3.2.3**, there are some legitimate and understandable concerns regarding UASFs, fuelled mostly by a few unfortunate examples. Some operators have expressed preference for alternatives, such as accepting reasonable rural build-out targets in their licence, or negotiating ex-ante specific rural universal access and service (UAS) targets with the regulator in exchange for relief from UASF levies or taxes (this is discussed in **Sections 2.4.1**, **Section 2.4.2** and **Section 2.4.3**). Also, there have been concerns raised over the complexity of establishing and managing a UASF. However, negotiating fair UAS contributions for all operators, which are equitable between them and accepted as fair, is not necessarily an easy feat either.Most of this chapter deals with the issues related to UASF mechanisms:

- *Sources and market capacity* in **Section 5.2** considers the limits of the market place to afford and support subsidized

UAS investments; and

- *Institutional aspects* in **Section 5.3** surveys the range of issues surrounding the constitution and management of UASFs, their staffing, accountability and transparency.

Section 5.4 then discusses *other (non-UASF) approaches* to funding and the strategic collaborative and complementary role that other players can have in the expansion of UAS infrastructure and services.

Reference Documents

- **Universal Access & Service (UAS) and Broadband Development**

4.5.1 GENERAL TRENDS IN ICT DEVELOPMENT AND UAS FINANCE

Over the last decade, the telecommunications sector has experienced a period of unprecedented growth at almost every level, from mobile telephony to broadband Internet, e-commerce, e-government, tele-education and medicine. At the same time, the style and sources of finance made available for ICT development have shifted radically. Traditionally, ICT infrastructure financing came either from government budgets and revenues generated by the state post and telecommunications authorities, or from donor and international financial institution (IFI) programmes supporting major capital infrastructure investments. Now, donor community financing plays a relatively small role in infrastructure development, except in some categories such as Output-based Aid (OBA) finance (see **Section 5.2.2**). Donor strategies focus at the government level, mainly on policy and regulatory support with almost total reliance on private capital for infrastructure and service development. Beyond policy and regulatory support, donor, non- government and other institutional initiatives focus mainly on fuelling ICT service application and capacity development.Private investment depends heavily on the regulatory climate, with government and donor activities playing an enabling role. However, since the market cannot achieve everything policymakers desire without additional inputs, a number of complementary activities now work together to bring about effective investment in ICT services and successful take-up beyond the urban markets. In a 2004 report of the World Summit on the Information Society (WSIS), in the context of infrastructure development and improved access to ICT services, it was noted that national governments and other stakeholders now have "many tools and opportunities available to them to enhance the attractiveness of their ICT markets for investors and financiers" [1]. The mix of key tools and measures for enhancing ICT markets can be summarized as follows:

- Regulatory reform – in particular, promotion of a level playing field, open access and fair competition for ICT investments and service provision, policies that entice new entrepreneurial investment in under-served areas;
- Universal Access and Service Funds (UASFs) and other public finance mechanisms such as loan guarantees and public private partnerships (PPPs) to enhance and target investments into priority areas in need of special finance;
- Fiscal measures – enabling tax, tariff, import, and business regulation policies designed to reduce risks and financial burdens and provide incentives to ICT investors and financiers;
- Demand support and capacity building – initiatives in e-governance, education and training, budget allocations within the public sector for ICT networking and service applications, as well as government pre-purchase of capacity through open tenders (i.e., the government commits to a medium-term contract with one or more providers to purchase capacity in bulk and hence becomes an anchor tenant, which lowers the risk to the private operator in building the infrastructure). Another measure of demand support and capacity building is open procurement plans that leverage ICT industry competition and private sector development; and
- Regional investment – support and promotion of domestic, regional and other South-South investments (e.g., mobile communications, software and systems houses emanating from emerging markets), and increased sub-regional and regional cooperation to address infrastructure and last mile gaps.

This trend and balance of activities is underlined by a 2005 report of the OECD's Development Assistance Committee (DAC) countries. The report shows that official government-to-government aid commitments amongst its 22 DAC members for ICT infrastructure declined strongly from USD 1.2 billion in 1990 to USD 194 million in 2002. The rationale for most donors to withdraw from providing ICT infrastructure finance was linked to the correct assumption that the private sector would play an increasingly strong role in the provision of services [2]. Declining donor assistance to ICT infrastructure is only part of the picture for the role of Official Development Assistance (ODA); many donors, while still engaged in some bilateral ICT-specific programmes, are contributing to public private partnerships (PPPs) and international multi-donor initiatives for ICTs, while also integrating ICT components into their development programmes for other sectors. The Practice Note Donor ICT for Development Programmes and Expenditures documents this trend for all 22 DAC members of the OECD and the European Union and lists many of the contributions to multilateral and multi-donor initiatives supported [3].When the additional role of non-government organizations (NGO's) and other private sector organizations, including technology investment trusts, philanthropic agencies, corporate social responsibility (CSR) programmes, and community groups are considered, the spread of activities in the ICT realm is seen to be large. With some notable exceptions, the role of these organizations is generally more related to applications, IT human resource training and capacity building than to infrastructure and service development. They are introduced in **Section 5.4**.

Practice Notes

- **Donor ICT for Development Programmes and Expenditures**

4.5.2 UNIVERSAL ACCESS AND SERVICE FUNDS

Since many Universal Access and Service Funds (UASFs) have recently been legally established and put into operation, there is a wide array of experience available that can be used to identify precedent and best practices in terms of financial sourcing and the role of the market. In addition, there is a growing body of experience with Output-based Aid (OBA), which relates to the performance-based disbursements of subsidies typically used by UASFs, after their competitive subsidy allocation.

Section 5.2.1 reviews the different sources which can provide finance for a UASF; it outlines most common practice and discusses the case of a more balanced funding for UASFs from different sources, looking at advantages and disadvantages of each funding source.

In **Section 5.2.2** the question is answered who should contribute to a UASF if an industry-levy is part of the financing source for it, and also on what revenue base the contribution should be levied.

Section 5.2.3 explains how the size of UASF programme and the appropriate level of contribution from industry players is determined.

4.5.2.1 SOURCES OF FUNDS

Universal Access and Service Funds (UASFs) are generally financed from one or more of the following sources:

- Government general budget (in a small minority of cases, including one of the first funds, Chile's Fondo de Desarrollo de las Telecomunicaciones);
- Industry levy, as a percentage of annual revenue, on certain classes of licensed operators;
- Various other regulatory sources such as the proceeds of license competitions, frequency spectrum auctions and fees; and
- Once-only contributions from government, financed by loans or grants from international donors such as the World Bank, contributing seed finance to assist UASF start-up in the early years.

Most UASFs are financed mainly through annual operator levies although the legal instruments (e.g., the communications law) establishing the fund might typically name all potential sources, or be worded in an open fashion to include all possible sources. However, a stronger case could be made that the funding should, if possible, be more balanced between the first three financing sources. The perceived advantage of a UASF financed mainly by operator levies typically is that it is independent of available government funding, and therefore particularly attractive for low-income countries with limited resources and more pressing funding priorities. However, countries with more resources could consider contributing some amount from the government budget to the UASF. After all, the UASF implements government policy. It is important though that the UASF remains independent from day to day politics to fulfil its long-term UAS objectives, and that it continues to focus on sustainable solutions with effective and cost-efficient private sector participation. In some cases, partial government funding of a UASF might create some administrative complications, as the UASF then has to comply with government procurement rules. Another option is that the government finances the administrative overhead of a UASF, e.g. the cost of the special department of the regulator. A strong argument can also be made that at least part of the proceeds of radio frequency auctions and licence competitions should be used to source a UASF [1]; Guatemala's FONDETEL used this financing approach. Auction proceeds are paid by various industry players for a national resource. It typically is simply added to the government budget, but it might be more appropriate to use this money particularly for ICT development, such as to fund UAS or special measures for broadband development (e.g. increasing PC ownership or equipping schools with computer labs and broadband access). Other sources are accumulated surpluses of regulatory fees: in 2007 the regulator in Botswana, BTA, pledged USD 1.6 million (BWP 10 million) of its surplus in regulatory fees for the use of the future UASF. Important in all cases is the predictability, timing and the frequency of the funding to allow proper planning and constancy for the UAS implementation. Also, regardless of the financing sources, a special fund like the UASF, administered often by a department of the regulator, with stringent transparency and other requirements, appears to be a helpful instrument to implement UAS policy efficiently. In conclusion, each country can evaluate which mix of financing might be available and appropriate for the UAS policy implementation. The contribution of multilateral and bilateral donors towards the UASF financial base is significant in the early years in some cases [2]. This is because some institutions and donors – notably the World Bank and the UK's Department for International Development (DFID) – are strong supporters of the transparency provided by Output-based Aid (OBA) and subsidy tendering mechanisms which are favoured by many UASFs. An introduction to the OBA mechanism is provided in the Practice Note Output-based Aid (OBA) explained. As described in Section 5.4, a large number of other sources, including international donors, non-government and corporate organizations are also involved in financing and supporting telecommunications public access, and ICT projects and applications, individually or through multi-donor initiatives. These often encompass applications across several sectors of the economy, from education to commerce, health and governance. The investments are sometimes associated with a UASF programme, but often independent of it. These other sources are thus complementary to UASF programmes, but also have the ability to leverage themselves through inter-agency collaborations and partnerships. This can perform a most vital role in creating the capacity for ICT user development and market emergence in otherwise very weak and non-commercial stages of development.

Practice Notes

- Output-Based Aid (OBA) explained

Reference Documents

- Output-Based Aid in Mongolia
- Output-Based Aid in Telecommunications
- Output-based aid in Uganda: Bringing Communication Services to Rural Areas

4.5.2.2 INDUSTRY LEVY – WHO SHOULD CONTRIBUTE?

Given that operator levies are generally the most common source of funding for Universal Access and Service Funds (UASFs), typically, all major operators, fixed and mobile, are required to contribute. In some cases (e.g., Uganda), ISPs and even post and courier companies have been required to contribute, even though many ISPs are still only marginally profitable and smaller ISPs often state to be unable to afford a contribution. On balance, it is probably best to require all telecommunications and Internet service providers (including VoIP service providers) to contribute to the UASF. The matter of affordability can be addressed in a number of ways; the most practical approach may be to set a minimum size limit (e.g., annual revenue or market share [1]) above which a company becomes required to contribute to the fund.

Regulators and governments need to be careful to ensure equity both in the contributions levied and in the eligibility for subsidy allocations. These have at times been controversial issues, especially where mobile operators have been major contributors, while the rules of the UASF have stipulated that recipients should be fixed service providers or the technical specifications of the bidding rules were clearly geared to fixed-only solutions (see Chapter 3).

Two countries with large UASFs, India and Malyasia, are examples of this type of situation, caused by UASF rules that were created before mobile telecommunications became prominent and accepted as providing basic services. UASF rules lagged behind developments in the market place and made no provision for the key role that mobile operators can and should be playing in universal access (UA) and even in universal service (US). Best practice is now pointing to the inclusion of mobile operators in UASF competitions; India, for example, now has a major universal access and service (UAS) programme of financing towers for mobile and other wireless operators in rural areas. Whereas the best solution is to ensure that UASF regulation is flexible from the outset, the issue of change and adjustment is also discussed further in Section 5.3.8 that deals with fund evaluation and adjustment of rules and targets.

For example, the European Union's 1998 Universal Service Directive allowed for small players (e.g. under 5% market share) to be exempt from contributing to any Fund. This is not mentioned anymore in the 2002 EU Directive, mainly because the wording has become more generic.

4.5.2.3 APPROPRIATE INDUSTRY CONTRIBUTION

As noted in Section 3.2.2, operator levies typically range from less than 1 per cent of operator revenues in South Africa to 5 per cent in India and Colombia and 6 per cent on certain qualifying revenues in Malaysia. How is the level of Universal Access and Service Fund (UASF) contribution established?

There are two ways to estimate what is an appropriate funding level for each country. These are as follows:

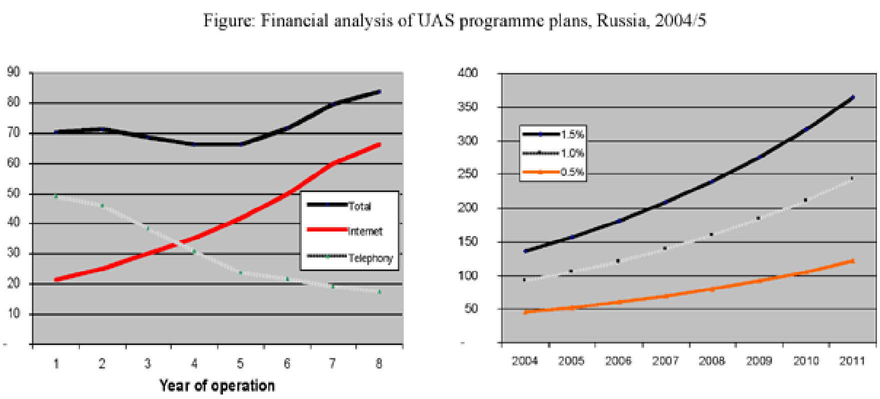
1.

- Policy-driven approach – Determine what scale of subsidy programme would be required to meet the country's policy objectives and time-bound universal access and service (US) targets. The total cost and subsidy estimates are compared to the total sector revenues. The percentage of total sector gross or net revenues calculated by this method becomes the high level estimate; or
- Market-driven approach – Determine from a survey or assessment of operator and other stakeholder opinions, as well as from international benchmarks, what operators would accept or could afford as a reasonable contribution. Then develop the UASF programme to match this.

For many reasons, a hybrid iterative use of these methods is recommended. The main reasons for this are:

-
  - Levies based on a policy-driven approach may be a political wish list and too costly which is not rooted in the reality of what can be achieved, or should be attempted, in a given time frame;
  - The policy-driven approach subsidy programme could also require a larger than practical bureaucracy, in the form of UASF staff and programme management, than is realistic or sustainable by the industry in a liberalized market; and
  - In some cases, the initial estimate of programme cost quickly becomes out of date due to the sector's rapid development (i.e., its expansion growth which in turn reduces the need for intervention and its financial growth which provides more finance than thought to the UASF), resulting in far less UASF subsidy requirement than first thought, and consequently less operator levy.

International experience indicates that no developing countries appear to have been able to disburse more than 2 per cent of sector revenues in their UASF programme. As discussed in **Section 3.2.4**, in the major countries that levied 5 or 6 per cent, despite having established sophisticated UASF organizations, less than half of the amount collected has been allocated back to the sector in subsidies. Matching programme cost (maximum subsidy) with the available resources Universal access and service (UAS) strategists must match the size of programme to the amount available annually in the UASF. In some cases, government or an international donor seeds the fund in the early years to assist with programme start-up. The following diagrams show the expected expenditures on the UAS programme initiated in Russia in 2004/5 compared with the options available for resources from operator levies. Three alternative percentage levy rates were based on a projection of market size over the planning years in question. The analysis indicated that Russia's fund would need to levy 0.5 – 1.0 per cent of annual revenues from the operators in the sector to meet the goals of the UAS programme. This analysis indicated that the goals and targets for telephony and Internet/ICT roll-out were realistic both in the context of total expenditure and expected balance in the early years and could realistically be scaled back to a lower level of collection after the third year.



◂ Figure: Financial Analysis of UAS Programme Plans. Russia, 2004/5

Source: Intelecon analysis

Changing requirements over timeSome existing UASFs have already seen an unexpected rapid increase in financial resources during the recent period of unprecedented market growth. As noted previously in this section, some have built up resources well in excess of their capacity to organize competitions and allocate subsidies. They may even be beyond all reasonable levels of investment requirement. Thus it is important for UASF statutes to provide for evaluation, re-assessment of the levy required and (by implication) reduction of levies over time to ensure that the supply of financial resources does not run ahead of needs and capacity. This is covered in **Section 5.3.7**. Should levies be from gross or net revenues?Arguments in favour of collecting levies based on net or after-tax revenues, or at least based on revenue minus required interconnection payments to other operators, are as follows:

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  - Avoids potential objections to what some operators would consider to be double taxation; and
  - Avoids the appearance of imposing a heavy burden on new entrants, who are often taxed more heavily than early-entry operators who often have received a tax holiday. New entrants also typically face a heavier net interconnection outflow (as a percentage of total revenues) than well-established operators.

The pre-tax versus after-tax argument depends to a great extent on each country's tax regime, and whether UASF levies are classed or allowable as tax-deductible and whether subsidy receipts are also taxable in the period they are received. In general, UASF levies should be tax deductible as they represent a real cost, and subsidies received should not be taxed, as that is counter-productive to making finance available for the implementation of governments UAS policy. For the sake of simplicity and ease (low cost) of administration, levies are best calculated on gross revenues from telecommunications services, excluding certain items easily identified (e.g., equipment terminal sales, real estate or investment income) and value added taxes. However, some funds calculate their contributions on various formulations of net revenues, qualifying revenues, weighted revenues from various services, etc. [1]. The main objective should be to achieve the greatest transparency and efficiency in the levying process. As discussed in detail in **Section 5.3.8**, the level of contribution should be re-evaluated and adjusted from time to time, as UAS objectives are met or as targets are changed or the growth and revenues available in the sector change over time. The evaluation process, which includes determining levels of contribution, should be enshrined as a periodic activity under the policy in order to reflect both the achievements and performance of the UASF strategy as well as stakeholder interests.

4.5.3 INSTITUTIONAL ISSUES: MANAGING AND ORGANIZING A UASF

As noted in the introduction of this **Chapter 5** as well as in **Section 3.2.3**, there are some legitimate and understandable concerns regarding Universal Access and Service Funds (UASFs), as some have not performed as well as intended; however, closer scrutiny reveals that in most cases this is due to a lack of proper implementation and adherence to key principles of UASF management. This section therefore surveys the range of options available when developing UASFs, their management and staffing, accountability and transparency. This is a fundamental and critical step, one which can have political as well as practical and operational impacts; it influences whether industry ultimately responds and collaborates with the government and the regulator or holds back its support. A range of specific approaches are possible, so long as fundamental requirements are respected, such as the principles of efficiency, management capacity, accountability, fairness and transparency.

Section 5.3.1 to **Section 5.3.3** review areas of best practice that need to be considered and carefully adhered to, within the specific context of each individual country.

Section 5.3.4 to **Section 5.3.6** ponder some questions, concerns, risks or apparent shortcomings that can occur in the administration of UASFs. No survey of UASF finance can possibly be complete without a critical look at the experience gained around the world and the possible pitfalls and limitations that have been observed.

In **Chapter 3**, **Section 3.2.4** Performance of funds to date, it was seen that in the period 1998-2006, only 26 per cent of UASF funds collected had been distributed to the sector on universal access (UA) projects. These sections seek to put this apparent lack of efficiency into perspective.

Section 5.3.7 places both the best practice and the shortcomings of UASF operations into the context of the process of periodic evaluation and re-appraisal of UASF experience which should be enshrined in the implementation plan of a UAS policy and funding programme.

Finally, **Section 5.3.8** deals with the question of how UASF strategy and programming could evolve in the future as next-generation networks (NGNs) and enhanced ICT services evolve. These issues should be incorporated into forward planning under the periodic evaluation of the UASF in order to ensure that the strategy remains relevant into the future.

4.5.3.1 TARGETING COMMERCIAL VIABILITY AFTER SUBSIDY

The mechanism of smart subsidy competition geared to the achievement of realistic universal access and service (UAS) objectives also generally conforms to the Output-based Aid (OBA) principle introduced in **Section 5.2.1** and described in the Practice Note *Output-based Aid explained*. It is crucial that UAS targets are realistic and feasible for the market so that commercial operators, with some smart subsidy support, will be able to and will want to achieve them. The objective of a smart subsidy calculation is to enable operators to bring a potentially loss-making or marginal project into a normal commercial rate of return after the one-time subsidy has been received. The subsidy thus represents an amount that bridges the operator's financing gap. It could be viewed as support to offset capital investments, capitalized operating losses for the first few years, or a combination of both. The important concept here, is that the subsidy is a once-only allocation which may be disbursed in tranches over a stipulated period of time (e.g., one to three years) corresponding to various output milestones, but is not open for re-negotiation or longer term continuation. For an explanation of the smart subsidy principle, see **Section 1.3.3** Market gaps and UAS policy. If UAS targets are unrealistic and could result in chronic and ongoing losses for the operators, then the concept of a once-only smart subsidy is not achievable and the Universal Access and Service Fund (UASF) would have to consider ongoing support to operators to cover annual operating costs. Successful funds have used independent demand studies to provide adequate data on which to base their UAS targets and subsidy estimates (see **Section 7.3**). These can also be shared with the operators who, it is hoped, will bid for the UAS projects. In fact, issues regarding what targets are reasonable and sustainable after subsidization also require industry consultation. All efforts should be made to involve the fund's key contributors in decision-making with respect to the uses of the fund, the size of levies and the subsidy strategy. This increases the chances of achieving credibility for the UASF and its management, and that operators will buy-in to the programme and willingly contribute the finances required to support it. This important part of the broader process of consultation, which is an inherent component of UAS policy development, is described more fully in **Section 4.2.6**.

4.5.3.2 UASF MANAGEMENT

This section, as well as the following **Section 5.3.3** describes the practices typically outlined in the Universal Access and Service Fund's (UASF's) administrative rules or manual of operating procedures. A sample outline for this kind of document is provided in Practice Note Outline Manual of Operating Procedures attached to **Section 4.3.2** Detailed regulations. Often the national regulatory authority manages the UASF on a day-to-day basis. The two main reasons for this are as follows:

1.
    - The regulator will have a degree of independence from government and industry; and
    - The regulator will have technical and regulatory expertise.

A UASF programme will have a greater chance of success if the regulator has a strong reputation for independence and industry trust. This is even more important if the government still has an ownership stake in any of the operators. However, it is best practice that the regulator provides the Secretariat expertise and everyday management, under a special Management or Advisory Board, which provides high-level strategic direction, approves major projects and fund disbursements, and monitors proper execution and financial integrity.

Board

All UASF's have a Board functioning above the level of the senior executive. However the Board's role differs from country to country, depending on specific local factors. The options are as follows:

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    - Direction or management – making executive decisions on a wide range of issues from hiring of senior managers to budgetary approval, approval of UAS programme and projects, and the final award of subsidy contracts;
    - Monitoring and oversight – ensuring that the decisions of the executive (whether named director, manager or administrator) and his/her management team are scrutinized on behalf of stakeholder interests; or
    - Consultative or advisory – requested to review proposed UAS programmes and projects, executive decisions, provide expertise and advice.

Whichever model is chosen as most appropriate, the Board typically comprises members providing a combination of stakeholder interests, and typically includes:

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    - The Ministry responsible for Communications;
    - The Regulator;
    - Other ministry or agency with special interest in the Internet / ICT aspects of the programme (e.g., Education, Science & Technology, etc.);
    - Consumer associations (if existent);
    - Industry association; and
    - Special expert(s) in the fields of telecommunications and ICT without any direct affiliation to an operator.

Because of the spectrum of possible functions, there is a wide difference of opinion regarding the make-up of the board. For example, if the Board is actually responsible for the final decisions (as in the case of Peru or Nigeria), operators and service providers cannot have direct representation as this would constitute a conflict of interest. In such cases, it is still wise to have independent telecommunications experts who have experience of the commercial sector. On the other hand, if as in the case of Mongolia, the Board's role is purely one of monitor or watchdog, there could be a rationale for having several direct representatives of industry on the Board, to ensure openness, fairness and industry satisfaction that the money it contributed is being used properly. In cases where the regulator would not have the capacity to manage the technical, administrative or financial aspects of the fund, outsourcing to an independent private sector agency is recommended [1].

Staffing

In addition to a full-time Manager or Director (sometimes called the Administrator), who does the overall programme and implementation planning, the UASF should have at minimum, the following staff:

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    - Projects manager / Senior project manager(s);
    - Technical manager & staff for field inspections;
    - Research manager and data specialist(s);
    - Contracts & administrative manager; and
    - Finance & accounts manager (full or part-time).

The number of staff will vary depending on the size of the fund. For example, a small fund managing a programme of less than USD 15 million in the first five years, such as Uganda's or Mongolia's, will only need four to five dedicated staff, whereas others with annual potential of over USD 50 million could need two or three times the number of staff members. Some of the staff may be semi-permanently seconded from the regulator's other departments, or used on a time-share basis (e.g., the accountant's position may only require a few hours per week except during major reporting periods).

4.5.3.3 ENSURING ACCOUNTABILITY, TRANSPARENCY AND EFFICIENCY

This section discusses several different measures that are required to ensure the financial integrity of Universal Access and Service Funds (UASFs) [1]. These include:

- Accounting transparency;
- Independent auditing, publication and annual reporting;
- Keeping administrative costs to a minimum; and
- Efficient use of funds.

Accounting transparencyThe UASF has its own separate account in a reputable bank, which is exclusively used for its purpose and not mixed with any other regulatory activities, if the regulator is the UASF administrator. The UASF therefore has also a distinct accounting system that is not linked in any way with other institutions, with government or even the regulatory body which may manage the day-to-day UASF operations. In a system that maintains separate accounting practices for the UASF, balances can be monitored, expenditures can be tracked and thus the public's trust in the UASF can be upheld. In some countries, UASFs without proper accounting separation and standards, or where the funds are paid into a government account, have been appropriated and used for purposes other than initially intended. Independent auditing, publication and annual reportingThe finances of the UASF should be audited annually by an independent accounting firm and the report should be presented to the requisite government authority and be published for the general public.Also, an annual report of all the UASF's activities, its programmes, projects and plans, progress and set-backs, receipts and disbursements should be prepared, and made public.Keeping administrative costs to a minimum Dedicated staff should be competent but kept to a minimum. While the actual percentage of administrative overhead cost may vary from country to country, based on the size of the funds and in-country costs, it is important that this number is monitored and a ceiling is set, for example not to exceed 2-3 per cent of the total amount held by the fund per annum. However, in the first year the UASF is established, these costs may need to be slightly higher. Non-administrative costs related to project preparation, management and monitoring may also be higher, though it is wise to set a guideline for them in the rules (for example, 5 per cent of each projects' total cost). Maximum ceilings can be established by financial analysis that projects UASF fund receipts and staff and other costs.

An evaluation of Peru's Telecommunications Investment Fund (FITEL) was conducted in September 2003 after the Fund had undertaken several major projects. While in the early years, administrative overhead expenditure rose to as high as 2 per cent of the funds under management, this category stabilized to around 1 per cent of FITEL's cash balance (and maximum of 2 per cent of total annual levies) from 1998 to 2003.

BOX 1 Keeping Costs Manageable in Peru

Typically, a UASF's legitimate administrative and operational expenses should be spelled out in the operating manual, administrative rules or regulatory procedure describing the administration of the fund. The following are examples of legitimate costs and expenses:

- Salaries, emoluments, remunerative packages and allowances for:
    - UASF departmental staff;
    - Regulatory staff seconded temporarily explicitly to the UASF operation; and
    - Board members (in accordance with the provisions of the appropriate regulation);
- Office equipment, administrative and operational costs specifically and directly related to requirements of the UASF operation;
- Operational and travel expenses for the activities of the UASF Board, the UASF management and staff;
- Administrative fees associated with outsourcing contracts as allowed in the operating manual of regulation;
- Annual financial auditing by an independent accounting firm;
- Non-administrative special costs:
- the carrying out of technical, socio-economic or demand studies directly pertinent to the development of the UASF programme and tender competitions;
- consultancy or advisory contracts directly associated with the UASF's tender competitions;
- the hiring an independent technical auditor or the auditing process undertaken by the UASF departmental staff to certify milestone completion before disbursement of certain subsidy tranches as per contract; and
- the carrying out of monitoring and evaluation activities.

Additional items not covered in the agreed list should be added only with the express approval of the UASF Board. All finances should be governed in strict accordance with the rules and operating guidelines established by the Operating Manual or regulation and established budgeting practice. If the fund is managed as a department of the regulator, the finances, including all payments, withdrawals or other financial transactions relating to the UASF, should also satisfy the regulator's requisite financial policies and regulations. Efficient use of fundsCareful management as well as effective subsidy estimation and market mechanisms in the distribution of funds can combine to ensure that the required levy is kept to a minimum and funds are not wasted, either through inefficient administration and management or in the market place. Uganda's 2005/06 competitively tendered subsidy process saw an average of only 61 per cent of the maximum subsidies available (in three separate competitions) used for the universal access (UA) awards. The use of a competitive tender process, after the fund manager had estimated the maximum allowable subsidy, led to efficient use of resources. The unused 39 per cent of the money allocated to this tender could be used for other universal access and service (UAS) projects. By comparison, Chile's FDT programme used 54 per cent of its allocated subsidies in its main rural telecommunications subsidy competitions (1995-2000) and Peru's FITEL programme used just 36 per cent from 1999 to 2003, thus all three subsidy programmes have been efficient and have also leveraged private investment equal to or greater than the level of subsidies granted. Holding of investment fundsThe investment and management of funds that are being held prior to distribution as subsidies, should be done in accordance with rules that govern safe and low-risk investment practices as determined by the government or laid out in the operating manual. Typically, the assets of the fund may be invested in fixed bank deposits with an approved bank, in government treasury bills and securities, or in other vehicles only in accordance with guidelines approved by its Board and openly reported in the UASF's annual report.

As noted in **Section 5.3.3**, one possibility for proper management and disbursement of UASF funds is to outsource these functions to a respected financial trust company. This role should be openly tendered in accordance with very specific rules and regulations.

4.5.3.4 RISKS OF HIGH CHARGES AND HIGH COST UAS ORIENTATION

A few Universal Access and Service Funds (UASFs) struggled with the following two problems:

- Some UASFs were limited, by law or lack of appreciation for wireless developments, to provide financing for fixed-line universal access and service (UAS) only; fixed line expansion into remote, high costs areas has been very expensive compared to more economic wireless options (see also Section 3.2.3.);
- A few UASFs set the operator levy quite high in the early days before regulatory reform and the mobile expansion led to unexpected and unprecedented growth in the sector; as a consequence, these UASFs accumulated more financial resources than needed and that they were able to efficiently distribute.

Country cases

As noted in Section 5.2.3, international experience has shown that there are no developing countries that have been able to distribute more than 2 per cent of sector revenues in their UASF programme. Section 3.2.4 shows that funds such as those in India, Malaysia and Colombia, that have levied 5 or 6 per cent and established relatively large UASF organizations, have managed to distribute back to the sector less than half of the amount collected. In the case of India and Malaysia, there has been only a limited universal access and service (UAS) role to date for mobile operators, even though mobile operators are often now best placed to be the carrier of UAS services. The original high levies designed to cover the cost of implementing high cost fixed line solutions, without making financial adjustments as the commercial market expanded and changed, have yielded far more financial resources than the fund managers need to meet an objective that may in fact have shrinking costs. In the case of India, the programme of the Universal Serviced Obligation Fund has been expanded and diversified considerably in order to spend more of the resources available to it. Measures have included the financing of mobile infrastructure and it is understood that Malaysia's policy is also under review.

In 2001, Brazil established the National Telecommunications Fund (FUST), financed through a one percent operator levy. Because of Brazil's large market size, the government has been able to accumulate a large amount (USD 1.7 billion as at June 2005). The fund was created to finance telecommunications service access to low-income groups, schools, hospitals, libraries and remote locations. However, the money cannot be disbursed due to conflicting legal interpretations, largely relating to its restriction to the funding of fixed services and inability to facilitate any role by mobile services, and a lack of political will and consensus, as policymakers are the decision-makers on the use of FUST. As a result of FUST's inability to operate, the unused funds support the federal government's efforts to increase the public sector surplus or stabilize its currency through important foreign reserves, though negatively affecting the general credibility of the UASF mechanism internationally. However, Anatel managed to further UAS goals through issuing new licenses which included UAS requirements and innovative pairing of frequency spectrum tendering with UAS targets, as discussed in Section 2.4.2.

A further example is South Africa's fund, which even though the levy has been only a small percentage, experienced problems in the early years. The Universal Service Agency of South Africa started with a telecentre programme in poor communities, but the majority was considered ineffective due to a combination of insufficient connectivity, management issues and sustainability problems. Also, the later approach of licensing small rural operators and providing them with grants in underserved areas is considered controversial: it under-estimated the rapid progress of mobile operators in rural areas and only a handful of the rural operators are operational, struggling against the competition from mobile operators as well as dealing with lack of regulatory support. However, it is probably too early to decide whether they are successful or not, as there are some that have become Mobile Virtual Network Operators (MVNOs) for the leading mobile operators and others that provide VoIP. South Africa's UASF has large unspent reserves; while the government is now pressing the re-organized Universal Service and Access Agency of South Africa (USAASA) to distribute available funds, it is also placing UAS obligations on new licensees in the sector as well as attaching them to new frequency holders.

In all of these cases, unspent levies represent an opportunity cost to the sector, which lowers overall economic efficiency and, ultimately, network reach. To balance these negative experiences, as already noted, the Ugandan model became the first of several new-breed, smaller sized, less bureaucratic and technology neutral UASFs in Africa and elsewhere. These exist mostly in lower income and/or geographically challenging markets that do, in fact, need some level of intervention.

The Ugandan fund, in addition to telephony tenders, also successfully held competitions for Internet POPs in every district centre in the country. Up to 2007, it has attracted more seed finance from the World Bank than it has spent from the one per cent levy on operators and, in reality, has contributed more to development of the sector and to UAS, in a challenging economic climate, than it has cost the operators.

4.5.3.5 FASTER COMMERCIAL EXPANSION THAN UASF IMPLEMENTATION PACE

In Uganda, as well as in Nigeria, Mozambique, South Africa and many other countries, mobile network development has outpaced the regulator's ability to promote universal access and service (UAS). For example, due to funding and tender delays, half of the communities slated for subsidy in Uganda under the first Rural Communications Development Fund (RCDF) tender had already been reached by the leading GSM operators before tender award had been made. As well, the highly successful Village Phone model of public access had already been rolled out to more than 4,000 villages. Happily, this actually enabled the leading operator to bid the lowest subsidy and saved the World Bank (and ultimately the RCDF) almost 40 per cent of the predicted subsidy. However, because of political instability and insurgency in the north of the country, the RCDF programme had an important and relevant role to play in areas not yet served commercially. Thus there are lessons to be learned which have shown that in many cases, the administration of a Universal Access and Service Fund (UASF) may not be sufficiently agile to actually keep ahead of the market and distribute subsidies to the most appropriate areas. This emphasizes the need for regulators and fund administrators to work closer with operators and include their roll-out plans more strongly into UAS programme planning, make special efforts to avoid areas that will be served commercially through normal market forces, and focus on the removal of hurdles to market efficiency.Prioritise the enabling of commercial solutionsBecause of the pace of development of the telecommunications and ICT industry, commercial solutions are often better, more sustainable and arrive faster than policy makers are able to anticipate and design for. Therefore policy makers, regulators and UASF managers need to be careful not to waste time and resources planning interventions for areas and basic services that would be better served without intervention. Policy makers, regulators and UASF managers should focus attention on the following market efficiency gap measures (See **Section 1.3.3**):

- Regulatory measures that create an environment more conducive to competitive network expansion;
- Fiscal measures that will make services and communications hardware more affordable to low-income users; and
- Enabling activities, such as promotion and advertisement that highlight the opportunities available to people, communities and organizations to take advantage of the services offered in the competitive market.

This places the policymaker and the regulator in the leadership role in the investment environment aspect of the general trends, sector developments and tools described in **Section 5.1**. At the same time, the UASF manager's identification of projects for funding under the UAS programme should probably favour the less attractive, more marginal side of the smart subsidy zone than the more obvious areas that are likely to be reached soon, in recognition of the capacity of the market players to outstrip the UASF process (see **Section 5.3.6** following).

4.5.3.6 THE SMART SUBSIDY ZONE IS HARD TO PREDICT

As indicated by the Ugandan example in **Section 5.3.5**, there is some uncertainty associated with the nature and size of the smart subsidy zone (see **Section 1.3.3** Market gaps and universal access policy for a discussion of this concept). The question of whether there is even a need for financial intervention could be one of timing. Some areas will receive commercial service, though government would prefer that to take place ahead of the market. On the other hand, commercial service could arrive before the UAS funding programme can be implemented. Considerations include asking how long a marginal area might remain unserved in today's dynamic and competitive mobile growth market or how likely it is that some very remote access-gap areas are to remain unreachable by conventional mobile networks. In some cases, networks deemed unviable or less interesting today and that apparently justify intervention, could become commercially viable sooner than policy makers (or even operators) had previously expected. This could be due to several factors, such as the following:

- Some areas are strategically important to an operator for the purpose of achieving competitive advantage and brand recognition e.g., along lightly populated highways or leading into tourist or agricultural growth areas;
- The application of new and more advanced technical strategies that lower the cost of the network, e.g. extended range transmission or low power consumption (both essentially lowering Opex costs), could change the fundamental economics of an area; or
- Operators may simply reach lower priority areas before a Universal Access and Service Fund (UASF) can actually tender the subsidy, due to better than expected operator performance, competitive pressure or UASF procedural delay.

Focus interventions on areas definitely needing assistanceBecause of this, UASF outlays need to be focused on genuinely under-served and commercially unviable areas which would still flourish with a smart subsidy. Otherwise intervention could undermine commercial activity by subsidising one operator in an area that should be left to the market. The fund manager's task is a challenging one. First of all, it is best to avoid subsidizing areas that could be served by one or more operators in the next two to three years. However, this information is often difficult to secure. On the other hand, the most remote areas, which are definitely in need of support, may be chronically beyond the smart subsidy zone. These areas would need ongoing subsidy; this would also require more complex administration and management. These are the areas referred to as residing in the true access gap as discussed in **Section 1.3.3**.Alternatively, as incorporated into Botswana's Draft UASF policy, some areas may justify temporary operational support, such as power supply subsidization or fuel subsidization, until such time as national grid electrical power supply becomes available.It is very difficult to predict which areas will need financial support when a market is still in its rapid expansion and growth phase. UASF managers are better able to predict the areas requiring support once a market reaches some level of maturity and shows early signs of saturation or clear signs of where the financial barriers lie.

4.5.3.7 EVALUATION AND RE-APPRAISAL OF UASF OPERATION

Considering the issues outlined in **Section 5.3.4** to **Section 5.3.6** – namely the risk of unused revenue from levies, the pace of commercial developments, the challenge presented in identifying the smart subsidy zone, and the questions about Universal Access and Service Fund (UASF) continuing relevance – there will always be the need and opportunity for evaluation and re-appraisal. As communications markets develop and grow and as policy targets are met, adjusted or freshly crafted missions and targets are required. The amount of money needed to maintain a universal access and service (UAS) programme may not remain at the same level for very long. The Universal Access and Service Fund (UASF) programme, its orientation, and even the structure of the fund itself, should be subject to a regular strategic policy and management review, e.g., every three years. The evaluation should consider such issues as:

- The achievements of the fund against its objectives and targets;
- The development of the telecommunications market, and the role, relevance and usefulness of the UASF in meeting UAS objectives in the country;
- The collections and disbursements of the fund against projections, and investigation of reasons for departure from plans and targets;
- The costs and effectiveness of the fund's management and management structure;
- The strategic options for future development of the fund to further meet its own objectives and the fundamental ongoing UAS policy objectives for the sector; and
- The financial requirements of the fund to meet the new objectives, and recommendations with respect to future levies.

There could be a strong possibility that as the market grows and UAS targets are met, the percentage levied on operators could be reduced, unless the fund's mission and objectives (and staff size) expand considerably. The questions related to how UAS policy and UASF strategy and programming could evolve in the future, as next-generation networks (NGNs) and enhanced ICT services evolve, are also discussed in **Section 5.3.8**. These issues should be incorporated into the forward analysis under the periodic evaluation of the UASF, in order to ensure that the strategy remains relevant into the future. Also, considering these required adjustments identified in evaluation and re-appraisal, it is evident that legislation on UASFs needs to be flexible – more principle-based and less prescriptive – to allow for required changes in the UASF operation to adapt to changing market and technological advances.

4.5.3.8 NGN, ICTS AND FUTURE ROLE OF UNIVERSAL SERVICE AND ACCESS FUNDS

There are several developments and considerations influencing the thinking about the future of Universal Access and Service Funds (UASFs), asking the questions:

- If universal access and service (UAS) to telephony will be achieved in the near future, how relevant is the UASF model for ICT and broadband?; and
- How will the move to Next-Generation Networks (NGNs) influence the funding model of UASFs?

Changing focus to ICTA 2006 study undertaken for the Latin American association of regulators (Regulatel), concluded that Latin American UASFs funds had played an important role in network development, and identified some of the challenges as discussed in **Section 5.3.4**, **Section 5.3.5**. and **Section 5.3.6**. While the study made many specific recommendations for improving, streamlining, or realigning the activities of Latin American UAS policies and UASF programmes, it also recommended consideration of a new mandate altogether for their role in the future of the telecommunications sector in the years ahead. Since universal access (UA) to telephony is, in the opinion of the study's authors, close to being achieved in Latin America, a main feature of the study's recommendations was to consider re-orienting UASFs towards supporting "ubiquitous deployment of advanced technologies and services". The study advised that as the communications technology revolution continues, the new generation of UASFs could be envisaged to become leaders, not delayed followers, in ensuring that populations have access to the most modern and effective networks, services, and applications available on the market. This would include broadband, wireless, multi-service platforms permitting full access to all functions and features of telephony, Internet, data transmission, e-commerce, e-government, multimedia entertainment and interactive communications.

These new USAFs role in promoting broadband would be through support to intermediary facilities, such as backbones (including POPs), towers and other passive infrastructure.The full account of this study and its interesting conclusions is available in the reference document New Models for Universal Access in Latin America.A new generation of funds, managed by public sector administrators, is still unlikely to have the capacity to lead developments in the field of advanced technologies and services, especially since the Latin American UASFs have faced similar challenges as referred to in **Sections 5.3.5** and **Section 5.3.6**; instead, the commercial private sector is likely to continue to be the leader in technology and service innovation and service expansion, and that is in line with market-driven developments. Therefore, new UASFs may not lead but by putting emphasis on broadband can at least mirror in rural areas what the market is achieving on its own in urban areas. New UASFs, once government has agreed on an aggressive broadband promotion policy, would not wait until a large portion of the population has access to broadband to start filling in the gaps, but rather act in parallel to the market while taking care not to subsidize areas that the market would serve on its own.Enabling and supporting ICT developmentUASFs' greatest outstanding value for the medium term could be in support of Internet POPs, points of public access to the Internet, and ICT user development, as many funds are already doing. The latter will include short-term subsidization of access for vanguard institutions, such as schools, libraries, community groups and other agencies with limited resources, until the costs reduce and value to these organizations is sufficiently demonstrated for them to pay cost based prices. Such activity should also be well measured, focused on areas and communities with potential for sustainability in the medium term, and designed to be responsive to market forces, with several types of financial instrument that respond to entrepreneurial need, while not distorting or misdirecting embryonic and still emerging markets. NGNs, funding UASFs, and broadband.

There are questions as to how UAS policy, operator responsibilities and funding might evolve in the competitive technological and service environment giving rise to the emergence of next-generation networks (NGNs). This discussion is today most prevalent in the advanced OECD countries and is seen in a major Reference Document produced in 2006 entitled, Rethinking Universal Service for a Next Generation Network environment.

◂ Box 1 Re-thinking Roles

As noted in the referenced OECD report *Rethinking Universal Service for a Next Generation Network environment*, "in rethinking 'universal' access to the range of NGN services, a core issue is whether broadband should be part of universal service obligations (USOs)". Of course, the level of access or service considered universal in the OECD or EU will be totally different from that in developing countries. Nevertheless, the same principle will hold that: "Universal service is an evolving concept ……In an NGN environment, current funding arrangements for USOs may be unsustainable. A variety of alternative arrangements can be envisaged ranging from a tax on each telephone number to financing through general taxation revenue. They should be thoroughly assessed against a number of criteria, such as economic efficiency, equity and competitive entry as well as against current practice where the infrastructure and service providers directly fund universal service."

While the discussion in developing countries is different, some of the impacts of current developments are already being felt, or soon will be. Thus, increasingly developing countries are turning their attention to broadband Internet and ICT services, including applications, usage and capacity development in addition to pure access. The roles and responsibilities for access to advanced ICT services include a wider range of players and financiers. In the broadband Internet and ICT realm, donors and non-government organizations (NGOs) whose roles shifted due to the rapid expansion of mobile telephony networks, focus more on applications and capacity building than on network reach. For this reason, the importance of a UASF, whose role has been mostly the provision of infrastructure and access to services, could possibly be thought of as diminishing once near-ubiquitous telephony service is achieved. That is not necessarily the case. Globally, the IP-based broadband networks needed as platforms for ICT services may not be simple upgrades of the networks dominating the telephony market, but may be disruptive new technologies that by-pass existing networks. These could be based on optical fibre or new wireless technologies. While in OECD countries, the competition will be intense and new services may roll out relatively painlessly through a number of alternatives, this may not necessarily be so in developing countries. New broadband networks may only arrive into rural areas at a cost that is much less recoverable from the service demand than was the case for the steamrolling expansion of mobile telephony. Thus UASF models and smart subsidy concepts developed for the telephony generation may need to be adjusted to this different reality. In summary, UASFs in the next generation could move in two main directions, namely:

- An increase in importance and role as a stimulating force for the market, piloting innovative rural service and application concepts, creating demand for advanced ICT connectivity and services (e.g. through financing broadband access for schools, more direct support of users and applications) and an enabling environment; and
- A funding mechanism for broadband networks into rural and unviable areas through support both at the retail end (e.g. shared access), as well as at the wholesale end (e.g. through intermediary network facilities such as backbones,

wireless towers and other passive infrastructure).

Such re-thinking of options will be common to both developed and developing countries. For a multiplicity of reasons, therefore, a periodic evaluation and re-appraisal of the UASF, as described in **Section 5.3.7**, is necessary to ensure that both best practice and best role of UAS policy and funding are maintained.

Reference Documents

- **New Models for Universal Access in Latin America, Summary of Main Report, Regulatel / World Bank**
- **Rethinking Universal Service for a Next Generation Network environment**

4.5.4 OTHER APPROACHES TO UAS FUNDING

This section discusses the financial contribution to universal access and service (UAS) of Public-Private Partnerships (PPPs), international funding institutions (IFIs), non-government organizations (NGOs), corporate social responsibility (CSR) and philanthropic trusts, and municipal governments, amongst others.

Section 5.1 General Trends in ICT development and UAS financing provided an overview of the spectrum of financiers active in the sector. It was noted that many OECD country donors, while still engaged in some bilateral ICT-specific programmes, are contributing to international multi-donor initiatives and public private partnerships (PPPs), and are also integrating ICT components into their development programmes for other sectors. Practice Note *Donor ICT for Development Programmes and Expenditures* provides a detailed summary of the activities in ICT of the 22 OECD's Development Assistance Committee (DAC) members and of the European Union and lists many of the contributions to multilateral and multi-donor initiatives supported.NGOs and other public and private sector organizations, including technology investment trusts, philanthropic agencies, CSR programmes are also involved. It must be stressed that in the field of telephony, these agencies' roles are usually additional to the role of Universal Access and Service Fund (UASF) funding, and are typically not an alternative to them in remote and otherwise non-commercial areas. Also, whereas voice telephony often tends to require little more than to have service coverage in place for the benefits to spread even to the poorest, additional investments in developing shared and public access vehicles prove to be very important in many situations.

In the field of Internet and ICT development, the additional activities and investments become even more critical. For instance, investments in local promotion and awareness, applications development and capacity building are vital. Without the activity of international donors, NGOs and corporate organizations, UAS to ICT services would be largely ineffective in the first instance at least. Donor and NGO involvement in ICT development is more effective if adequately leveraged into partnerships and collaborative arrangements, which can have a broad impact on the users, communities, social groups, and on economic activities that can benefit from ICTs. In these situations, a UASF mainly plays the role of funding initial network access, e.g., an Internet POP, or access for a school or other vanguard institution, Internet café or telecentre. However, without the broader donor involvement in supporting ICT for development activities that leverage the use of these facilities, pure access may produce few benefits.

Reference Documents

- **Broadband infrastructure investment in stimulus packages: Relevance for developing countries**

4.5.4.1 PUBLIC-PRIVATE PARTNERSHIPS (PPPS)

Governments in both advanced and developing countries are turning to the private sector for the delivery of infrastructure services. This is additional to the cases of full-scale privatization. The reasons for new kinds of public-private partnership are driven equally from two different directions, which are:

- Recognition that private sector organizations often have superior management skills, understand the market and marketing forces, are motivated and financially efficient, even though they are driven by financial profit and may have a limited tolerance for risk in challenging situations; and
- Government has a mission and responsibility to meet social and developmental needs and service objectives which are in the public interest; it has financial resources it can invest in order to secure those objectives, and thus reduce the risk of financial failure as compared to a purely private venture.

The rationale for harmonizing these principles into projects that have a bearing on universal access and service (UAS) is not hard to see. For example, the government is keen to take steps in the development of broadband, enhanced Internet service provision and e-governance which need both private sector skills and government direction or vision and financial resources. **Section 4.1.3** provides relevant background to this discussion.Definition and degree of Public-Private PartnershipWithin this concept of combining the two forces into a partnership for common goals, there is a wide range of types of PPP. However, as a general concept, the following can be used as a broad definition: A cooperative venture between the public and private sectors, built on the expertise of each partner, which best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards [**1**]. The label of PPP could be applied to any project where both government and private organizations have a financial stake and the private sector is providing infrastructure or public services. A list of possible PPP models and the financial relationships involved is provided in the Practice Note Models of Public-Private Partnership.PPPs in telecommunications and ICTPPPs are coming into focus for a range of ICT activities, from some forms of network development (e.g., broadband), e-government and e-commerce initiatives, to some forms of application development. As discussed in **Section 1.3.3** and elsewhere in this module, purely private sector led development, or even Universal Access and Service Fund-style (UASF) subsidy funding may not be sufficient to reach certain areas or provide certain services, even with ‘smart subsidies’. This may be especially the case where the government should take a lead in order to catalyze or enable a style of development that is not driven by commercial demand (e.g., health, education) and requires ongoing public funding. This could also include broadband backbones and the supply of transmission bandwidth sufficient to catalyze advanced ICT applications, for which demand is not yet proven. This could be a case for public-private partnership. There are a range of potential means by which government or international public sector participation could be used to catalyze the development of broadband networks. Some of these are listed in the World Bank’s “Global Public-Private Partnership in Infrastructure” web portal’s section on telecommunications [**2**]. The government of Singapore, often a leader in government initiated ICT schemes, has recently announced a competitive tender for such a scheme, offering up to USD 500 million funding for a national broadband network infrastructure to carry next generation services. The network of optical fibre cables will be operated in a structurally separate manner from the operating service companies’ switches and routers. The Practice Note Public-Private Partnerships in the telecommunications and ICT sector provides brief descriptions of a limited number of PPPs from Canada, India, Estonia, Malaysia, Egypt, the East African Region and the World Bank’s Africa Regional Communications Infrastructure Program (RCIP), where various PPP models are used to promote the development of national backbones. Potential concerns around PPPsA natural concern with PPPs is whether the government by entering into an agreement with an industry player, is distorting the market by backing a certain player or technology, and that PPPs are anti-competitive. The same concern applies to multi-lateral donors, and to bilateral donors who may sometimes be seen as favouring their own industry in providing development assistance. Ways to avoid distorting the market are similar to the mechanisms universal access and services funds (UASF) often use: competitive tenders. The Singapore initiative described above is a good example for a best practice PPP, as they use a competitive tender to determine the private sector partner for their PPP. Another principle is to have, as far as possible, technology-neutral competitive tenders, or in general, focus on specifying the results and outcomes of a PPP initiative, its requirements, and provide flexibility for the private sector to develop their own proposed solution, model or approach. This avoids pre-determining the best technology, software or solution in the tender, allowing fair competition. A final concern relates to the period after the private sector player has been selected: is the government and are customers locked in? This concern needs to be addressed at the outset, in the design of a PPP project, and has to be weighed against the desire of the private sector party to have certainty and continuity. Possible approaches to reconcile these diverging interests are the following:

- Separate various parts of the PPP project where appropriate, e.g., have one company build a backbone and another manage and operate it; this might make it easier to replace a management company later;
- Consult industry beforehand on their particular interests, and on issues of ownership, divestiture and replacement rules, and include those rules, if appropriate, into the PPP contract;
- Limit the service contract, e.g., for three, five or ten years, after which it is open whether the chosen company will continue or a new tender is conducted.

Universal access and service funds (UASFs) and PPPsThe provision of UASF funding support on infrastructure projects is, arguably, a form of PPP. Even though the funding is levied from the industry, it can be seen as a specific-purpose tax and as such becomes state property. The government, through the UASF, allocates it to sector players, which sign special contracts with detailed obligations that they would not otherwise have. The retention of even partial ownership by the government is less important than its ability to play a role in directing the behaviour of the operator. In the case of most UASF programmes, the primary role for the host government (and/or regulator) is the analysis and setting of direction as to which targets for infrastructure development shall constitute the minimum acceptable level of coverage in telephony and ICT access and service provision, and which areas will need financial assistance to meet targets. Hence, UASF can be considered one form of PPP, possibly a “light PPP”, as opposed to other forms where government has major ownership and is involved in management.In the case of UASF developments where the government, through loans or grants from the World Bank, has provided seed finance for piloting (e.g., Mongolia and Mozambique), or to support the first round of universal access (UA) project tenders (e.g., Uganda and Mongolia), there is clearly a form of PPP taking place.

Practice Notes

- Models of Public-Private Partnerships
- Public-Private Partnerships in the telecommunications and ICT sector

4.5.4.2 MUNICIPAL NETWORK ALTERNATIVES AND FUNDING APPROACHES

The emergence of municipal broadband networks provides an additional source of financing - from the municipal government - for ICT service development. There are encouraging and discouraging examples, which are described briefly below. The Reference Document Diversifying Network Development: Microtelcos in Latin America and the Caribbean identifies a number of small-scale network initiatives in Latin America. Among these, the Pirai municipal network in Brazil is a successful case that commenced from the demands of the municipal authority but spread to become the cornerstone of a broader and visionary plan to diversify the local economy and attract new investments through ICT and network development. The project included e-government, education and public access, with a range of application support and development activities. Many broadband access nodes have been established connecting all local government offices and most of the public schools, libraries, and general public access points. Broader commercialized services to households and businesses were also established though a public-private company. It appears that all financing flowed first of all from the municipal government and even though a commercial enterprise was later established, it was funded and supported by the municipality. The Practice Note Pirai municipal network describes this case. [1]On the other hand, several municipal Wi-Fi networks have been initiated in the USA, some with very limited success. Most of these are proving themselves to be operational failures because the cost and technical complexity of building the networks for reliable operation is high, the revenue base had been largely unproven before the plans were laid, and effective commercial relationships were either not established or, in the liberalized environment of the USA, tend to create conflicts between public and private interests. Financial support for networks that are not built on the basis of solid demand and commercial feasibility will usually prove unviable, unless one player (such as the municipality) has limitless resources. Generally speaking, such networks should not be considered unless the municipal government is willing to pay for its development and to become the anchor tenant and thus to under-write operating costs at the start, as well as to form alliances to create vision and collaboration. This clearly took place in the Pirai case in Brazil, but has been lacking in most of the USA cases. On balance, this model is difficult to use for building a strategy for the developing world unless central or local government has both the vision and resources to under-write the initial installation and first few years of operation. But even then, the relationship with private sector interests (e.g., ISPs) must be clarified and it must be proven that the establishment of municipal networks does not run counter to general market development, which must eventually take place, and the health of private sector operators.

Practice Notes

- FTTH Projects
- Models for Infrastructure Sharing: Ireland
- Models for Infrastructure Sharing: Sweden's Stokab
- Models for Infrastructure Sharing: United States
- Pirai municipal network
- Public (Municipal) Initiatives

Reference Documents

- Diversifying Network Development: Microtelcos in Latin America and the Caribbean

4.5.4.3 VILLAGE PHONE, OPERATOR OUTREACH AND PARTNERSHIP PROGRAMMES

A number of mobile operators have promoted public access to telephony and ICT as a commercial outreach to rural areas, or as non-commercial investments to develop future markets, or even under their corporate social responsibility (CSR) programmes as economic empowerment projects. From the financing perspective, it is important to note two features, namely:

- This kind of initiative effectively participates financially in covering the costs of universal access and is sometimes directly complementary to UASF disbursements (as in the case of Uganda), while contributing to wider economic impacts; and
- In most cases, the projects involve the provision of finance, expertise and technical assistance from

international partners and donors, effectively creating public private partnerships (PPPs) to reach beyond the purely commercial market gap boundaries.

A few examples of the financial approaches and partnerships being implemented in these styles of initiative are listed below, only as representatives of a wide range of projects taking place worldwide:

- Micro-finance bank led – Village Phone is the generic name attached to micro-finance led public access programmes originated either through the financial involvement of Grameen Bank (i.e., the original Village Phone programme through Grameen Telecom in Bangladesh) or replicated and financed through the Grameen Foundation and its partners [1]. The World Bank Group, through the IFC and its infoDev programme, have actively supported the programme, and Africa's leading mobile operator, MTN, has been the primary investment partner for three Village Phone replication programmes, in Uganda, Rwanda and Cameroon. The programme also offers a Replication Manual – see the reference document in Section 3.3.1 or see endnote [2].
- Corporate Social Responsibility led – MTN Nigeria has implemented a Rural Telephone Project (RTP) under a micro-finance scheme similar to but distinct from Village Phone, where rural and urban women, referred to as phone ladies are loaned money through Micro Finance Institutions (MFIs). Importantly, this programme has been supported financially through the company's CSR Programme, the MTN Foundation [3]. The objectives of the project are to provide GSM services in rural communities, and to alleviate poverty and empower women. The World Bank contributed to a pilot phase of this project that helped to expand the concepts from its initial start to a full-scale economic empowerment programme married to rural service outreach. Finally, the IFC, an investor in MTN Nigeria, also contributed to the planning of the final scale-up, by funding a performance assessment and feasibility study.
- Operator led – Telenor Pakistan has launched two programmes fitting the category of public telephony and information centres. One is called apnaPCO, which aims at bringing telephone access to the most disadvantaged rural communities in the country, and the other is a programme of community information centres, named Rabta Centres, to offer high speed Internet access to people in rural areas of Pakistan. The apnaPCO project has been set up with support from the Development Fund of the GSM Association (GSMA), the global trade association for GSM mobile phone operators.Telenor Pakistan has also entered into an alliance with the National Rural Support Programme (NRSP) for the roll-out of the project in the most impoverished rural areas of southern Punjab. The project works on the principle of shared access to voice, a term which refers to the sharing of a mobile phone, in the form of a supervised public payphone. The Rabta Centres offer all modern communications facilities, using high-speed EDGE technology to help bridge the digital divide. The role of both these programmes from the universal access (UA) perspective is obvious, but equally important is the partnership that this provides to Pakistan's Universal Service Fund (USF). While Telenor Pakistan might be investing in future markets irrespective of USF funding, Telenor is also using its programmes, alongside subsidized network expansion, in part to fulfill obligations accepted under the USF's pilot project in the north of Pakistan. For the Rabta Centres, Telenor Pakistan is also collaborating with the GSMA Development Fund, Nokia Siemens Networks and the ILO (International Labour Organisation) [4].
- Private development trusts and funds – The GSMA Development Fund, which has contributed to the above example, provides a significant model where investment has been put into collaborative projects with the objectives of providing scalable examples of shared or public access to telephone and ICT services and increasing awareness of governments, regulators and policymakers to potential commercially driven approaches to UA. Projects similar to the above are being supported in South Africa, Kenya, Nigeria as well as several other African and Asian countries [5].
- Corporate programmes and foundations – A number of major corporate programmes can be identified that can play (or have played) significant roles in ICT development alongside UAS programmes. These include, but are by no means limited to, the Intel World Ahead Programme, which assists with building of WiMAX networks [6], and HP's e-Inclusion program, which assisted individuals and communities in education and micro enterprise business development, among others, and ended in 2005.

4.5.4.4 COLLABORATIVE INITIATIVES FINANCED BY OECD GOVERNMENTS

The following is a sampling of major multi-participant initiatives in ICT development which are financed or sponsored in whole or in part by OECD governments. Some of these activities, including activities of bilateral donors, are listed in the Practice note attached to **Section 5.1**, entitled Donor ICT for Development Programmes and Expenditures. Most of the initiatives listed in this section promote institutional collaboration that reaches down to the community level.DOT-COM Alliance (**www.dot-com-alliance.org**)Funding is provided by the United States Agency for International Development's (USAID) Bureau for Economic Growth, Agriculture, and Trade (Office of Energy and Information Technology and Office of

Women in Development), regional bureaus, and missions. "Digital Opportunity through Technology and Communication" (DOT-COM) is an alliance of three organizations to promote ICTs for development. These organizations are:

- dot-GOV provides assessments, training and technical assistance on telecommunications and e-commerce policy and regulatory reform;
- dot-ORG provides pilots, technical assistance and institutional support to increase access and use of communication technology in under-served areas; and
- dot-EDU provides pilots, technical assistance and institutional support for the use of ICTs in education.

The DOT-COM programme provides USAID access to 15 grantee institutions and over 75 resource partners who work on ICT-for-development issues. Each of the DOT COM groups has a prime grantee with sub grantees and resource partners. The expected value of the awards is USD 75 million over five years.USAID Last Mile Initiative (**http://ict.usaid.gov**)As of 2007, USAID had Last Mile Initiatives (LMI) in more than 25 countries, including Ethiopia, Ghana, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Sao Tome e Principe, Sudan. Tanzania, Uganda and Zambia.USAID's Last Mile Initiative is a global programme to expand communications access for the rural poor in USAID presence countries. The initiative was launched in April 2004 to help increase productivity and improve the prospects of rural organizations in areas underserved by telecommunications networks. The programme is administered by the Economic Growth, Agriculture, and Trade (EGAT) Bureau and supported by budget resources from all the regional bureaus. The Last Mile Initiative provides technical assistance of private telecom service providers (where possible) working with wireless and other information technologies to provide telecommunications, Internet, and ICT services in underserved rural communities. International Development Research Centre (IDRC) (**www.idrc.ca**)The IDRC is a crown corporation created by the Parliament of Canada to help developing countries use science and technology to find practical, long-term solutions to the social, economic, and environmental problems they face. The support programme, which supplements that of the Canadian International Development Agency (CIDA), is directed toward creating a local research community whose work will build healthier, more equitable, and more prosperous societies. Among the many projects in the telecommunications and ICT field financed by CIDA, was the original baseline research and consultancy that assisted the government of Uganda to establish its universal access and service (UAS) policy and to operationalize the Rural Communications Development Fund (RCDF). IDRC' Acacia initiative (**www.idrc.ca/acacia/**) supports Canada's contribution to the African Information Society Initiative (AISI). Acacia works with African partners to help countries apply ICTs that improve livelihoods, enhance social service delivery and empower citizens while building the capacity of African researchers. Acacia funds research and pilot projects that focuses on appropriate applications and technologies, infrastructure, policy, and governance. The funding is not typically used to finance the construction of ICT networks or facilities. Acacia provided USD 23.7 million in funding for the period 2006-2007.International Institute for Communication and Development (IICD) (**www.iicd.org**)The IICD is an independent non-profit foundation, established by the Netherlands Minister for Development Cooperation in 1996. Its funding sources are the Dutch Directorate-General for Development Cooperation (DGIS), DFID and the Swiss Agency for Development Cooperation. IICD specialises in ICTs for development. IICD creates solutions using both modern media (such as computers, Internet, email and multimedia) and traditional media (such as radio and television) to connect people and enable them to benefit from ICT. IICD is active in Bolivia, Burkina Faso, Ecuador, Ghana, Jamaica, Mali, Tanzania, Uganda and Zambia in education, environment, governance, health and agriculture.In 2006, organizations and NGOs working at the community level accounted for 51 per cent of IICD's partners. In the private sector, IICD partners include small enterprises, such as farming cooperatives or small ICT training centres. Within governments, the national sector ministries are often local partners. By the end of 2006, IICD supported more than 130 project and policy processes, of which 30 per became self-supporting, while 60% continue with IICD support. Only 10 per cent could not be sustained. IICD's country programmes are currently reaching over 250,000 end-users. End users are people who now have access to the Internet or a computer.The European Development Fund (http://europa.eu/scadplus/leg/en/lvb/r12102.htm)The European Development Fund (EDF) is a EUR 13.5 billion fund for African, Caribbean and Pacific (ACP) countries and for overseas countries and territories (OCTs) associated with EU member states. The fund began operations in 1959. Each EDF programme is designed for five years.The tenth EDF covers the period from 2008-2013 and provides an overall budget of EUR 22.7 billion. Of this amount, EUR 21.9 billion is allocated to the ACP countries, EUR 286 million to the OCT and EUR 430 million to the Commission as support expenditure for programming and implementation of the EDF. The amount for the ACP countries is divided accordingly: EUR 17.7 billion to the national and regional indicative programmes, EUR 2.7 billion to intra-ACP and intra-regional cooperation and EUR 1.5 billion to investment facilities. Approximately EUR 4.0 billion will be available on an annual basis for Sub-Saharan Africa under the 10th EDF.In December 2007, an agreement between the European Commission and the International Telecommunication Union (ITU) was signed with regard to implementation of an Action entitled "Support for the establishment of harmonized Policies for the ICT market in the ACP," a component of the ACP-Information and Communication Technologies (@CP-ICT) Programme financed by the European Commission (EUR 20 million from the 9th EDF). This Action will address the regulatory challenges facing the beneficiary countries in sub-Saharan Africa, the Caribbean and the Pacific Island States through three separate regional projects. The goal is to create a regulatory environment conducive to massive investments in ICT infrastructure and ICT-enabled applications which the countries will adopt for day-to-day use in their economic and social activities. It also fulfils the needs expressed by the beneficiaries concerned in the domain of capacity building on ICT polices and regulations and e-readiness. As part of the agreement, the European Commission has allocated EUR 8 million from its 9th EDF, to which the ITU has added USD 500,000 from its ICT Development Fund (ICT-DF). The Action will be managed and implemented by the ITU in close collaboration with relevant regional organizations.The three ACP projects build on an initial project funded by the European Commission and ITU to create a harmonized regulatory framework for 14 West African nations. In January 2007, 14 West African heads of State adopted as Supplementary Acts, a series of regulatory guidelines and decisions on key regulatory issues such as licensing, interconnection, numbering, spectrum management, universal access as well as model ICT legislation and policy. These decisions are now being transposed into national law in the region. (**http://www.itu.int/ITU-D/treg/projects/itu-ec/index.html**). The Commonwealth Development Corporation (CDC) (**www.cdcgroup.com**)CDC's sole shareholder is the UK's Department for International Development (DFID). The CDC provides capital on a commercial basis in countries where businesses have difficulty accessing finance. All profits are re-invested in funds in emerging markets. CDC has received no government capital for a decade. In 2003, its investment in the telecommunications, media and technology sector was approximately 10 per cent of its portfolio, about GBP 111 million. Investments included mobile operators Celtel and Digicel.CDC has net assets of USD 2.8 billion. They aim to make at least 70 per cent of their investments in countries with per capita GNI less than USD 1,750, and the remaining 30 per cent in countries with per capita GNI less than USD 9,075. CDC targets at least 50 per cent of their investments in sub-Saharan Africa and South Asia. As of the end of 2007, the fund had GBP 53.3 million invested in the telecommunications sector in Africa. African investments included Moga Holdings of Algeria and mobile operator MTN Côte d'Ivoire. As of the end of 2007, the fund had GBP 6.2 million invested in the telecommunications sector in Asia.Private Infrastructure Development Group (PIDG) (**www.pidg.org**)The Private Infrastructure Development Group (PIDG) is a multi-donor group founded in 2002. PIDG seeks to address the shortfall in infrastructure provision in developing countries through encouraging private sector participation. PIDG members include: DFID, the Swiss State Secretariat for Economic Affairs (SECO), the Netherlands Ministry of Foreign Affairs (DGIS), the Swedish International Development Cooperation Agency (Sida), the World Bank, the Austrian Development Agency (ADA) and Irish Aid. The PIDG works through a number of facilities, such as:

- InfraCo - A privately managed infrastructure development company. It acts as an honest broker to create viable infrastructure investment opportunities which balance the interests of host governments, the national and international private sector and providers of finance. InfraCo aims to stimulate greater private investment in African and Asian infrastructure development by acting as a project developer, focusing on lower income countries. InfraCo funds early stage, high risk costs by taking an equity stake in the project. InfraCo will consider investments in the telecommunications sector, but has not yet invested in the sector;
- Technical Assistance Facility (TAF) - The overall objective of TAF is to enhance the ability of public and private sector clients to attract private capital to the financing of infrastructure and related services. TAF achieves this through assisting PIDG clients to evaluate, develop and/or implement risk mitigation, financial and regulatory mechanisms, standards, systems and procedures essential to raising funds in the capital markets. This will enable developing countries to make a strong and positive contribution to growth and poverty reduction. TAF grants are for studies, technical assistance, consultancy services and training to facilitate in country development and/or project implementation. TAF was established in 2004 and has USD 3 million per annum in funding; and
- Emerging Africa Infrastructure Fund (**www.emergingafricafund.com**) - The Emerging Africa Infrastructure Fund (the Fund) is a public-private financing partnership initiated by the Private Infrastructure Development Group (PIDG). Following a competitive tender to the private sector, the Fund was launched in 2002. The Fund provides long-term debt or mezzanine finance on commercial terms to finance the construction and development of private infrastructure in 45 countries across sub-Saharan Africa. EAIF is able to provide between USD 10 million to USD 36 million to telecoms, transport, water and power sector projects, amongst others. Loans offer terms of up to 15 years. Loans are provided without the need for political risk cover. The fund has USD 365 million in resources.In the telecom sector, EAIF has funded a number of mobile operators (MTN Nigeria, Celtel Africa, Celtel Nigeria) and provided a total of USD 100 million in funding. The EAIF provided also USD 35 million debt financing to the USD 600 million Seacom project - an undersea fibre optic cable project along the east coast of Africa. The project closed in November 2007 and involves the construction of a 15,000 km cable connecting South Africa to India, via France, Egypt, Mozambique, Madagascar, Kenya and Tanzania.

4.5.4.5 WORLD BANK AND OTHER INTERNATIONAL FINANCE INSTITUTIONS

This section highlights World Bank Group organizations or initiatives and International Finance Institutions (IFIs) particularly involved in the financing of telecommunications and ICT, and the complementary support of universal access and service (UAS) projects.

World Bank (**www.worldbank.org**)

The World Bank Group is the largest multi-lateral financier and provider of policy advice in the field of ICT in developing countries. Over the past five years, the World Bank Group has provided more than USD 3 billion of funding in over 80 countries through its three financing arms; the World Bank, the International Finance Corporation (IFC), and the Multilateral Investment Guarantee Agency (MIGA): The World Banks' mission is global poverty reduction and the improvement of living standards.

The World Bank is made up of two unique development institutions owned by 185 member countries—the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The IBRD focuses on middle income and creditworthy poor countries, while IDA focuses on the poorest countries in the world. Through IBRD and IDA low-interest loans, interest-free credit and grants are provided to developing countries for education, health, infrastructure, communications and many other purposes.

The Global Information and Communication Technologies Department (GICT) is a joint department of the World Bank and the International Finance Corporation (IFC), and promotes access to information and communication technologies in developing countries through policy and regulatory expertise and leveraging private sector finance. The World Bank has supported reforms in over 80 client governments and provided approximately USD 750 million in loans for ICT related projects. This support is in addition to lending projects in other sectors—such as health, education, trade, and finance— that have ICT components. Trust funds administered by the IBRD have contributed an additional USD 50 million to the ICT sector in the past five years.

MIGA, as an agency that provides political risk insurance to foreign investments in developing countries, has supplied an additional USD 700 million to the ICT sector through private investment guarantees. ICT is one of the best performing sectors in the World Bank Group's portfolio, both in terms of returns and development impact.

International Finance Corporation (IFC) (**www.ifc.org**)

The IFC has been established to foster sustainable economic growth in developing countries by financing private sector investment, mobilizing capital and providing advisory services. In partnership with private investors, IFC provides loan and equity finance for business ventures in developing countries and helps expand their economies and create jobs. As a member of the World Bank Group, IFC coordinates its activities with the International Bank for Reconstruction and Development, the International Development Association and the Multilateral Investment Guarantee Agency, but it is legally and financially independent. Its 179 member countries provide its share capital and collectively determine its policies.

The Global Information and Communication Technologies Department (GICT) is the joint department of the World Bank and the International Finance Corporation (IFC). The total of IFC's commitments to telecommunications was USD 1.4 billion by the end of 2007, and includes mobile and fixed-line operators, broadband and cable TV infrastructure, satellite, and broadcasting. Investments typically range from USD 5 million to 150 million. IFC is able to finance from its own funds up to 25 per cent of total project cost for new projects and up to 50 per cent for expansion projects.Additionally, through its syndicated loan program, the IFC offers commercial banks and other financial institutions the opportunity to lend to IFC-financed projects that they might not otherwise consider. These loans have contributed another USD 1 billion toward the sector.

Starting in 2008, IFC expects that their new projects will enable an additional 12.2 million people to be connected, create 1,800 new skilled jobs in the IT and media sectors, and contribute a total of USD 2 billion in fiscal revenues and license, spectrum, and numbering fees over the next five years. IFC's portfolio, with outstanding commitments of USD 970 million, has seen no loan defaults and strong rates of return across the board in telecommunications, IT, and media. IFC has financed telecommunications projects in Afghanistan, Albania, Bangladesh, Cameroon, the Dominican Republic, Ghana, Haiti, India, Jamaica, Lao PDR, Maldives, Morocco, Nigeria, Pakistan, Paraguay, Peru, Romania, Russia, Sri Lanka, Thailand and Turkey.

Public-Private Infrastructure Investment Facility (PPIAF) (**www.ppiaf.org**)

The Public Private Infrastructure Advisory Facility (PPIAF) is a multi-donor facility managed by the World Bank. It provides small technical assistance grants to developing country governments to help them improve their infrastructure services through public-private partnerships. PPIAF funds are grants provided on a demand-driven basis. About half the grants are under USD 75,000, while the average size of a PPIAF grant is USD 215,000.The Public Private Infrastructure Advisory Facility (PPIAF) advises developing countries on improving the enabling environment for private sector participation in infrastructure. Through its Sub-National Technical Assistance Program, PPIAF helps sub-national entities (government entities other than national governments) borrow to improve infrastructure. Telecommunications accounts for about 9 per cent of PPIAF's budget since its inception. From 1990 to 2006, PPIAF facilitated investments over 750 telecommunications projects. For 2007, activities funded in the telecommunications sector amounted to USD 2.4 billion, or 14 per cent of total funding. PPIAF financed telecom projects in Liberia, Sierra Leone, South Africa, Sudan, Pakistan, China, Indonesia, Sri Lanka, Armenia and Haiti.

The Global Partnership for Output-Based Aid (GPOBA) (**www.gpoba.org/index.asp**)

GPOBA was established by the World Bank and the UK's Department of International Development (DFID) in 2003 to design pilot projects for OBA approaches, learn lessons, and disseminate best practice. DFID approved GBP 6.8m from 2003 to 2006. In 2005, DFID approved also a GBP 20 million Challenge Fund, to allow GPOBA to expand the scope of its activities to include funding of subsidy payments for pilot tests of OBA approaches in the infrastructure sectors. The IFC joined GPOBA as a donor, focussing their funds on projects in the infrastructure, health and education sectors that involve the private sector. The Netherlands government joined GPOBA with funding to support the provision of performance based grants for the delivery of basic services to the poor, particularly in the water and sanitation sector in Sub-Saharan Africa. The Australian Government Overseas Aid Agency (AusAID) and the Swedish International Development Cooperation (Sida) also joined as donors.GPOBA has funded telecommunications projects in Bolivia, Cambodia, Guatemala, Indonesia and Mongolia. As well, GPOBA funded a Regulatel study on UAS in Latin America, and a study of ICT development in the Asia Pacific region. The total funding provided by GPOBA for these projects was approximately USD 8.9 million.See also the practice note attached to **Section 5.2.1**, entitled Output-Based Aid explained.

infoDev (**www.infodev.org**)

infoDev is a global development financing program, coordinated and served by the Global ICT Department (GICT) of the World Bank, one of its key donors and founders. infoDev's disbursements (typically less than USD 10 million per annum) is used mostly for commissioning studies, research and pilots. Its role is mostly as an neutral facilitator of dialogue, and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private-sector organizations who are innovators in the field of ICT4D.One focus area for infoDev is "Access to ICT – Broadening the reach and affordability of ICTs". Currently, infoDev's work in this area focuses on three interrelated challenges:

- Designing and implementing effective policies and regulations for ICT infrastructure and services;
- Developing new models of public/private partnership in financing the expansion of access to ICT infrastructure and services; and
- Exploring the contributions that technological innovation can make to developing new solutions to the access challenge.

European Bank for Reconstruction and Development (**www.ebrd.com**)

Established in 1991, the European Bank for Reconstruction and Development (EBRD) was initially aimed at helping communist countries in central and eastern Europe and ex-soviet countries in their transition to market economies, and supporting new private sectors in democratic environments. Today the EBRD extends its tools of investment to help countries from central Europe to central Asia similarly. The EBRD's main aims in the telecommunications sector are the following:

- Promote network expansion, thereby increasing access to telephone services and improve the quality of service;
- Encourage the emergence of innovative and advanced communication services;
- Accelerate the privatisation process; and
- Develop appropriate regulatory and legal frameworks.

The EBRD is the largest single investor in central and eastern Europe and the Commonwealth of Independent States (CIS). Direct investments generally range from EUR 5 million to EUR 230 million. Smaller projects are financed both directly by the EBRD and through financial intermediaries.

European Investment Bank (**www.eib.org**)

Created in 1958, the European Investment Bank (EIB) is the long-term lending bank of the European Union (EU). While the main task of the Bank is to contribute towards the integration, balanced development and economic and social cohesion of the EU Member States, it also makes telecommunications investments in developing countries and emerging markets such as Angola, Brazil, Colombia, Ecuador, Peru, Syria and Turkey. The EIB is expected to play an increasing role in the EU policy to reduce the "broadband gap" by encouraging private sector investment in broadband infrastructure. The investment requirements for next generation networks are potentially large, and the EIB is supporting the establishment of alternative broadband access platforms, including wireless technologies.

Inter-American Development Bank (**www.iadb.org**)

Established in 1959, the Inter-American Development (IDB) Bank provides financing, policy advice, research, and technical assistance for development projects in 26 Latin American and Caribbean countries. In 2007, the bank made loans and guarantees of USD 2.1 billion in the transportation and communication sector. The IDB addresses telecommunications access through a number of activities, including the following:

- Project financing in the area of information and communication technology facilitated by the Information and Communication Technology for Development Division (ICT) of the IDB;
- Supporting universal broadband access through investment to expand local Internet access networks using the Multilateral Investment Fund; and
- Assisting public, private and mixed-capital entities in the identification, development and preparation of bankable infrastructure projects through the Infrastructure Fund (InfraFund) because the IDB identified the lack of funding for project preparation as a major bottleneck for the much-needed scaling up of infrastructure investment in the region.

African Development Bank (**www.afdb.org**)

The African Development Bank (ADB) is a regional multilateral development finance institution engaged in mobilising resources towards the economic and social progress of its regional member countries. Approvals for infrastructure projects in 2007 reached a record level of UA 1.9 billion, accounting for 75 per cent of the total loan and grant approvals for the year. 48.2 percent was allocated to power supply projects; 39.2 percent to transportation; 11.0 percent to water and sanitation; and 1.7 percent to information communication and technology (ICT) projects. The East African Submarine Cable System (EASSy) is of interest to the Bank's private sector operations. In 2007, the Bank's total cost for the EASSy project was USD 51.4 million, which included a USD 9.5 million loan.The Connect Africa Initiative is a global partnership launched in October 2007 to mobilize the human, financial, and technical resources needed to bridge major gaps in ICT infrastructure across the continent. A total of USD 55 billion (UA 34.08 billion) has so far been pledged for the development of infrastructure and services necessary to achieve both the ICT-related MDGs and the World Summit on Information Society Action Plan. The ADB will play a leading role in the coordination of this initiative.

Asian Development Bank (**www.adb.org**)

Established in 1966, the Asian Development Bank (ADB) is an international development finance institution, owned and financed by its 67 members, of which 48 are from the region and 19 are from other parts of the world. ADB's mission is to help its developing member countries reduce poverty and improve the quality of life of their people.ADB provides assistance in the form of equity, loans and guarantees, as well as complementary financing scheme for infrastructure projects. Examples of ADB involvement in ICT is its financing of the nationwide expansion and upgrading of Afghanistan's leading cellular network operator, Roshan, and its financial support to help prepare Assam (India) for e-governance.

4.5.4.6 NON-GOVERNMENT & PHILANTHROPIC SOURCES

Most of the focus of non-government assistance is on a specific sector of activity, e.g., e-health or e-education for rural and poor people. As noted in **Section 5.1**, the role of most of these agencies in universal access and service (UAS) development is one of applications development and user and institutional capacity building. Without these complementary and supportive activities, the benefits of having access to the Internet and to ICT services, which UAS programmes provide, would go largely unrealized.

Digital Freedom Initiative (**www.dfi.gov**)

The Digital Freedom Initiative (DFI) is a partnership among US federal agencies, industry, NGOs and universities. It aims to expand connectivity around the world, particularly by helping developing nations utilize ICTs for economic development and to broaden social and economic benefits. Areas of focus include:

- Improved rural access to telecommunication services in rural and under-served areas;
- Policy and regulatory reform, and technical assistance to support infrastructure investment;
- The use of ICTs by small and medium-sized businesses;
- Expand use of technology in health care, education, and for secure financial transactions;

- More inter-regional commerce and export competitiveness through use of ICTs.

Recent DFI initiatives include a public-private partnership to bring telemedicine services to rural areas in Pakistan. Completed projects include: ICT skill training for private entities in Senegal; and, working with Intel, Cisco, Motorola, Voxiva and Hewlett Packard to supported Peru's effort to extend Internet access to over 1,000 rural areas.

Grameen Foundation (**www.grameenfoundation.org**)

As described in Section 5.4.3, Grameen Foundation is a non-profit organization that combines microfinance, technology, and innovation to empower the world's poorest people to escape poverty. The organization was founded in 1997 by a group inspired by Dr. Muhammad Yunus and Grameen Bank in Bangladesh. The Foundation's network of microfinance partners has impacted an estimated 16 million lives in 22 countries across Asia, Africa, the Americas, and the Middle East. Dr. Yunus is also a founding and current member of Grameen Foundation's board of directors. In terms of support for ICT programmes, Grameen Foundation's Technology Center is involved with ICT initiatives that are dedicated exclusively to advancing microfinance. The Foundation focuses on increasing the efficiency of microfinance institutions' operations, creating new microbusiness opportunities for the poor and providing telecommunications access for the world's rural poor.Building on the successful Grameen village phone programme in Bangladesh (see **Section 3.3.1** for details), the Uganda village phone programme was created in cooperation with mobile operator MTN Uganda in 2003. In 2006, after a yearlong pilot project with 50 entrepreneurs, village phone Rwanda was created as a joint venture between Grameen Foundation and MTN Rwanda. Grameen Foundation has also partnered with Nokia to make a village phone equipment kit available for purchase in developing countries.

Bill & Melinda Gates Foundation (**www.gatesfoundation.org**)

The foundation partners with select countries to provide free access to computers and the Internet in public libraries. Their strategy has three elements:

- Identify country partners through extensive research—countries are invited to partner based on several criteria, including demonstrated need, the presence of a strong library system, necessary infrastructure (such as electricity and Internet capability), demonstrated commitment to public access to technology, and the potential for implementing and sustaining service.
- Provide resources—these include resources for planning, hardware, training, advocacy, evaluation, technical support, and project management. Microsoft donates software if the country requests it. Each country is asked to commit to the programme as a full partner, requiring them to make a significant investment for infrastructure, librarian salaries, and Internet connectivity; and
- Encourage sustainable programmes—the foundation works with grantees to develop library-based technology services that can be valued and supported for the long-term.

Grants include, but are not limited to, the following (examples only):

- BiblioRedes: Abre tu Mundo – USD 10 million to provide more than 2,150 computers, Internet access, and training to 368 public libraries in Chile (2000-2004); this grant brought the percentage of public libraries with computers from 10 to 100 per cent;
- Consejo Nacional para la Cultura y las Artes – USD 30 million to provide computers, Internet access, and training to approximately 2,400 libraries in Mexico (2002-2006); and
- Latvia – USD16.2 million to connect 3,833 new computers in 874 public libraries to high-speed Internet, to expand access in rural Latvia, and for related training for 1,455 librarians.

Aga Khan Fund for Economic Development (AKFED) (**www.akdn.org/agency/akfed_indpromo.html**)

AKFED is mainly an investment fund dedicated to promoting entrepreneurship and building economically sound enterprises in the developing world and works with governments, international corporations, international financial institutions and donors to create solutions to infrastructure needs, including power generation and telecommunications. AKFED has existed since 1960 and creates profitable companies in developing countries through long-term investments. Profits generated by the Fund are reinvested in other economic development initiatives under the AKFED umbrella.AKFED operates as a network of affiliates with more than 90 separate project companies employing over 30,000 people, with annual revenues in excess of US$1.5 billion. The Fund is active in 16 countries in the developing world: Afghanistan, Bangladesh, Burkina Faso, the Democratic Republic of the Congo, India, Ivory Coast, Kenya, Kyrgyz Republic, Mali, Mozambique, Pakistan, Senegal, Syria, Tajikistan, Tanzania and Uganda. AKFED's initial involvement in building telecommunications infrastructure was in Indigo, a GSM operator in Tajikistan. In Afghanistan, AKFED determined that building communication infrastructure was critically important to the redevelopment of the country and formed the company Roshan, which was awarded the country's second GSM license. Roshan has invested over USD 338 million in expanding its coverage. Roshan directly employs over 900 people; indirectly, nearly 20,000 people are employed through distributors, contractors and suppliers.

Dhan Foundation (**www.dhan.org**)

Development of Humane Action (DHAN) Foundation was initiated in India in 1997. The Trust has the objective of bringing highly motivated and educated young women and men to the development sector. The Foundation works towards bringing significant changes in the livelihoods of the poor. The DHAN Foundation has taken up information technology for the poor as a new theme with the following objectives:

- Making IT accessible to the poor by developing relevant programmes through research and pilot projects; and
- Collaborating with research institutions on e-governance and computer education at schools in rural areas.

As part of the programme, Village Information Centres (VICs) in rural areas as well as urban slums are set up through which services such as computer education, e-mail, ePost, agricultural market intelligence, etc. are rendered. Computer aided adult literacy centres for the Kalanjiam and Vayalagam members and computer training centres for the children of members of Kalanjiam and Vayalagam are also set up through the programme. By the end of 2006, the Foundation was involved in IT activities in 162 villages in 11 districts. One Lap-Top per Child (OLPC) initiativeStarted in 2005 by faculty and researchers at MIT's Media Lab, the One Lap-Top per Child (OLPC) initiative aims to provide children worldwide with new opportunities to explore, experiment and express themselves. The One Laptop Per Child Association is a non-profit organization set up to manage the creation of an affordable educational device for use in developing countries. OLPC is funded by a number of sponsor organizations, including AMD, Brightstar Corporation, eBay, Google, Marvell, News Corporation, SES, Nortel Networks, and Red Hat. Each company has donated two million dollars.The OLPC Association's XO laptop was designed to be flexible, low-cost, power-efficient and durable. It uses free and open-source software. The XO, originally intended to cost USD 100, ended up costing USD 188, mainly because little or no large quality purchases were forthcoming from governments as expected. The first production units were delivered in December 2007. In May 2008, a new design concept was revealed that eliminates the computer's keyboard and is targeted to cost just USD 75 when it is released in 2010.Eleven countries have participated in OLPC pilot projects. Countries participating in the project (not pilots) include Afghanistan, Cambodia, Colombia, Ethiopia, Haiti, Mexico, Mongolia, Rwanda and the United States. Approximately 370,000 laptops had been shipped by July 2008. In total, there have been over one million XOs either shipped or ordered.

4.6 UAS PROGRAMME DEVELOPMENT AND PRIORITIZATION

This chapter presents and discusses some of the main steps to develop a universal access and service (UAS) programme, including an ICT sector review, demand analysis, subsidy estimation, and also a discussion on measuring economic impact and benefits and how this may help to prioritize programme components and individual projects.

Section 6.1 expands on the sector analysis already outlined in the UAS policy chapter (**Section 4.2.1**) which helps to ascertain the country's current UAS status and answer the question: What areas and population groups do not yet have affordable access to ICT services? This results in a detailed identification of service gaps in the country; the section then looks at quantifying the demand for various ICT services in those areas that are unserved, as well as qualifying the demand, e.g., at what price point and for which level of service is there a need or a demand? Both desk-based and field demand study methodologies are presented. The purpose of this step is to:

- Identify which areas (regions, provinces, districts etc.,) of the country are to be included into the UAS programme;
- Identify which ICT services are required in each of these areas; and
- Quantify the demand for those ICT services, to be used to model potential revenues, which in turn helps to prioritize projects within the UAS programme.

With the groundwork laid in identifying unserved communities and quantifying their demand, **Section 6.2** then looks at determining how much it will cost to provide UAS services. It further looks at what subsidies are required by comparing revenues against costs. Approaches to modelling costs, assessing viability and estimating subsidy requirements are also presented.

Section 6.3. discusses the status of economic impact analyses, measurements and findings, separate for communications projects and broadband Internet & ICT service development. While these broader economic impact studies may not be well suited for the purpose of UAS programme development or prioritization, their understanding and knowledge of the latest research in this area provides nevertheless crucial information for any UAS programme planner.

Section 6.4 then looks at practical approaches to project prioritization in the context of UAS programme development.

Given the dynamic nature of the communications market, and the increasing number of players, collection and analysis of the data required to perform some of the above analyses may be quite challenging,. A UAS programme developed two years ago, for example, may already be partially obsolete.

It is therefore recommended that regulators have a designated UAS department that regularly monitors, collects and analyze data on an annual basis. In addition, regulators need to maintain close and continued co-operation with the ICT industry in developing and updating UAS programmes.

Reference Documents

- **Universal Access & Service (UAS) and Broadband Development**

4.6.1 ICT SECTOR ANALYSIS AND ASSESSING DEMAND

The first step towards developing a universal access and service (UAS) programme is to determine the country's current UAS status. The country's unserved communities and/or regions need to be identified and their demand for services assessed. This can be accomplished through an ICT sector review, described in Section 6.1.1, which includes policy issues and market players, stakeholder consultations, near-future plans (e.g., one to three years) with regard to existing infrastructure, and that may be complemented with a demand study. This enables the regulator to identify and design feasible UAS targets that can built upon the existing strength and potential of a country and leverage the capacities and synergies of market players and stakeholders already active in the market. The ICT sector review may allow other development players to identify effective strategies that might not need high-end technology and bandwidth. For example, if a country has an active health-related NGO that wants to reach the rural population, it might use a combination of an FM radio station for information dissemination and add call centre and information retrieval services for call-in and 'question and answer' services.

Uganda's success at lowering the rate of HIV/AIDS infection within the country is partly attributed to a campaign that uses radio to educate and raise awareness of HIV/AIDS issues, particularly with teenagers and other at-risk citizens, via radio-talk shows [1]. When implementing a UAS strategy, governments or regulators like to have a demand study undertaken that identifies consumer needs, preferences and demand for service. This can also be used to highlight the social and economic impacts of new service provision into formerly underserved areas.

For telephony services, the simplest initial desk-based demand estimate can be made in terms of the call-generating or purchasing power of specific areas or administrative units. The most common approach for estimating demand is establishing the individual household expenditure on communications, as described in Section 6.1.2.

In addition, for telephony, there is also demand and revenue potential for incoming calls to as of yet unserved areas which should be included in this desk-based demand estimation, as described in Section 6.1.3.For Internet services, an initial demand scenario can be created based on estimates due to the presence of administrative, business or institutional structures, as illustrated in Section 6.1.4.

The demand scenarios can be based on different assumptions, creating conservative, moderate and optimistic demand scenarios, and include a sensitivity analysis. However, in order to confirm or refine these desk-based demand estimates, it is recommend to undertake field demand studies where actual users and potentianl users of ICT services are interviewed about their needs, affordability and other topics, as explained in Section 6.1.5.

4.6.1.1 ICT SECTOR REVIEW

To prepare for an ICT sector review, which is required both for policy and programme development, statistical and other country data (e.g. socio-economic, cultural) needs to be collected and compiled to summarize the country's geographic, political, economic, social and cultural characteristics, in addition to ICT data. Regional population, geographic, topographic, demographic, and socio-economic indicators that reflect relative wealth, wellbeing and poverty should be tabulated and compared, for the entire country, including served and unserved areas. This data is needed for the ICT sector review, as it joins socio-economic data with ICT data; both are needed in order to develop a universal access and service (UAS) programme and identify the potential role and impact communications may have on development.

Socio-economic data review

The result of gathering this data is a basic desk-based comparative study that tabulates the socio-economic and infrastructural wellbeing or poverty of a country. Ideally, to get the clearest picture of the county's UAS status, the study should be broken down into lower administrative levels, e.g., province-by-province, district-by-district, etc. Typically, the following socio-economic data are collected and compiled:

- Population size, density and distribution;
- Number of towns, villages etc., classified by size;
- Income levels and distribution;
- Nature of economic activities and major sources of income;
- Health & health infrastructure statistics and indicators;
- Education infrastructure statistics (e.g., number of schools, primary and secondary, tertiary institutions such as universities and colleges etc.) and education levels and enrolment;
- Composite Human Development Index (HDI); an index combining normalized measures of life expectancy, literacy, education, and GDP per capita for countries worldwide;
- Commercial indicators (e.g., number of bank branches, businesses, etc.);
- Local governments and administrative offices, other institutions, NGOs, etc.;
- Major construction or development activities and programmes in a province or district;
- Basic infrastructure such as power, transportation (e.g., paved roads, etc.), and postal services;
- Terrain (e.g., rugged mountains, hills, savannah, crop lowlands, etc.); and
- Socio-cultural distinctions that may have relevance (e.g., ethnicity, religion, language, minority groups, presence of indigenous people, nomads, etc.).

In addition to the government's official statistics office, sometimes various ministries (agriculture, local government or rural development, planning, transport, health and education) have useful additional resources and a good understanding of the specific needs of regions and certain population groups. Also, banks that have a national-wide presence, as well as farmers associations, NGOs, development agencies and micro-finance institutions can contribute valuable information. A benefit of this level of research is that it will help the UAS programme identify and connect with other development initiatives.Once data is collected, its comparative analysis provides an understanding and description of the country's geographic zones, regions, administrative departments, municipal units and other population centres. The output can provide both descriptive material and tabular comparative analyses that can be used to classify the country's regions for total market capacity (potential revenue), level of development, as well as identify the existence of social and physical infrastructures that create demand for communications services in unserved areas.

ICT data Review

After analysing the socio-economic data, it is necessary to review the existing communications infrastructure throughout the entire country. As discussed previously, understanding the country's communication infrastructure will:

- Identify which services and applications the infrastructure can support;
- Identify the infrastructure gap
- Identify the next steps for achieving universal access and service (UAS);
- Identify feasible upgrades and alternatives, as well as any potential for leveraging existing technology for new types of services.

The ICT sector review also necessitates a thorough review of current policy and regulatory frameworks – including issues such as tariff policy, spectrum allocation, licensing and liberalization, among many others (see also **Chapter 2** on regulatory reform and UAS). In addition, developing a clear view of the policy changes likely to be implemented in the short-to-medium term is essential because these changes will determine what infrastructure development and service provisions will be available in the near future, and these, in turn, could be leveraged for Universal Access (UA) and rural ICT projects. A helpful tool for the ICT sector review is to interview various industry players. This may be outsourced to an independent expert entity or accomplished through a qualitative questionnaire. In addition to obtaining detailed information on the existing and planned infrastructure from each operator, questions as to any planned policy initiatives, market development and regulatory constraints may be included. The interview or survey process ideally includes the main telecommunications and Internet infrastructure and service providers, a few of the smaller players, and if possible, potential new entrants and alternative service providers (e.g., railway, power companies). If they exist, public phone operator companies and others related to telecentres or Internet cafes could also be interviewed. This process provides a good understanding of the existing context, demand, constraints and opportunities within the telecommunications/ICT sector in terms of reaching the country's unserved communities and achieving UAS for both telephony and the Internet. These interviews, crucial to identifying the current status of UAS, will ascertain which areas will be served commercially and which will require intervention. The topics to be discussed with the relevant communications operators and service providers include the following:

- Network related topics:
- Network statistics, current coverage, points of presence (POPs), bandwidth capacities;
- Cost structure, both capex and opex;
- Network expansion and investment plans;
- Technologies used and future trends/ preferences;
- Financial topics:
- Revenues (average and marginal) for various services;
- Expectations for financial returns;
- Market and subscriber issues:
- Levels/range of services, numbers and types of customers for each service type, etc.;
- Marketing and distribution;
- Tariff strategies and prices;
- Public access:
- Experience with deployment of phone or Internet public access facilities;
- Current numbers, types and deployment of public ICT access facilities;
- UAS issues:
- Experience with reach into rural areas and underserved communities;
- Approaches of the operators and ISPs towards reaching low income people and communities; and
- Strategic ideas for UAS, etc.

The operators and service providers should be asked whether they are planning to serve the unserved areas and population groups in the near future and which areas or target groups will require government intervention. These discussions may be held in private due to the confidential nature of expansion plans. It is also very helpful to include non-ICT players that have either a commercial interest in rural areas (e.g., agricultural suppliers) or in socio-economic development, such as donor and development agencies, and NGOs. Results of the overall ICT sector analysis should be summarized in a report and presented to the telecommunications industry and other relevant stakeholders for validation and refinement. Such presentations also provide opportunities for identifying areas of uncertainty so that further informational needs can be identified and later integrated into the demand study design.

4.6.1.2 PER CAPITA AND HOUSEHOLD EXPENDITURE ON COMMUNICATIONS

Universal access and service (UAS) programme developers can build up a desk-based demand model for unserved areas based on data collected during the ICT sector review which may be refined later through a field demand study. The model uses national data on communication expenditure and projects it to unserved areas. It starts out with the country's total telecommunications revenue divided by its GDP, resulting in the percentage telecom expenditure of GDP. This can be refined with additional data where available, as follows:

- Percentage of GDP accounting for household income (typically 60-70 percent of total GDP);
- Typical rural or low-income compared to average income;
- Regional variation of income;
- Percentage of telecom revenue from business users (to be subtracted from the total telecom revenue for a closer approximation of household expenditure);
- Data on telecom expenditure by households; and
- Household number and size.

By having data on population or household and income in various identified unserved areas, the total revenue generating potential of each unserved area can be calculated on an annual basis, as follows:

(per capita income) x (population) x (the telecom expenditure percentage)or(per household income) x (no. of households) x (the telecom expenditure percentage)

In most countries, the demand for telephone service has been identified at somewhere between 2-5 per cent of a country's GDP, using ITU's indicator of telecommunications revenue as percentage of GDP, as can be seen in the Figure below.

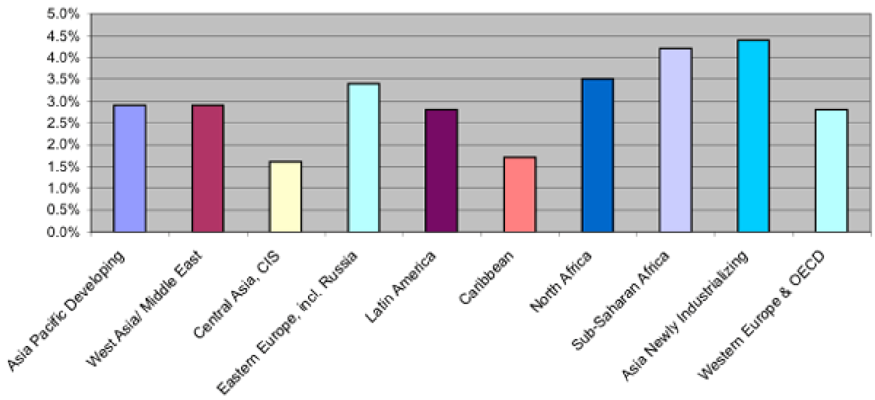


Figure: Total Telecom Revenues as % of GDP - 2007

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module based on ITU World Telecommunication/ICT Indicators.

A recent review of several telecoms demand studies in developing countries found a high variability in spending levels per household, as well as significant rise globally of the percentage in household income spent on communications [1]. Field surveys of rural areas in Africa have indicated household expenditure levels of more than 5 per cent in some countries. This makes sense, considering that rural incomes are often lower than average income, thus the expenditure is a higher percentage of the income and also, living in rural and remote parts of the country, the opportunity costs of travelling to communicate are much higher. This makes the argument for communications services all the more attractive. In a large demand study commissioned in 2005, by the Nigerian Communications Commission (NCC), respondents stated they spent on average USD 20.7 per month on the mobile phone (fixed phones are almost nonexistent outside the main cities), which is 7 per cent of monthly household income. In the developed world, phone cost expenditure is typically less than 2% of Gross National Income (GNI) per head, due to a combination of low telephone costs and higher incomes. People want and need to communicate and are prepared to pay for it no matter what their economic status is. The benefits they receive from communications expenditures are now well known as they relate to routine family, business and emergency matters, and to time and expense savings (the opportunity cost) of alternative means of communications, such as the necessity to travel.In NCC's demand study, over one third of respondents (36 per cent) indicated that they travel to another town to make a telephone call (as shown in the Figure below). 21 per cent of the respondents actually travel to meet in person because they have no access to a phone. A third of respondents send a letter or use a messenger (or a combination of both – i.e., write a letter and then have a messenger deliver it) to communicate. Approximately 8 per cent do none of the above or selected "Other" (methods of communication) in the survey. Less than 1 per cent of respondents stated that they have their own mobile phones and travel to the nearest coverage area.

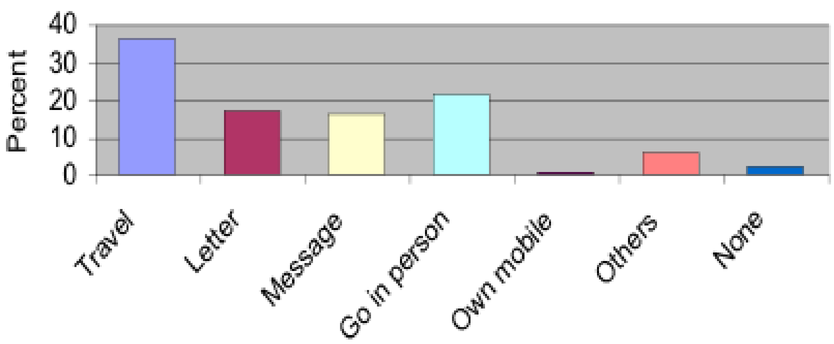


Figure: Alternative Means of Communication Due to Lack of Phones

Source: NCC Demand study, 2005

On average, respondents stated they spend one hour and 40 minutes travelling to make a phone call and return home. The average total cost of return travel to make a phone call is USD 2.84. This is based on over 5,000 interviews in all six regions of Nigeria, and a sample that included urban, semi-urban and rural areas (but excluding major cities).

Reference Documents

- **Final report on expanded national demand study for universal access project – Part 1 – Household survey, Nigerian Communications Commission, Dec 2005**
- **Final report on expanded national demand study for universal access project – Part 2 – Business and institutions survey, Nigerian Communications Commission, Dec 2005**

4.6.1.3 INCOMING CALL REVENUE

When considering the demand and revenue potential of unserved or underserved areas and communities, it is important to include the demand for incoming calls, a significant source of revenue. Adding revenues stemming from calls flowing into rural areas from urban (and international) destinations to revenues from basic service connections and outgoing calls, the total potential revenue from unserved areas and communities could be double what potential users themselves are willing and able to spend. The following illustrates the results of a rural demand study undertaken in 2005 for Mozambique's Ministry of Transport and Communications. The study of 226 rural households without telephone access in three different districts in the province of Zambezia, revealed that 19 per cent of the respondents stated that they have close family members living abroad, often in Malawi or South Africa. The Figure on the right shows that 24 per cent of respondents stated that they have close family members living in Maputo or another major city outside of Zambezia. These findings predict (incoming) international and national long-distance traffic that might be generated by providing services to those rural areas.

Figure: Family members in Maputo or other major city outside the province

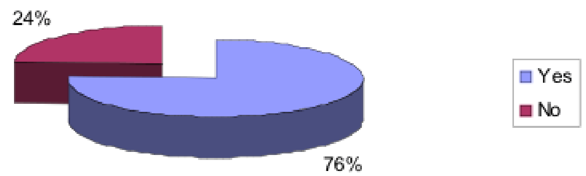


Figure: Family members in Maputo or other major city outside the province

Source: Mozambique Demand study 2005

Further, the study revealed that 92 per cent of respondents would receive incoming calls if their village had phone service. On average, the respondents would expect to receive three incoming calls per week. When asked how many calls they would make on a public phone per week themselves if phones were installed in their village, respondents stated they would make on average four calls. Similarly, in the 2005 study commissioned by the Nigerian Communication Commission (NCC), 39 per cent of respondents stated that they have family members living abroad, as shown in the Figure on the left. This incoming call market (into rural areas) can generate revenues for carriers either in the form of termination charges or urban customer revenue. In many countries, urban callers tend to be more affluent and can afford more calls and lengthier calls to rural relatives and friends.

Figure: Family members living abroad – in %

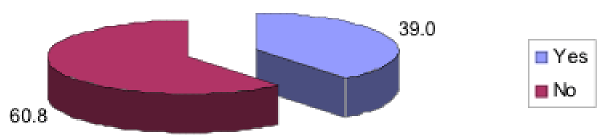


Figure: Family members living abroad – in %

Source: NCC Demand study 2005

In Latin America, data from Chile demonstrate that rural telecommunications operators earned more than 60 percent of their revenues from incoming call terminating charges. It is remarkable that rural pay phones in Chile report this significant number of incoming calls because typically, stand-alone pay phones are not set-up to receive incoming calls as easily as a phone shop that has an operator in attendance [1]. For pay phones to be effective for incoming calls, they need someone living close to the payphone who is willing to receive incoming calls and relay messages to the called party, or who is willing to set up appointments between the caller and called party. Another example of significant revenue potential made from incoming calls, is Bangladesh's Grameen's Village Phone programme, discussed in detail in **Section 3.3.1**. This well-documented case illustrates how telephone service can be extended to low-income, rural populations. The average usage of the village phones amounts to about 1600 minutes per month, out of which approximately 1000 minutes are from incoming calls [2].In conclusion, when estimating demand, incoming call revenue needs to be included, either through data gained from a demand study or reasonable assumptions based on data from comparable markets.

Practice Notes

- **A demand study in rural areas of Mozambique**

4.6.1.4 DEMAND FOR INTERNET SERVICES

In developing countries that include access to the Internet as part of their universal access and service (UAS) policy, the target is typically not individual household access but public access to the Internet. Thus, this public usage through Internet cafés and telecentres needs to be forecasted, as well as some private demand for Internet services. This section discusses methods of forecasting Internet demand.

An estimate of the total revenue potential should be made, including both public demand at telecentres and private demand of households, businesses and institutions. The estimate should include private demand in order to assess the feasibility and viability of extending Internet infrastructure and service to a targeted area. Further, demand can be broken down into the various Internet related services (from e-mail via browsing to Internet telephony, e-commerce or e-government services) as well as several pricing models (time-based, data-throughput-based, flat-rate and bundled pricing).Demand obviously has two dimensions – those who want to use Internet services, and those who can afford to use it, e.g., many youths want Internet access but often can't afford it. Assessing potential demand for Internet in unserved areas starts with interviewing the existing national ISPs and cyber cafés, and collecting other key data on topics such as the following:

- Internet subscriber penetration (business/ household);
- Internet user penetration;
- Socio-demographics of Internet users;
- Computer penetration (if possible, disaggregated by urban and rural, and business and household);
- Number of businesses and institutions (per region, administrative units);
- Typical Average Revenue Per User (ARPU) per standard or low-end user;
- Typical ARPU of business users;
- Typical ARPU of specific institutions (e.g., NGOs, local government offices, schools, health centres, etc.);
- Typical respective data speeds to different types of users; and
- Data on cybercafé number, usage, revenue, and services that are most in demand.

The above data provide an understanding of how much demand there is for the Internet in rural and underserved areas and should be used to develop a demand model. However, the model may have to use certain assumptions, which need to be conservative and are likely to vary from country to country. Some illustrative and hypothetical assumptions that might be made from the data are:

- If Internet user penetration is 20 percent (nation-wide), then a plausible assumption could be that demand in unserved areas comes initially from 10 per cent of the population;
- If the national average for telecom users is USD 10 per month on communications, then an assumption might be made that users in unserved areas might spend USD 5 per month; and
- If 30 per cent of nation-wide businesses have computers, a starting assumption might be that 15 per cent of businesses in unserved areas have computers;

These assumptions can be tested by the field demand study where actual and potential users are interviewed. By preceding the demand study with a sector review, the field demand study will then focus on indicators that are actually required to model demand and assess feasibility for the UAS programme. This will support the development of an effective UA programme. The demand study makes it possible to develop an estimate of the number of short-to-medium term potential Internet users on a district-by-district basis, and a resulting estimate of potential revenues and subsidies for the provision of an ISP wireless access system. In many developing countries, the degree of confidence will be less than for telephony as data in this emerging Internet market is more transitory and less reliable.

Businesses and institutions as vanguard users of Internet

In most developing countries, local government agencies, social infrastructure and health institutions, schools, NGOs and businesses provide most of the demand for Internet services. They can be considered intermediaries: while the vast majority of these institutions are located in district centres and/or other small towns, the benefits of their access to the Internet can spread to villages. Many of their clients are villagers who may also visit their offices frequently. There is also a growing public demand for the Internet via cybercafés.Overall, the potential user community and demand for Internet services has to be identified in a more consultative fashion than that for telephony. In most developing countries it is less advanced than in the developed world and that has more varied uses and applications than telephony. Estimating Internet demand often involves more than the simple identification of the number of business or administrative units. It includes consideration of how to catalyse partnerships between development, administrative and private agencies to create sustainable and scalable ICT demand.

4.6.1.5 FIELD DEMAND STUDIES

A demand study carried out in the field (often interviewing rural end-users) is important in the development of a universal access and service (UAS) programme for the following reasons:

- While modelling using desk-based data research and industry interviews is important, there can be data gaps that need to be filled by a field demand study;
- Key assumptions of a model can be validated or refined through a field demand study – the demand study is the bottom-up approach interviewing end-users, which complements the modelling top-down approach;
- A demand study increases the credibility of the UAS programme with industry and other stakeholders as it represents a thorough investigation and not a theoretical modelling approach; and
- Elements of a potential UAS programme can readily be tested, such as the following questions:
- What are suitable service levels and required service elements?
- What are the best public access models in the country's context?

A side benefit of field demand studies is that it can educate potential future users about ICT services and their applications and benefits. Field demand studies range from sample or pilot field studies to full-scale representative baseline demand studies. These have several levels of depth and accuracy. Demand studies can provide information on the following:

- Needs for communication of various kinds;
- Private demand, affordability and willingness of users to pay for telephone, Internet and other ICT services;
- The numbers, location preferences and mode of public access points;
- Technology and service preferences (e.g., mobile versus fixed, required Internet speeds, broadband needs); and
- Knowledge and demand for different value added and non-voice ICT services.

Deciding on the scope of a field study

Various factors – e.g., size of country, expected scale of UAS programme and whether or not a pilot project is planned – will influence the required scope of the demand study. The scope of the field study will also depend upon what data is already available and how reliable the data is. Demand studies require money and time and thus determining the right size of the demand study is important. Key questions to be asked in determining the scope and size of a field study are the following:

- Is there the political will or the need to include certain regions or populations? E.g., some countries have strong regional or ethnic differences that require field studies to be more inclusive than others;
- How reliable is the existing available data? E.g., if there is good quality data and research on household income, population and ICT usage then the field study can be smaller and focus more on specific UAS issues;
- What assumptions industry and policymakers make about the demand for and importance of UAS? E.g., in some countries there might still be a prevailing perception that communications is not as important as other development initiatives. Access to the telephone or the Internet may be considered a luxury in unserved areas where fundamental needs such as food, water and roads are not served. In those cases, a wider demand study can be an educational tool and provide credibility that will assist in changing perspectives among stakeholders;
- How comfortable are (industry) stakeholders with certain demand model assumptions? E.g., if there is more uncertainty about demand indicators and assumptions, then a field demand study is required to solidify the model; and
- Is a pilot project planned? E.g., a pilot project can provide hard data on demand, affordability, revenues and

sustainability. If a pilot is planned, the demand study may focus mainly on the planned region or area of the pilot.

Elements and process [1]

A field demand study can be designed either for telephony or non-voice ICT, or both. Usually, a demand expert designs the survey with the assistance and active collaboration of a local research institution (e.g., university social research department or institute) or a market-research company. The following diagram shows the various steps of a field study, which ideally, is based on a prior desk study.

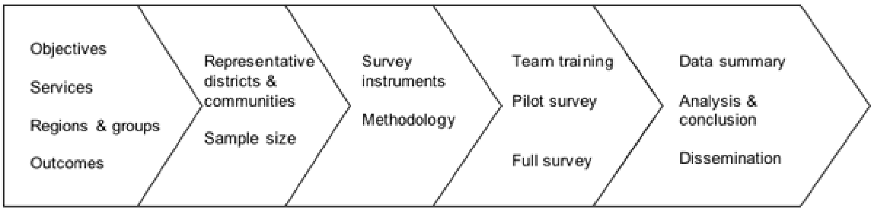


Figure: Steps of a Field Study

Source: A Rural ICT Toolkit for Africa, Andrew Dymond, Sonja Oestman, infoDev 2003

For an overview of a demand study design, see the *Practice Note A demand study in rural areas in Mozambique*.

Step 1: Study objectives

Study objectives articulate the purpose of the study, outline the services to be investigated, determine the region(s) in which the demand study is to be conducted and identify which target groups are to be interviewed.A UAS demand study that focuses on telecommunications and Internet services in areas that currently don't have services has the following objectives:

- Identify and assess the potential demand for both voice and Internet services;
- Determine user ability to pay for communications services, including priority customers such as business and institutions;
- Explore needs and preferences of users regarding private and business service, public phones, public access for the Internet, value-added services (VAS) and required Internet speeds; and
- Explore and validate appropriate UAS targets for desired service levels. This could include travel to public phones, numbers and type of public phones and public access for the Internet.

Step 2: Selection of representative districts and communities

If representative provinces, districts and communities are carefully selected for the study, then a smaller sample may be used. Although statistically representative field studies may be desirable, they are expensive and time consuming, and in most cases their level of accuracy may not be required for the purposes of a UAS programme design. Based on an earlier desk study, the following criteria and questions should guide the selection of a representative sample from which results can be extrapolated nationally:

- Does the sample cover all typical or key regions and districts?
- Does the sample cover gender and age groups representation?
- Does the sample cover typical sizes of villages or towns?
- Does the sample cover both areas with telephone and ICT services and areas without?
- Does the sample cover various economic situations (e.g., poor to more affluent areas)? and
- Does the sample cover different population densities and terrain (e.g., remote and sparsely populated, more densely populated, mountainous or plains, etc.)?

Step 3: Survey instruments and questionnaires

There are several general considerations to take into account when developing questionnaires. These are as follows:

- The length of the interview – respondents can become impatient or bored if the questionnaire is too long resulting in poor quality of responses. If possible, limit questionnaires to 30 minutes;
- Self-administered versus interviewer-administered questionnaires – the latter is the preferred approach in underserved areas, which are often rural and where literacy might be an issue. Interviewer-administered

questionnaires allow more control, consistency (as questions can be explained in case of misunderstandings) and higher completion rates;

- Open and closed questions – this depends on the objective of the study; open-ended questions require a more complex analysis and classification process, and should be used sparingly. On the other hand, closed questions are prone to confirm preconceived expectations. Multiple choice questions are an effective compromise between open and closed questions and ideally are tested or developed through initial pilot surveys with focus groups and with more open-ended questions.

Typical UAS demand survey instruments include questionnaires for private, business, community leaders and informants, and might have separate surveys for telephony and Internet. A rapid community assessment checklist, in which the researchers are requested to record a set of community data for each locality targeted, is also useful to aid later analysis of survey results. The methodology and survey instruments of a field study could include a mix of the following:

- Focus group discussions. Depending on the objective, several open interviews can be conducted for purposes of generating a discussion around some of the key hypotheses of the survey and the planned UAS policy or programme. Focus groups can be used to develop the questionnaire design and to tailor multiple-choice questions. Special attention should be paid to variations in the socio-economic characteristics of participants and actual access and utilization of telecommunications and Internet services. Examples of topics to discuss might include:
  - The location of public telephones and/or telecentres;
  - The distance people are willing to travel;
  - The main use of the phone and/or the Internet; and
  - The amount they would be willing to spend.
- Key informants. A few key informants, (ideally in each district surveyed) selected on the basis of their overall knowledge of the area and use of ICT in the community, could be interviewed. Key informants can provide considerable qualitative information about the area, economy, local village life, etc. They can include district administration officials; representatives of health centres, schools, community leaders, business people, phone operators, NGOs, head of farmer associations, local bank branches, etc.;
- Household & small business survey. At the heart of the field demand study is a stratified random sample of a significant number of households and small businesses in each community. An interviewer-administered questionnaire with both closed and open-ended questions is typically used to solicit responses from male or female heads of households; and
- Rapid community assessment. This assessment profiles the community being surveyed and details the number and type of key administrative and social or public infrastructure institutions, businesses, households, market(s), and other key social collection points, transportation facilities, etc. that generate demand or locations for public access.

Control groups

A further distinction is required between existing users in areas where people have access to telecommunications or the Internet, and potential users where there is no access. Demand studies typically need to include at least one control group from areas that have access to the telephone or other ICT services. By doing this, the study can measure the actual existing demand, usage and willingness to pay.

Overview of key elements of various questionnaires

The questionnaire typically covers, as a minimum, the following areas:

Key information on village	• Other infrastructure (how connected or how remote is village?) • Business structure (retail, agriculture trade, animals, markets, etc) • Dominant economic activity
	• Main agricultural crops • Existing institutions in villages (schools, doctor, etc.) • Average household income
Demographics of respondent	• Age • Family situation • Occupation • Education • Language • Income
Demand Topics	• Current phone availability • Phone usage (frequency, purpose, duration, spending, etc.) • Satisfaction and quality of existent services • Services desired (incl. interest in voice-mail boxes) • Price perceptions, affordability and willingness to pay • Possibility of incoming calls • Costs incurred through having no access to telephone (e.g., travel) • Current communications alternatives: postal services, HF radio etc.
Socio-economic impact (if required)	• Current communication patterns • Alternative means of commmunication in absence of phone or Internet • Cost of the alternative means of communication • Perceived impacts on business and personal affairs • Travel cost savings from use of phone or information services • Other savings or benefits and their valuation

◄ **Figure: Overview of Key Elements of Various Questionnaires**

Examples of different types of questionnaires used in a rural demand study in Mozambique are provided as Reference documents.

Step 4:Training and pilot survey

The actual training of the research team helps to deepen their understanding of the field survey objectives, and role-playing the interview process among the researchers has been found particularly helpful. An initial pilot survey is recommended to give the survey team a test-run and to refine the methodology and survey instruments before beginning the main research.

Step 5: Analysis of demand study findings

The results of the field demand study will inform and refine the UAS programme design. Demand studies also help to adjust previous estimates of cost, revenue and commercial viability, and the amount of subsidy likely to be required per area or project. Typical results of demand studies indicate the following:

- The current accessibility of telecommunications and ICT networks and services, both in terms of how much they cost and how far end users need to travel in order to use them;
- Potential penetration of private telephony and Internet service (fixed or wireless) amongst businesses, schools, clinics, government offices, households, etc.;
- Which technology is requested (e.g., fixed versus mobile, high-speed up to 256 Kbps or broadband Internet connection);
- Identifying the optimal number of public phones or telecentres per community or neighbourhood, as well as the population size to support each public phone or telecentre, best location, preference for mode of public access facilities (e.g., manned or unmanned, coin pay, card phone, etc.);
- Interest in Internet and potential for public access to telecentre services;
- Private Internet demand;
- Interest in voice messaging, SMS (text), information services, e-mail, fax, etc.;
- Readiness of schools, institutions, and businesses for Internet or participation in ICT programmes; and
- Potential partnerships that could be forged to stimulate sustainable and scalable demand for Internet and ICT services.

Caution about household income data

While field studies are infinitely more valuable than simple desk-based modelling in many regards, there are still some challenges. For example, obtaining data on household income through questionnaires is notoriously difficult, especially in developing countries. The main challenges in determining income are as follows:

- People usually do not like to disclose their income level and may under-report it;
- A larger number of people, especially in rural areas, have incomes that vary from month-to-month. Some may not know, or be able to predict, what their monthly household income actually is (e.g., shopkeepers, self-employed, and especially farmers or labourers whose income is seasonal), and while they may know their seasonal incomes, they man not be able to calculate a monthly average household income;
- People's income is often derived from numerous sources, e.g., their shop, from breeding and selling animals on the side, occasional jobs, etc. Again, in many cases people do not know how their income from various sources averages out over the year, and are not able to state a monthly household income;
- Income sources that are non-cash, contribute to the wealth of households. Examples of this are barter, trade and subsistence farming;
- Several household members may contribute to the household through various activities and employment (e.g., the grandfather tends animals, the father has a shop, the mother does some sewing, and the oldest son works part-time at a garage and might give his parents part of that money);
- In some countries a considerable number of people derive income from the grey or black market [2] which they are hesitant to report.

Demand related to Internet services is in many cases even more challenging to assess as there numerous Internet applications and services as presented in Section 6.1.4. Therefore, in general, results from desk or demand studies are still approximations to actual demand, but they are likely to provide the best information that is available. It is very helpful to disseminate the field demand findings to the sector and other stakeholders and make it available to the public e.g., through publishing it on the regulators web-page. The survey output can specifically be used for the next step of UAS programme development which is the modelling costs, viability and subsidy analysis described in Section 6.2.

Practice Notes

- **A demand study in rural areas of Mozambique**

Reference Documents

- **Business & institutions questionnaire – District centre**
- **Business & institutions questionnaire – Rural area**
- **Control group questionnaire**
- **Household questionnaire – District centre**
- **Household questionnaire – Rural area**
- **Key informant questionnaire – District centre**
- **Key informant questionnaire – Rural area**
- **Rapid assessment – District centre**
- **Rapid assessment – Rural area**

4.6.2 MODELLING COSTS, VIABILITY AND SUBSIDY ANALYSIS

Once the ICT sector analysis and assessment of demand are conducted, the costing aspect needs to be addressed in order to develop a universal access and service (UAS) programme:

- How much will the UAS programme cost and how much will individual projects cost;
- What is the commercial viability and sustainability of the UAS programme and projects; and
- What is the estimated financial shortfall between the cost and revenues through the provision of UAS services, and therefore how much subsidy is required to finance UAS.

The following methodology on modelling costs and viability and subsidy analysis is designed to assist UAS programme development in the context of a Universal Access and Service Fund (UASF) using competitive mechanisms to allocate subsidies. The typical process to competitively allocate UASF subsidies for UAS service projects is as follows:

- Identify how much subsidy an operator or service provider needs in order to construct the stipulated level of infrastructure and to provide UAS service to the target area, population group or project, using current least-cost technology that meets the required quality and level of service; then
- Submit the specified area to be supplied with UAS services to tender and accept the lowest bid commensurate with meeting the published technical, corporate and operational pre-qualification requirements, provided the required subsidy is less than or equal to the set maximum subsidy.

The methodology for calculating the amounts of subsidy to be offered is designed to achieve, with the subsidy, commercial sector investment and sustainable operations. The purpose of establishing maximum subsidy levels is to set a realistic ceiling. It is not necessary to establish exact costs and a detailed engineering study by the regulator is not required. An illustration of the methodology used to estimate the maximum subsidy is described in **Section 6.2.1** for a public access telephony project and in **Section 6.2.2** for a public access Internet project This methodology is chosen, among other reasons, because the regulator has less information than telecommunications operators and service providers have about the costs of providing UAS services. Operators and service providers also consider their financial and non-financial benefits they may stand to gain from providing UAS. Some of the benefits of being a UAS provider may include:

- Increased brand recognition;
- Good public relations;
- Additional private revenue; and
- More traffic due to increased national network, etc.

With a maximum subsidy amount in place, the competition among operators and service providers ensures that costs are not inflated, and that the operators include their tangible and intangible benefits from being a UAS provider into their considerations for the subsidy request.

4.6.2.1 REVENUE AND COST ESTIMATION FOR PUBLIC ACCESS TELEPHONY

For every universal access (UA) region or project, the expected communication service revenue and costs to supply the service can be estimated and submitted to a viability test. This viability test will establish if a certain project needs a subsidy in the first place, and if so, will calculate the likely maximum one-time subsidy that an operator or service provider would require to provide service in a commercially sustainable manner.

Revenues

The revenue estimate typically takes the following into consideration:

- Regional/rural population (p);
- Regional/rural per capita income (i), estimated either as:
- the average of the lower deciles of national income distribution – corresponding to the proportion of the population who are rural (this assumes that the rural population is generally at a lower income level than urban), or
- an average for the region (e.g. district, provincial) GDP (for example household income from UNDP studies); and
- An expenditure factor (e), which is the percentage of income spent on telecommunications. This can be the national average, or a more conservative regional (e.g., district, provincial) estimate, or findings from demand studies, if available.

Revenues can thus be estimated as follows:

R = p x i x e (Revenues = Population x rural per capita income x expenditure factor)

Findings from demand studies are helpful to refine the input for (i) – the income of rural people, and (e) – the communications expenditure factor. While the installed public access phones will not necessarily be able to capture all potential demand, it is likely, if wireless technology is used, that the potential service provider will also be able to capture some private demand, including business and institutions, as well as revenue from urban customers travelling to those rural areas.

Costs

The capital and operating expenditure costs of supplying service can be estimated using the pre-dominant technology (usually wireless) utilised by existing operators and service providers in the market. This assumes that existing operators will be interested in expanding into the unserved areas targeted by the UAS policy. Using the predominant technology will represent the cost ceiling, since more cost-efficient alternative and newer technologies, whether selected by the major operators or new entrants, would generally need to be less expensive to be considered competitive solutions.

Maximum subsidy estimate

The maximum subsidy requirement may be calculated in one of two ways:

- Construct a 10-year cash flow for each project and area, showing revenue (with an allowance for growth over the cash flow period), capital and operating costs, and calculate the net present value (NPV) using the operator's assumed cost of capital as the discount rate. If the NPV is negative, this amount will represent the maximum subsidy required by the operator to provide service. If the NPV is positive, this indicates that no subsidy may be required, although it will be necessary to investigate alternative revenue and cost assumptions to determine the robustness of the calculation; or
- Make a basic benchmark calculation that assumes a standard pay-back period of capital cost from revenues of perhaps three years, which is typical for private telecommunications investments. If the projected revenues are greater than 33 per cent of the capital costs (meaning it takes less than three years to achieve pay-back), the project is viable. If they are less than 33 percent of capital cost, the project has negative viability. This will indicate whether, and by how much, the revenues fall short of providing the operator with an acceptable rate of return.

Whatever method is used, both models and their assumptions should be discussed with operators and service providers. Either of the above methodologies should safely estimate the maximum subsidy required for the following reasons:

- The assumption that public service points will be the prime instrument for securing potential revenue is conservative. In the event an operator is also able to use the same infrastructure to provide private services (e.g., mobile services to individuals that possess a mobile phone), more revenue could be available from some private customers. In this event, the actual revenue would be higher than that calculated by this methodology; and
- The revenues are based only on local (rural) affordability. For example, if revenue from incoming calls is significant, and is also encouraged through a good interconnection arrangement (such as asymmetric interconnection) and revenue share with a village phone operator, it is possible that operators' incomes could improve significantly due to incoming calls from urban areas.

4.6.2.2 REVENUE AND COST ESTIMATION FOR PUBLIC ACCESS INTERNET

In many developing countries, there is limited information regarding the cost and demand for semi-urban and rural Internet provision. While field demand studies are very helpful overall and in some countries provide the very first survey-based data from rural areas, they often still yield insufficient solid data on Internet demand in some countries where many people have not used the Internet before. A potential guide for estimating cost and demand is through examining the experience of other universal access and service (UAS) programme designs and tenders. In 2004 in Uganda, district level Internet POPs have been subsidized between USD 10,000 and USD 60,000 and public Internet centres for between USD 15,000 and USD 25,000, however, data evaluating their sustainability are not yet available. Subsidy estimates include the capital, the cost of the digital bandwidth leased from terrestrial service providers, and the initial promotion, marketing and basic training. For estimates of potential subsidy requirements for an Internet programme, it is usually recommended to offer a value equal to almost the entire capital costs of a district centre POP and a public access centre. The reason for this is that demand for Internet is typically less immediate and takes more time to build up, and operating, maintenance and staff costs in districts are considerably higher than in cities. Offering the entire capital costs as the maximum subsidy, and then letting the market determine the real subsidy through competitive bidding, ensures that it will not be under-estimated. As an example, capital costs for the Internet component of a pilot in Mozambique are estimated at USD 75,000. This included VSAT backhaul as the worst-case scenario. Details of the cost components are shown in the Table below:

Table: Once-only costs of one rural Internet POP and public Internet access point offered as maximum subsidy in competitive bidding process	Capital (USD)
Network infrastructure & services	
VSAT terminal including all electronics hardware, power & support	8,000
Wi-max type broadband base station electronics	6,000
IP server computer & Interface	5,000
Tower / support structure (expected to be building roof mounted)	3,000
Ancillary equipment (e.g. standby power)	4,000
First year leased bandwidth (0.25 E1)	12,000
Miscellaneous	5,000
Network Subtotal	**43,000**
Internet public access / ICT systems	
Average 6 computers for Public Access Centre @ US$1,000	6,000
Printer/scanner & other accessory equipment	1,000
LAN & power supply equipment	2,000
Internet user terminals for first year	5,000
User Subtotal	**14,000**
ICT 'Soft costs' and operating budget support	
Initial recruitment, HR development and training	5,000
Customer awareness, training and support	6,000
Extra maintenance & operational support ($100 for 24 months)	2,400
Marketing and incentives to secure customers	3,000
Soft cost Subtotal	**16,400**
Total capex invested (incl. capitalization of soft costs)	**73,400**

Source: Mozambique Universal Access Internet pilot programme 2007

4.6.3 ECONOMIC IMPACT OF UAS PROJECTS

As discussed in **Chapter 1** of this module, countries develop universal access and service (UAS) policies based on the premise that providing access to basic and advanced telecommunications and ICT services have a wide-ranging socio-economic rationale. There are general studies and analyses, sometimes conducted by academics, that address broader questions of economic impact of communications, ICT and broadband Internet. Their understanding and latest knowledge is an important background for UAS policymakers and UAS program planners, as these studies provide the general rationale and justification. **Section 6.3.1** outlines the impacts of communications and **Section 6.3.2** discusses the status of research for broadband Internet and ICT. In the case of telecommunications projects, it can often be demonstrated that there is significant benefit in the form of 'consumer surpluses', over and above the price paid for the service. These include items such as the following:

- Businesses (small or large) often report that the money they save due to greater efficiency and saved personal travel time related to stock control, delivery co-ordination, following up sales opportunities, maintenance calls, etc. amount to several times the cost of the telephone rental and calls they make.
- Farmers and micro-business proprieters often report that the phone enables them to gain timely and geographically-specific information on urban market prices that increase their bargaining power with 'middlemen' and enable them to earn more for their product or secure a better price for their inputs.
- A third of personal calls typically represent personal or family emergencies that would again require travel or other costs if the call was not made. Sometimes people report their benefit in terms of lower health risk, a life saved, better family relationships, more opportunities.
- Institutions and government agencies – schools, clinics, local administrations, NGOs and other development agencies - similarly report increased efficiencies and the ability to deliver services in a more timely, effective and less wasteful manner through use of the telephone.

The benefits of broadband Internet and ICT are less direct and more difficult to quantify, though, there is general consensus that critical macro-economic value is gained from the provision of broadband access to ICT services. Research and analysis on measuring broadband impact are only beginning. What is clear is that the impact of broadband is highly dependent on framework conditions within the country and also within the sector which is to benefit from broadband access. An example to illustrate this is the following: a health project plans broadband connections to be provided to rural district hospitals to facilitate remote diagnosis, consultation, transmission of imagery and data, and video-conferencing between the rural hospital staff and specialist doctors in the urban hospitals. In order for the health sector to reap the benefits, certain conditions need to be in place, such as:

- Trained staff at rural hospital to operate and maintain necessary ICT facilities and equipment;
- Increased staff at the urban consultation hospitals to be able to accommodate increased demands through rural hospitals;
- Privacy regulation on patients records which are electronically submitted; and
- Cost accounting and financial incentives for urban hospitals to provide remote consultation to rural hospitals.

Successful case examples of how broadband and ICT is addressing crucial development issues need to be studied in terms of there required pre-conditions to be transferable to other countries. Another important aspect is their sustainability. Piloting broadband networks and ICT projects maybe a helpful tool to adapt and refine the models to be used for a particular country and assess the required inputs, outputs, outcomes and project efficiencies. While the economic impact provides the broad rationale for UAS programmes and projects, nowadays UAS programme development typically requires less extensive detailed economic analysis, as it is more widely accepted that ICT are crucial for socio-economic development. In UAS programme development it is about making choices and decisions on how to prioritize UAS projects among available options. Section 6.4 presents practical approaches, considerations and methods that are used to help to prioritize UAS projects, some based on financial analysis and others considering benefits.

Reference Documents

- **Universal Access & Service (UAS) and Broadband Development**

4.6.3.1 ECONOMIC IMPACTS OF COMMUNICATIONS

Since development planners first recognized the immense socio-economic impact of communications, general hypotheses about impacts with regard to rural communications systems have evolved, and have been demonstrated to various degrees, in a wide range of studies since the early 1980's. In 2005, the study *The Impact of Telecoms on Economic Growth in Developing Countrie*s, has added to this long history of previous research, conducted over many years, to demonstrate that telecommunications has a significant impact on economic growth. This research has highlighted the particular impact of mobile communications penetration on economic growth. The socio-economic impact of communications can be summarized as follows:

- General regional integration:
    - Areas with communications are less isolated economically and socially, are better able to enter the market system, and will experience improved political administration and social services;
    - The benefits can be described as macro-economic and structural, e.g., development of market system, and the enablement of the services and information sectors; and
    - The level of impact is increasing and becoming more widespread the more mobile the communications medium is becoming [1].
- Market & social infrastructure:
    - Typically 25-40 per cent of calls made from rural public phones or payphones in developing countries can usually be classed as related to administration, business or financial matters [2];
    - Related to commercial markets, better communications provide both the means and sources of information regarding the price of rural products, typically yielding fairer market relations and more efficient operation of the market system;
    - Improved organizational management is possible – most organizations (e.g., government, health, education and transportation) and businesses run more efficiently as communications services improve, resulting in better coordination, stock ordering & replenishment, more timeliness, and quicker response to operational and maintenance needs; and
    - New market and employment opportunities – businesses can organize better outreach, market access

and market expansion.

- Personal urgent need to communicate:
    - Typically 10-15 per cent of calls made from rural public phones or payphones can usually be classed as 'personal urgent'. These typically relate to health, family emergencies or other matters considered urgent enough that some other form of communication – often personal travel to deliver a message – would have been necessary; and
    - Urgent matters often include notification of family or social events, coordination of travel arrangements, or such matters as school exam results, deadline related matters (e.g., financial enquiries, school entry applications), etc.;
- Personal non-urgent communication:
    - Up to 50 per cent of all calls are typically classed as personal and non-urgent, but nonetheless important enough that people are willing to spend 3-5 per cent of personal incomes on them; and
    - The benefit enjoyed is the reduction of isolation for family members living elsewhere, especially with younger generation members studying or working in the capital city.

A compendium of cost-benefit results illustrating many of the above benefits are documented and discussed in the reference document *Methodology for Economic Analysis of Telecommunications Projects*. The expected economic impacts and targets of a universal access and service (UAS) programme should be stated as specifically as possible, in order to assist with final selection or prioritization of projects. The Practice Note *Specific regional and poverty reduction impacts in Mongolia* provides an example for this.

Practice Notes

- **Specific regional and poverty reduction impacts in Mongolia**

Reference Documents

- **Guidelines for the Economic Analysis of Telecommunications Projects**
- **Output-based Aid in Mongolia: Expanding rural telecommunications services to rural areas**
- **The Impact of Telecoms on Economic Growth in Developing Countries**

4.6.3.2 ECONOMIC IMPACTS OF BROADBAND INTERNET & ICT SERVICE DEPLOYMENT

With the proliferation of broadband connections worldwide, the Internet is increasingly described as being always on and with a minimum speed of 256 kbps. This broadband Internet moves well beyond traditional dial-up and mid-speed Internet (e.g., less than 256 kbps) in terms of the applications it supports and the value it offers. While dial-up Internet offers some additional value over telephone communication, in terms of basic Internet browsing, e-mail, and simple document transmission, most agree that the Internet's full capacity is only realized through broadband Internet that allows the use of multiple ICT applications and services.

Assessing the economic benefits and impact of broadband Internet is fundamentally different to assessing the impact of telephone communications, for the following two reasons:

- A broadband Internet connection does not in itself provide any value or service, thus contrasting with a traditional telephone connection that provides an instant use and benefit through immediate and direct verbal communication (saving travel costs and time of alternative means to communicate). Only the use of Internet services and applications made possible through a broadband connection create benefits for the user, such as remote network access, VoIP services, video-conferencing, online-banking etc.; and
- The realization of benefits from broadband for a country is strongly dependent on overall conditions such as the: regulatory framework (e.g., security for e-commerce transactions, laws for on-line banking, etc.); business environment (e.g., computer penetration, ability to develop skills, capacity for organizational change); supporting infrastructure (e.g., reliable electricity); and ICT literacy among the population, among others.

Like electricity, ICT may be considered a general purpose technology, which is characterized through its pervasiveness throughout the economy and society, its constant evolution and improvement, and its capacity to spawn new innovations.

Measuring economic benefits of broadband

Due to broadband Internet's multitude of applications and its recent national spread in certain markets only (in many developing countries it is limited to the main urban areas only), it is more challenging to measure its economic impact than traditional telephony. As a consequence, the situation for measuring the impact of broadband can be summarized as follows:

- It is still in a nascent stage – the first attempts at gathering empirical evidence were made in 2003 in Ontario, Canada (see box below), and in 2005 with national scale data from the United States [1];
- It is often restricted to the developed and most advanced nations; and
- There is little quantifiable proof and no internationally comparable data of value [2].

Also, in developed countries the impact of broadband is measured at the individual subscriber level, while most developing countries are aiming at providing broadband at a community level.

A method to measure the benefits from services used via a broadband connection in the developed world is to make the simple assumption that the direct benefit must be higher than the cost of the broadband connection to the subscriber, otherwise they would not subscribe. The assumption is that the subscriber has conducted a personal (or household) cost/benefit analysis and has determined that the net benefit outweighs the cost. This is a reasonable assumption since the market is the final arbiter of value, and demand is the indicator of benefit.

In general, a useful approach to assessing the impacts of ICT is as a system that looks at inputs, outputs, outcomes and efficiencies, as follows:

- The inputs are mainly the costs of providing broadband to a market including any required complementary investments;
- The outputs are direct results of the inputs, e.g., a certain number of broadband connections within that market, number of schools or hospitals connected, number of ICT services used, number of on-line training courses provided, etc.;
- The outcomes are measured through the impacts of the outputs such as: number of school-children now ICT literate, number of hospital staff trained via on-line courses etc.; and
- The efficiencies of the investment which concerns the cost to produce each unit of output, e.g., USD 5,000 per school to provide broadband connection, USD 500 per on-line course per person, etc.

ChileCompra, the Chilean government's online procurement system launched in 2000, has saved over USD 70 million in 3 years over the placement of notices in publications, and by increasing efficiency. ChileCompra has increased transparency by giving open access to details of all contracts for good and services procured by the public sector. The system also has a distinct advantage for the private sector since it provides an equal opportunity to all companies to obtain contracts and has helped to balance the distribution of these contracts. While in the overall Chilean economy 80 percent of all business sales are generated by large companies (and only three percent by micro companies and 17 percent by small and medium enterprises), 53 percent of sales through ChileCompra went to large companies and 35 percent went to small and medium enterprises. Twelve percent of contracts were signed by micro enterprises.

◀ Box 1 ChileCompra - Levelling the Playing Field

Source: ITU adapted from EU and ChileCompra

Findings of studies so far

There are studies that have attempted to analyze and measure the economic impacts and benefits of broadband Internet. In general, these studies found evidence supporting the following impacts:

- ICT sector growth;
- Productivity gains;
- Transformation of how individuals, business, government and other parts of the society work, communicate and interact – transforming economic relationships and processes in the private and public sector; and
- Reduction in pollution (due to reduced travel).

In particular, a study in 2004 [3] analyzed direct benefits to subscribers, the benefits to providers of services, and indirect benefits arising to others as a result of broadband across Europe, and concluded that the potential economic impact of broadband is very significant but that it varies between countries. The variation is mainly dependent on three factors – the size of country (the greater the number of subscribers, the greater the benefit), the cost of transportation (the higher the cost of transportation, the higher the benefits of reducing travel through ICT) and the value of time (the more time is valued, the higher the benefits as ICT saves time).

Another study from 2006 [4], analysing data from the United States on the effect of broadband on several economic indicators, stated that the analysis supports the conclusion that broadband positively affects economic activity, and in particular more rapid growth in employment, the overall number of businesses, and business in IT-intensive sectors.

An illustrative example of benefits of broadband in Canada can be found in the Practice Note South Dundas Township and their broadband experience.

Implications for developing countriesWhile specific academic detail and quantifiable data on the impact of broadband Internet is still being gathered, it is nevertheless evident that broadband development does have significant macro-economic impact.

However, "it is not clear to what extent ICTs have helped to directly reduce major development concerns and particular those of the Millennium Development Goals (MDG), such as poverty, hunger or sickness."[5] The existing studies have shown that the economic impacts and benefits are variable between countries and dependent on framework conditions. Therefore experiences and models, especially from the most advanced world, are unlikely to be directly transferable to the developing country context.

But with the huge potential of broadband Internet for economic growth and development, developing countries can hardly afford to wait until there are more studies showing clear evidence, as they are already lagging behind the advanced nations in regards to ICT. Most developing countries recognize this reality and are keen to promote broadband Internet development, and many are developing national broadband strategies or policies.

In terms of reaping the benefits of broadband in rural areas and among poorer population groups - which is the concern of a universal access and service policy (UAS), it is not necessarily clear how to proceed, how much to invest, what the required inputs are, what the results are and more importantly, what the required additional framework conditions are.

Nevertheless, some guidance can be given in regards to how each country can tailor the broadband and ICT strategy to their objectives and situation, as follows:

Piloting of broadband ICT projectsPiloting projects is a good approach that allows for the testing of working hypotheses of required input, output, outcome, efficiencies and required additional components. Consider complementary activitiesAny UAS broadband strategy should coordinate with other government ministries and non-government activities and programmes, which can bring a range of complementary activities. These include:

- Public awareness, training and skills development;
- ICT deployment in the education;
- Health sector
- e-Government;
- Environment and emissions reduction;
- Regulatory improvements;
- Development and expansion of ICT business opportunities; and
- Expanded ICT and electricity infrastructure.

Pre-conditions for benefits from ICT developmentA certain level of complementary activity and investment should be considered as essential pre-conditions to the effectiveness of ICT and broadband development. For example:

- Reliable 24 hour commercial power supply is generally required for the use of computers and Internet access to be prevalent and beneficial;
- School Internet access projects generally need the pre-condition of the national or provincial education authorities to develop a school computerization and networking programme, a computer lab, teacher training, and the specific institution of an IT curriculum, and relevant national content;
- Promotion of computerization and Internet skills within all government levels, especially including local government and local public health and education institutions;
- Promotion of tele-working, e-government, e-banking, and conducting other activities on-line to offset emissions

generated through travel.

Commercial reality and targeting of growth areas firstUAS deployment strategies for ICT services need to be carefully tailored, with the application of smart subsidy, to harness the potential for commercial sustainability and beneficial impact in critical growth areas. This might entail the following components:

- Internet points of presence (POPs) in district centres and population concentrations which have administrative, health, non-government, community broadcast and educational institutions, as well as businesses where sufficient demand will exist to sustain ISPs' business development;
- Public access centres (cyber cafés, telecentres or information centres) in those same localities, to ensure access to the services for these populations and those of the nearby surrounding communities; and
- Subsidized Internet access for schools and other vanguard institutions that serve and train the coming generation of active ICT users.

Practice Notes

- **South Dundas Township and their broadband experience**

Reference Documents

- **Broadband infrastructure investment in stimulus packages: Relevance for developing countries**
- **i2010 - A European Information Society for Growth and Employment**
- **Ireland's Broadband Future 2003, Information Society Commission (Ireland)**
- **Technical assistance in bridging the "digital divide": A Cost benefit Analysis for Broadband connectivity in Europe, EC / European Space Agency 2004**
- **Universal Access & Service (UAS) and Broadband Development**

4.6.4 PRIORITIZATION OF USA PROJECTS

There are several approaches to assessing or analysing a programme's socio-economic impact or to prioritizing between several universal access and service (UAS) projects. They are as follows:

- Qualitative approach;
- Quantitative approach, using Net-Present Value (NPV) or Internal Rate of Return (IRR) analysis;
- Comparative subsidy analysis; and
- Subsidy cost per beneficiary comparisons.

Each of these approaches lends itself to certain types of projects. The qualitative approach might be best employed for pilot projects or slightly larger ICT projects for which it is difficult to estimate hard market data such as costs and revenues. This approach requires some field investigations, and also benefits from using data or experiences, gained in similar projects in comparable countries. While a qualitative assessment will not readily lend itself to a simple ranking, it can help to prioritize alternatives projects, based on an assessment of whether and how closely they meet government and developmental goals. The qualitative approach is presented in **Section 6.4.1**.The quantitative approach, using economic valuation, outlined in **Section 6.4.2**, is an approach which has been widely used in telecommunications development projects in the past, for example by Chile's Fondo de Telecomunicaciones (FDT). However, it is now better understood that UAS telecommunications projects require less economic justification or analysis, but rather a financial estimation of commercial viability and subsidy requirement. A simpler methodology that uses subsidy analysis is described in **Section 6.4.3**, and a subsidy cost per beneficiary comparison is illustrated in **Section 6.4.4**. In the light of backbone and broadband infrastructure projects, the NPV analysis might regain some importance, though the precise means of applying quantitative economic valuations to either kind of project is not clear at this time. In some cases it will be most sensible to prioritize projects in order of size of population reached, or required subsidy per targeted person, with the lowest subsidy per person having highest priority. This yields maximum impact at minimum cost.

4.6.4.1 QUALITATIVE APPROACH

The qualitative analysis is best used for ICT services projects where cost and revenues are not easily known or predictable, and other methods are therefore difficult to apply. Nevertheless, it ideally combines a market (financial and commercial) and the socio-economic perspective, i.e., both user needs and demand as well as developmental rationale and impact.

Projects that have these two aspects in balance are the most likely to succeed. On the other hand, projects that skip the market side and seek justification based solely on socio-economic and developmental cases can face sustainability problems.

- The basic issues to be addressed qualitatively are summarised by the following two tables:
- Table A provides a checklist to define the project's core ideas, values and approach in a descriptive manner, covering the overall developmental rationale and justification.
- Table B captures a more market-oriented view of the project's deliverables, their viability, and the hurdles that may be faced either at implementation or with long term sustainability.

The combination of the qualitative data summarized through these checklists allow an understanding of the project's impacts.

Table A – Developmental rationale	
Vision and objective	• What is the project's core idea, specific objectives and key outputs? • Describe the before/after picture (E.g. 25 institutions serving rural communities and addressing specific social issues will have broadband access to the Internet through five new regional Internet POPs.)
General development focus	• Is the project consistent with development goals that have been identified by policymakers or other development actors in the country or countries where the project will take place? • Does the project have the potential to influence larger development agendas, within the telecom or ICT sector (e.g. market liberalisation) or further afield (e.g. break new grounds in education or health)? • Will the execution and success of the project promote sustainable and equitable development, and how?
Project beneficiaries	• Is the project targeted on any specific communities, classes of people, income groups, age groups, gender? • How will the project address the needs and demands of its target groups?
Nature of the benefits	• What is the primary nature of the benefits of the project? E.g. access to business information, health information, education, government services. • Will the project have any impact on employment, working conditions or quality of life, and how? • What secondary impacts will the project have – e.g. better delivery of social infrastructure services (e.g. education, health & welfare)? • What will be the effect on culture, values, freedom, democracy, etc.?
Distribution of benefits	• What specific benefits or opportunities will various income classes, especially the poor, enjoy? • Will the project help to empower the poor, vulnerable or disadvantaged groups, and how? • What will be the degree and nature of local participation in the project design, implementation and ownership?
Gender considerations	• Does the design and methodology of the project take into account different gender roles, perspectives, interests, and priorities, and how? • Is the project's potential impact assessed from a perspective that recognises gender inequalities and imbalances, and how? • Will research data, demand and expected impacts be broken down by gender? • Do the project's capacity-building features reflect gender considerations, and how? • What are the specific value of the services to women, e.g. in facilitating better access to information, assistance, credit and business opportunities? These should be cited as specifically as possible. • What is the value and usefulness of the services provided? These should be explained in detail, and the targeted outcomes described.

Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003 (updated)

Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003 (updated)

Table B – Market, prices, project sustainability and regulation	
1. User need & Demand	• Has the development rationale for the project been confirmed through a baseline study demonstrating people's interests, needs, demand and preferences for the project services? • Does/will the analysis identify the various user groups identified in the project objectives?
2. Services & prices	• How will the project outputs be paid for, and how do the prices charged relate to the cost of supply? • Are prices cost-based? If not, is the problem related to affordability or regulation, or both?
3. Affordability & willingness to pay	• Does the requisite baseline study address affordability and willingness to pay? • What are peoples' opportunity costs to satisfy their communication or information needs, without the project? Have they already demonstrated a willingness to incur these costs (e.g. by travelling), or is the idea of communicating and securing information relatively new? • In the case of government or institutions as users of ICT, what is their willingness or ability to pay for the ICT services, and what are the opportunity costs to provide the end services they are responsible for without the project?
4. Costs	• Does the project deliver the proposed services in the most cost-effective way possible? E.g. Has the most cost-effective technology been considered/ selected?
5. Policy & Regulation	• Are the prices/ tariffs to be charged regulated by government? What flexibility exists? • Are there any regulatory impediments that constrain the project from delivering the services in the most cost-effective manner? (E.g. technology choice or licensing, enforcement of interconnection with incumbent operator, etc.)

4.6.4.2 QUANTITATIVE SOCIO-ECONOMIC ANALYSIS USING NPV

A quantitative socio-economic analysis using net present value (NPV) requires the analyst to:

- Carry out a normal cash flow analysis using capital and operating costs and revenues, as described in Section 6.2. to calculate a NPV or financial internal rate of return (IRR) in the normal way;
- Adjust the revenue flows to 'economic values' by:
- estimating the economic benefits received by recipients of the project's output/ services over and above the price they pay for the services;
- using this information to derive an 'economic valuation factor (EVF)', and
- using the EVF as a multiplier to convert the project's financial revenue streams into economic benefit streams. The methodology for calculating EVFs can be found in the Practice Note Economic Evaluation Factor.
- Adjust the costs using 'shadow prices' which reflect the economic value of the various cost items, such as skilled and unskilled labour, imported technology, etc., and eliminate taxes (which are not a cost to the economy) [1];
- Recalculate the project's NPV or IRR using the adjusted economic values to calculate the economic performance – e.g., an economic NPV or IRR.

Table C – Economic valuations	
1. Identify the specific user groups	• Arrange into categories, e.g. 20% male farmers, 10% female heads of household, 20% schoolteachers, 20% government workers, 20% students, 10% micro-enterprise women. • Refine the categories to reflect groups which can be identified economically, as discussed below
2. Estimate the realistic monetary or economic benefits enjoyed from the project by specific private user groups (include individuals, micro-enterprises and small businesses).	• E.g. if making a call from a public phone, securing information from a telecentre, or undertaking an tele-educational course reduces lost time or out-of-pocket expense due to less travel, list these as case examples. • For the most identifiable cases, estimate the size of benefit received (the $ saved compared to the alternative way of communicating– i.e. the "opportunity cost") compared to the price paid for the telecom or ICT service. • Estimate how "typical" these cases are – i.e., do they represent the majority of users, the average user, or a small minority? • Prepare a profile of case types, matching user categories if possible. • Estimate some typical 'benefit-to-cost' ratios (i.e., benefit received versus price paid for the telecom or ICT service)
3. Make estimates of benefits received from small and medium sized businesses	• E.g. a business owner might say "I pay $50 per month for this service, but my benefits are five times this amount in saved time, more efficient inventory control, and sales that I would not be able to make without the service." • Estimate how typical this story is amongst users of the service, and estimate a typical range. • Estimate typical benefit-to-cost ratios. • Estimate how much the business owners would be willing to pay for the service if the price were increased. (This might be an indication of how real the benefits really are.)
4. Estimate the realistic monetary or economic benefits enjoyed by institutional or government users	• What programs are enhanced, enabled or improved as a result of the telecom or ICT service? • Who are the beneficiaries of the organisation's program(s)? • What are the savings in terms of time, transportation cost, staff efficiency as a result of the ICT service? • Estimate typical benefit-to-cost ratios. • If the organisation does not have to fully pay for the service, estimate through interview with management what it might be willing to pay.
5. Identify locality specific factors	• Determine if the benefit to cost ratios estimates in 2, 3 & 4 above vary depending on locality size and type, distance from the main population centre, etc,. • Identify benefit-to-cost benchmark categories for a limited number of locality types if possible
6. Place an "economic value" on the revenue stream of the project	• From the estimated benefits or benefit-to-cost ratios received by the users of the telephone or other ICT services, as estimated in steps 1-5 above, calculate a composite economic valuation of the revenue stream.
7. Identify other benefits or externalities from the project	• Add an estimate of benefits received by non-users, who will be the recipients of services enhanced by the institutional ICT users. (This can typically only be described qualitatively.)

◀ **Table C provides a detailed checklist for assessing benefits for projects, if the project lends itself to such an analysis, and assisting with deriving the required inputs for the economic evaluation above. It requires on-the-ground investigations, which can be a component of a demand study. Only the questions relevant to the case under consideration need be answered.**

A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003 (updated)

In principle, UAS projects with a positive economic NPV but which have a negative financial NPV (i.e., needing subsidy for financial sustainability) should be added to the pool of projects to be offered for subsidy. They may be arranged in order of benefit to cost (benefit to subsidy) ratio or economic NPV, or in any other strategic way.Projects with negative economic NPV at the desired minimum rate of return (i.e., the cost of capital) should not be undertaken, as their returns in terms of development and economic benefits to the wider economy are likely to be marginal.

Practice Notes

- Economic Valuation Factor

Reference Documents

- Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy
- Guidelines for the Economic Analysis of Telecommunications Projects, Asian Development Bank, authored by Andrew Dymond of Intelecon and Stephen Curry of the ADB, September 1997

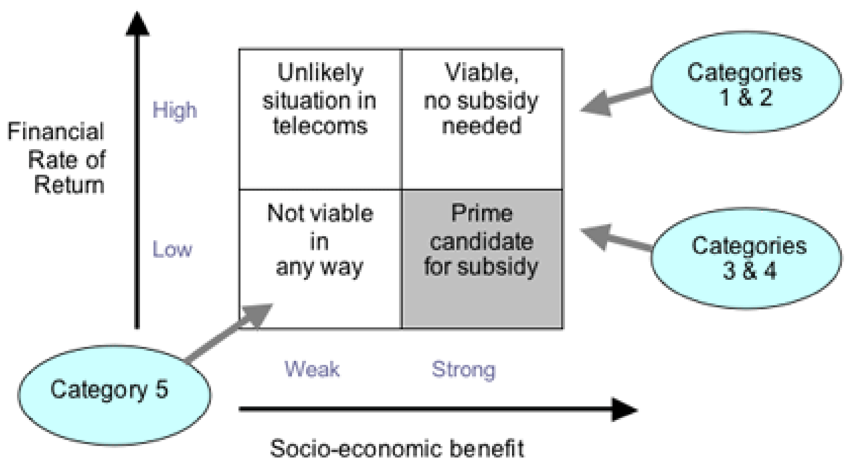
4.6.4.3 RANKING USING THE FINDINGS OF A FINANCIAL SUBSIDY ANALYSIS

An increasingly practical way to prioritize projects is through the level of expected private investment compared to subsidy. Some projects require less than 30 per cent subsidization and are therefore likely to generate as least twice the amount of subsidy in capital investment. Whereas universal access and service (UAS) programmes are geared towards extending the reach of markets into areas where service providers may not reach without subsidy, the principle of smart subsidy requires consideration of service sustainability in the medium to long run [1]. Project viability in the context of subsidy requirements can often be summarized as shown in the following table.

	Table: Classification of project viability
Category	**Description**
1	Definitely commercially viable & will be served by existing operators soon, no subsidy required
2	Commercially viable under optimistic assumptions regarding affordability and costs, but marginal. May be strategically valuable to operators – e.g., extending range along important transportation routes.
3	Commercially viable with favourable regulatory or fiscal conditions (e.g., asymmetric interconnection, tax or import duty incentives) and/or subsidy requirement is less than approx. 33 per cent of Capex costs
4	Marginal viability, but viable with moderate subsidy (e.g. covering less than 50 per cent of Capex costs)
5	Definitely unviable without major subsidy (e.g. requiring more than 50 per cent of Capex costs and/or required operating cost subsidy)

◂ Classification of Project Viability
Intelecon Research & Consultancy Ltd.

The methodology for making these assessments is described in **Section 6.2** Modelling costs, viability and subsidy requirements. In general, projects and service locations in categories 3 and 4 are the most attractive for UAS programmes since they address areas that are not likely to be served in the short to medium term commercially, yet have a good chance of becoming sustainable and commercially viable in the long run after application of a smart subsidy. They also successfully leverage private investment beyond the amount of subsidy offered. This principle can and should be considered as the most desirable, whether the project is for telephony into new areas, ICT service development or broadband backbone infrastructure, as the principle of commercial viability is generally the only that can guarantee sustainability. Communications projects in these categories also typically carry socio-economic benefits that exceed the level of subsidy provided. The figure below illustrates how financial viability and socio-economic benefit viability can be compared when considering project priorities.



◂ Project Priorities
Intelecon Research & Consultancy Ltd.

Projects in categories 1 and 2 usually do not need subsidy. Even if the geographical areas in this category are not presently covered, they may be contiguous with existing service areas or represent the next logical step in national infrastructure build-out. They will be reached by the market, sooner or later. Projects in category 5 (low financial return and socio-economically weak because they might reach so few people) carry with them the risk that even after receipt of a one-time subsidy, the service provider may not be able to continue profitably in the long run, as the operating costs may be too high and revenues too low because of low population. On balance, if the usage is low, the socio-economic benefits may be considerably below the level of subsidy required, which means they may be hard to justify. However, since this category may apply to the last 3 to 5 per cent of the population but sometimes up to 25 or 30 per cent of a country's land area, they could justify the government deciding to subsidize them for political reasons, or they could become viable at a later stage in the UAS programme, after the more viable areas have been reached. In the case of telephony access, some areas in category 5 can also be packaged with service areas conforming to category 3 or 4, in order to increase coverage to less viable communities.The final selection of and prioritization of projects, as well as subsidy requirements, will usually involve a blend of qualitative and quantitative regional ranking as well as financial analysis to determine apparent commercial viability and to estimate the financial gap, which is the one-time subsidy required to entice operators to meet UAS targets. The Practice Note Malawi Pilot – Prioritizing and selecting districts for UAS project provides an insight into the use of the above methodology for regional prioritization.

Practice Notes

- **Malawi Pilot – Prioritizing and selecting districts for UAS Project**

4.6.4.4 SUBSIDY COST PER BENEFICIARY

Having evaluated the amount of subsidy required (as per the methodology in **Section 6.2**) in the various projects that make up a universal access and service (UAS) programme, one way to assess, evaluate and rank them is to identify the costs (in terms of required subsidy) per beneficiary or cost per community served. It is appropriate to make cross-country and, more importantly, internal provincial or district comparisons when evaluating UAS costs, in order to help decide how reasonable a programme appears to be.

Telephony fixed line costs

Although less relevant as a guide for UA telephony competitions today, the table in **Section 3.2.1** described the cost of the universal access (UA) programmes in the three leading Latin American countries in terms of subsidy per locality for both public village telephones, telecentres and school Internet programmes.A recent study preparing the first UA pilot project for Mongolia compared Mongolia's costs with the Latin American examples (since the country's geography is similar to the Latin American examples in terms of remote regions) and at least one of Mongolia's programmes involved primarily UA in remote areas. The table summarizes the approximate projected subsidy per person for Mongolia's 2006 public access network deployment to remote nomadic herder areas. The expected subsidy costs per community were projected to range between USD 5,100 and USD 7,200 per station. The table shows an overall expected average of approximately USD 7.69 per person, though ranging from USD 5.28 to USD 11.86 in the various locations.

Table: Mongolia subsidy analysis

Soum	Under-Ulaan	Tariat	Khangai	Jinst	Bayant sagaan	Khure maal	Total
Total district population	6,068	5,858	3,554	2,352	4,526	2,466	24,824
Nomadic herder population	4,700	4,543	2,895	1,855	3,999	1,950	19,942
Expected subsidy per herder (USD)	6.64	5.28	9.67	11.86	6.63	11.08	7.69

◂ **Mongolia Subsidy Analysis**

Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid and World Bank, January 2006, Intelecon Research & Consultancy Ltd.

These estimates compared favourably with other fixed network competitions in similarly remote and mountainous areas of the world, of which Chile and Peru were the prime examples. The Chilean competitions awarded subsidies in the range USD 2,256 to USD 12,727 per locality and between USD 2.88 and USD 45.50 per inhabitant (the first round of competition was for terrestrial wireless, while the later rounds included more satellite solutions and were comparable with Mongolia's).

Table: Experience of Chile's UA Subsidy Competitions

Year	Population still without telephone (% of country) Before	After	Locations awarded	Total Subsidies awarded (USD M)	Subsidy per location (USD)	Subsidy per inhabitant (USD)
1995-96	15%	9%	2,358	2.88	1,220	2.88
1997	9%	4%	2,146	7.28	3,390	9.45
1998	4%	2%	858	5.19	6,320	22.57
1999	2%	1.3%	554	4.58	8,270	30.53
2000	1.3%	1%	143	1.82	12.730	45.50
Total 1995-2000	15%	1%	6,059	21.8	3,600	9.91

◂ **Experience of Chile\'s UA Subsidy Competitions**

Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid (GPOBA) and World Bank, January 2006, Intelecon Research & Consultancy Ltd.

The following table summarizes the universal access programme of the Telecommunications Investment Fund (FITEL) in Peru. Each project had slightly different features and characteristics. FITEL summarized its projects in terms of the population served and the reduction in average access distance for the populace to reach a public telephone.

Table: Summary of the FITEL Programme				
Item	FITEL I (1998)	FITEL II (1999)	FITEL III (2000/1)	FITEL IV (2000/1)
Approx. No. of Sites	213	2,170	2,520	1,614
Population (Millions)	0.14	1.6	2.1	2.9
Subsidy (USD Millions)	5.1	12.1	30.7	11.4
Population / site	689	758	827	1,822
Subsidy / site USD	23,937	5,575	12,163	7,061
Subsidy / per capita USD	34.74	7.36	14.71	3.88
Avg. Access Distance (prior)	90km	54km	24km	NA [3]
Avg. Access Distance (post)	5km	8km	4km	NA

Summary of the FITEL Programme

Source: Universal Access Program Assessment Report: Private sector provision of telecommunications services in rural and peri-urban areas in Peru, submitted to World Bank Public-private Advisory Facility (PPIAF), Sept 2003, Intelecon Research & Consultancy Ltd.

Overall, the Peruvian subsidies per site ranged from about USD 5,600 to USD 12,000, excluding FITEL I [1]. These values are comparable with the Chilean subsidies awarded per locality during the same period and the FITEL II and FITEL III projects illustrated the same effect as seen in Chile; the subsidy rising with time, going from more competitive to less competitive conditions and more remote, high cost and poorer areas. The FITEL IV Programme did not have the same access distance reduction effect as the earlier projects because it was designed to provide an additional public phone in locations that already had a public phone.

Mobile costs

Uganda was the first country to use competitive tendering for technology neutral solutions, won by mobile operators, through its Uganda's Rural Communications Development Fund (RCDF). The table illustrates that the subsidy amounts in its first country-wide competition were between USD 2.64 and USD 4.29 per person served. The final competitive bids and cost per person were approximately 40 per cent below these projections. Each public access phone served approximately 2,500 inhabitants, while several thousand rural private users were also served on the same networks, which explains the much lower cost per person and illustrates the recent trend towards universal access and service (UAS) since the ascendancy of mobile.

Table : Uganda RCDF Telephony subsidy amounts					
UA Region	Maximum UA Subsidy Amount (USD)	No. of localities	Subsidy per locality (USD)	Unserved pop'n	Subsidy per person (USD)
UA Region A: West & North-West	2,935,000	392	7,487	684,365	4.29
UA Region B: Central & North-Central	1,778,888	542	3,282	674,381	2.64
UA Region C: East & North-East	2,025,000	618	3,277	602,198	3.36
Total	6,738,888	1,552	4,342	1,960,944	3.44

Uganda RCDF Telephony Subsidy Amounts

Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid and World Bank, January 2006, Intelecon Research & Consultancy Ltd.

The first pilot projects of Nigeria's Universal Service Provision Fund (USPF) also saw relatively low subsidy costs per person as shown in the following table. These costs included the provision of Internet POPs and public Internet cafés at the Local Government Authority (LGA) headquarters.

Table : Nigeria USPF Pilot subsidy estimations					
UA Region	Maximum UA Subsidy Amount (USD)	No. of localities	Subsidy per locality (USD)	Population to be served	Subsidy per person (USD)
Pilot 1: North East Region	2,160,000	168	12,857	918,000	2.35
Pilot 2: North Central Region	2,669,000	139	19,201	731,600	3.65
Pilot 3: South-South Region	1,412,070	70	20,172	694,000	2.03
Total	6,241,070	377	16,555	2,343,600	2.66

Nigeria USPF Pilot Subsidy Estimations

Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy, Report submitted to the Global Partnership on Output-based Aid and World Bank, January 2006, Intelecon Research & Consultancy Ltd.

Internet POP and ICT programme costs

Internet POP and public access projects in district centres which already have digital backbones serving base station towers, typically cost in the range USD 2 to USD 20 per local inhabitant. The Uganda RCDF has implemented Internet POPs at district centres. These were designed to provide vanguard institutions (e.g., schools, colleges, hospitals, NGOs), government offices and businesses with high-speed wireless service on a commercial demand basis. The average subsidy per POP was around USD 30,000, serving a typical district centre population of 15,000. In addition, one telecentre per district is being funded to a maximum subsidy of approximately USD 25,000. The total average Internet and telecentre subsidy under the RCDF, therefore, averages USD 3 to USD 4 per inhabitant, though the most remote and sparsely populated district centres required much higher subsidies ranging up to USD 20 per inhabitant. Initial costs for remote district centre communications in the Mongolian universal access (UA) pilot programme offered joint subsidies for mobile telephony, Internet POP, public access and free access for the school for three years. Subsidies ranged from USD 16,000 to USD 40,000 for population centres of only 1,000 people. However, from the pilot experience described in the reference documents Output-Based Aid in Mongolia: Expanding telecommunications services to rural areas and Cost-benefit analysis on Mongolia OBA Pilot Program of the Universal Access Strategy (Section 6.3.3), telephony and Internet/ICT competitions are now being bid separately, with the Internet POPs attempted only for the largest and most well-connected centres. The subsidies are expected to range between USD 40,000 to USD 80,000 per centre, i.e., ranging between USD 30 to USD 80 per inhabitant, including all Internet and ICT components. As can be seen in all these examples above, subsidy cost per person and or per locality can vary considerably. These indicators are valuable tools to prioritize provinces or districts or projects, and help to decide how reasonable a programme appears to be.

Reference Documents

- **Output-Based Aid in Mongolia: Expanding telecommunications services to rural areas**

4.7 COMPETING FOR UAS SUBSIDIES

This chapter describes the key tender design considerations and the protocol for holding a competitive tender to allocate subsidies to a winning operator or service provider in exchange for universal access and service (UAS) provision. This process, which is almost always used in conjunction with a Universal Access and Service Fund (UASF), can also be used by international or national donors, or industry regulators, using government or other sources outside of UASFs, to supply subsidies or grants. The main objectives of a competitive bid are to select a qualified organization (with experience, personnel, track record, etc) that has the necessary capacity (e.g., capital, expertise, manpower, etc.), the long-term motivation (through sustainability or profitable business), and the minimum requirements for funds. Subsidizing ICT projects brings certain risks. These potential risks include:

- Distorting the market;
- Creating dependence on ongoing funding;
- Potential abuse of funds;
- Favouritism; and
- Project failures which waste resources.

To avoid these funding pitfalls, smart subsidy has emerged as a best practice approach. Smart subsidy is considered to be a part of a broader approach to government subsidies known as Output-Based Aid (OBA). The concepts are described in more detail in **Section 1.3.3** and **Section 3.2**. The OBA approach delegates service delivery to the for-profit or non-profit private sector under contracts that tie payments to the outputs or results that are actually delivered to target beneficiaries [1]. A smart subsidy:

- Should be a one-time result-oriented subsidy awarded typically to a private sector operator or entrepreneur, in some cases a commercially constituted government-owned entity might also be possible;
- Should not distort the market;
- Should encourage cost savings and market growth;
- Should kick start a project or service with the objective of ultimately seeing the programme become commercially viable; and
- Should encourage service development in regions where, without the subsidy, investors might otherwise have been reluctant to invest.

Smart subsidies address the experience of some earlier funded projects that had ill-designed tenders which resulted in wasted resources, created bottlenecks in development, and generally were counter-productive. The following are guidelines for the use of smarter subsidies:

- Operate according to pre-established clear, explicit rules that are transparent and do not create distortions in the market;
- Link subsidies to optimal results;

- Support cost-minimization incentives; and
- Facilitate good governance.

The following design parameters for the competitive bidding strategy (discussed in **Section 7.1**), bidding and subsidy allocation process (described in **Section 7.2**) and inspection, payment, monitoring and evaluation process (elaborated in **Section 7.3**) illustrate how the smart subsidy and OBA principles are implemented in practice.

4.7.1 DESIGN OF THE UAS BIDDING STRATEGY

The competitive subsidy bidding approach is described in the following sections. This approach is appropriate for universal access and service (UAS) projects that involve:

- Large capital investments in networks;
- Large sums of subsidies to be disbursed (e.g., starting from several hundred thousand dollars to several million); and
- Companies as subsidy recipients.

The reasons to use competitive bidding in the above types of projects are that:

- The investment climate would be affected negatively if the regulator or government were not using a competitive process and were to favour a certain company; and
- Organizing a competitive tender involves time and costs and thus is only efficient if large sums are involved.

As discussed earlier, the development of the UAS policy requires close consultation with the industry. The same holds true for developing UAS bidding strategies. The various steps of the UAS bidding design process are as follows:

- Formulate the bid objectives and desired outcomes;
- Articulate bidder eligibility, UAS areas, and separate or bundled UAS service provision;
- Present the UAS bidding strategy and detailed projects to potential bidders for discussion and integration of feedback;
- Conduct detailed design of the bidding process, including key parameters of the subsidy contract and license;
- Prepare detailed bidding documents; and
- Ensure a transparent bidding process.

The formulation of bid objectives and desired outcomes is based on each country's UAS policy. In addition to achieving the UAS targets, bid objectives could include minimizing subsidies or increasing competition in the market. Decisions on who is eligible for participation in the competitive tender for subsidies have an impact on the objectives and desired outcomes. This is discussed in **Section 7.1.1.Section 7.1.2** discusses how UAS area bidding lots can be determined and the implications of grouping regions and programmes. **Section 7.1.3** presents required decisions on the design of the bidding process itself, including key parameters of the contract and license. **Section 7.1.4** outlines the key elements of the bidding documents that are used in the competitive tender for UAS subsidies. **Section 7.1.5** addresses how competitive procedures might be adapted for smaller ICT projects or how other approaches can be used.

4.7.1.1 DETERMINING ELIGIBILITY FOR UAS COMPETITIONS

The following key questions relate to the eligibility of universal access and service (UAS) competitions and subsidy disbursements:

- Are government-owned companies eligible to participate in UAS competitions; and
- Can new entrants and smaller players compete for subsidies or are subsidies only available to companies that are already licensed and contributing to the Universal Access and Service Fund (UASF)?

Government-owned companiesIn some countries certain operators, typically the incumbent, is still whole or partially government-owned. This raises the question whether this type of entity is eligible to take part in a subsidy competition for UAS services. The main concern with government owned companies competing for subsidy, is the potential for conflict of interest as a UAS competition is the implementation of government policy. This raises the question of whether the government can be impartial in awarding a UAS subsidy if a participating firm is owned or partially owned by the government. This scenario exists in several countries, for example, in India where Bharat Sanchar Nigam Ltd (BSNL) is government-owned, and the Department of Telecommunications (DoT) within the Ministry of Communications and

Information Technology manages the Universal Service Obligation Fund (USOF), and has awarded subsidies to BSNL, among others. Even when government is impartial, there might still be the perception of a potential conflict of interest. However, government-owned companies can and should be allowed to participate in UAS competitions, provided they are also contributors to the UASF, and provided there are sufficient safeguards in place to ensure that competitions are run and awarded impartially and free from conflict of interest. One such safeguard is to have the competitive bid conducted by the industry regulator. The industry regulator, typically considered more independent than a ministry and one step-removed from government, should implement UAS competitive bids when government-owned companies are involved. This is the most common practice in countries with a UASF. Existing versus new entrant companiesIn some UAS competitions, currently licensed local operators that contribute to a UASF, or who are asked to contribute to a UASF, believe that only contributors should be eligible to participate. There is an alternative view, however, espoused by the World Bank and other International Finance Institutions (IFI) and donors, that UAS competitions must be open for all players, including foreign and local new entrants. Both these scenarios have merit. Currently licensed local operators point out that allowing only contributors to a UASF to compete and receive subsidies, is a fair scenario that in fact results in a broader buy-in to a UASF among existing operators. The alternative view, on the other hand, stresses openness, an equal-playing field and increased competition. It depends on the specific country circumstances as to which scenario might be more beneficial. An open UAS tender is a good opportunity to increase overall competition in the market place by encouraging new players to enter. New entrants might be restricted to a certain UAS area first (e.g., rural), but can be promised a national licence at a later stage (e.g., within two to three years). Bidding documents should include licences for the new potential entrants, or the bidding documents should contain the key terms and conditions of the licences offered to the winning bidder. If the specific market has a sufficient and satisfactory level of competition and constraints on scarce resources, in particular spectrum, make it impractical to license new operators to provide the required service, the bid could be limited to the existing local licensees and contributors to the UASF. In general, existing operators are likely to be in a better position than local or foreign new entrants to win a UAS competitive bid as they already know the market and have an existing network and service provision operation in the country which they may only need to expand, while new entrants need to set up a network and operations from scratch. Nevertheless, new entrants can win UAS tenders if either the local players are uninterested in participating, or if the new entrant is willing to make a low bid as a part of a long-term strategy for entering the market. A similar situation may emerge when new low cost technologies become available that may render irrelevant any potential competitive advantage that existing local operators may have acquired by virtue of their presence in the market. It is also conceivable to design different eligibility rules within the overall UAS programme that is a compromise between new entrants and existing companies e.g., new entrants are allowed to compete, but limited for certain projects or areas. It must be noted that, in countries with limited competition due to a small number of licensed operators, opening up the UAS tender rules to new entrants may have positive competitive spill-over effects beyond the UAS tender regions, since it may yield a viable new competitor in the whole market.

4.7.1.2 DEVELOPING UAS BIDDING STRATEGY AND DECIDING ON BIDDING LOTS

Deciding on the grouping of universal access and service (UAS) areas into bidding lots is one of the most strategically important tasks when preparing for subsidy tender. UAS bidding lots represent the grouping of areas within a country for UAS projects. For example in Uganda, the country was divided into three regions for the public access phone competitive tender. There are several considerations relating to developing UAS bidding lots. Choosing which grouping is best for a particular country and which programme depends on the UAS objectives and current UAS status of a country. The main considerations when developing UAS bidding lots are as follows:

Maximising and sustaining competition

Companies' appetites for aggressive bidding, are directly related to their strategic objectives (e.g., expansion plans, to secure licences). The division of UAS territories into several areas or regions, and the opportunity to bid for multiple areas, allows bidders to assemble territorial blocks according to corporate interests. When a UAS competitive tender allows new entrants and offers new licences, it also provides an opportunity for new entrants to assemble major national holdings through aggressive pricing of their bids. In one example from Chile, a successful bidder accepted zero subsidies in order to get a foothold into the market, develop its targeted territory, and secure long-term control of radio frequencies (For details on Chile's experience see the reference document Closing the gap to access to rural communications and **Section 3.2.1** including the practice note on Chile). Once the market is more mature and fewer areas and groups remain unserved, or the potential for new competitive entry declines, companies may not be as motivated to bid. This risk can be reduced, but not necessarily eliminated altogether, by fund managers considering competitive market interests when they design and group UAS areas. This means that they should assess the apparent commercial interests of the players likely to bid, and group the UAS areas in such a way as to increase attractiveness and maximise the number of competitors.

The problem of the most marginal localities

Some UAS territories, including those of strategic importance, are much less viable than territories containing broad opportunities for service growth and diversification or wider technology choice. This is seen especially in some very remote areas that can only be reached by satellite technology (e.g., the remoter regions of Chile, Mongolia, Peru, Botswana and Russia). Packaging attractive regions with less-attractive service areas, and by offering larger licence areas (to ensure economies of scale) or perhaps, even applying a higher level of interconnect access charge to reflect the costs of the more remote communities, will help promote operators' interest in serving these marginal regions. The ideal formula will vary from country to country as careful UAS area grouping is a crucial issue. It could be that ultimately, some funds having to deal with extremely high-cost areas may have to consider operational as well as capital subsidies, to secure long term operator viability. The reference document Output-based aid in Nepal provides one example of how to increase the attractiveness in a very challenging environment.

Economies of scale versus increased choice and flexibility

In 2008, Mongolia offered a high level of flexibility and choice for operators in its competitive UAS bidding process. The tender to provide public access and private telephony in 90 soums (district centres) without adequate services allowed operators to bid for each soum separately. The evaluation was for each separate soum. The advantage of offering individual bids was that the operators could bid for specific soums, which gave them maximum choice and flexibility. This method of tendering makes it is easier for the UASF fund manager who will not need to second guess the strategic interest of operators in the design packages. The potential disadvantages are that operators do not know which and how many soums they might win, and could lose out on economies of scale benefits for a larger region and end up with a very scattered distribution of UAS areas around the country. However, in general the strategy was a great success, as 89 of the 90 soums were awarded on the first round and the bids amounted to less than 70 per cent of the maximum allowable subsidies set by the fund manager.

Limiting dominant positions of a UAS provider

Regardless of whether UAS regions or individual locations are offered, it might be wise to limit how many of the regions or lots any one operator or service provider can win. A reason for this includes the scenario in which a winning bidder defaults on his obligation, then not all areas will be affected (limiting the dependence on a single operator). Another reason is that this scenario creates the opportunity for several operators and service providers to win an area and will increase the acceptance and interest in a competition (i.e., a single powerful operator cannot dominate the bidding). An example of a bidding process with limits is the tender in Uganda to award Internet Points of Presence (POPs) and Internet cafes in all the district centres. There were 32 district centres to be bid on at the time, but any one operator or ISP could only win a maximum of 10 Internet POPs [1].

Separate or bundled service provision

Another important consideration with regard to designing the bidding strategy is whether to bid certain universal access and service (UAS) requirements separately or bundled. For example in Uganda, the public telephony bid for very 2,500 rural inhabitants was separate from the bid for broadband Internet points of presence (POPs) in 32 district centres around the country. In contrast, in Mongolia's pilot project in Tariat soum (district) and Chuluut soum, wireless voice services, Internet POP, public Internet centre and support for the school to access the Internet was all combined into a single tender for each soum. Separate or bundled UAS service tenders have each their advantages and disadvantages and the selection of which approach to use depends on the country conditions. Advantages of the separate service tender approach are:

- The timing of separate tenders can be sequential and spread out over some time, matching fund availability;
- Complexity of the tender is limited as only a single main service needs to be provided;
- Separate tenders allow several (especially smaller) players to participate and increases the inclusiveness of the UASF programme (e.g. Internet service providers can participate in an Internet POP bid, schools can apply themselves for support for Internet access);

Advantages of the bundled service tender approach are:

- The bundling of UAS services increases economies of scale and the attractiveness of the tender; it is therefore useful if individual UAS projects and maximum subsidy offers are small by themselves and might not attract sufficient interest from potential bidders unless they are bundled;
- As the communications industry converges more and licences are technology and service-neutral (i.e., a licensee can use any technology to provide any communications service), bundled UAS bidding might be more appropriate.

Minimizing subsidies needed

In addition to the way UAS bidding lots are designed, there are a few other options which help to minimize the subsidy amount needed by operators:

- Offering free or low cost use of radio frequencies to the winning bidder;
- Allowing the winning bidder to provide other services (i.e., a service-neutral approach); and
- Mandating infrastructure sharing, both for transmission and access such as wireless towers (for details see Section 3.4.6 and its Practice Note Sharing mobile network infrastructure in India).

4.7.1.3 DESIGN OF BIDDING PROCESS

In addition to strategic decisions about the eligibility of various types of operators and services providers to partake in the competitive universal access and service (UAS) bidding process, discussed in **Section 7.1.1**, and the strategic design of the UAS bidding lots presented in **Section 7.1.2**, there are also important decisions to be made on procedural issues of the bidding and key parameters of the contract and licence, discussed in this section.

Pre-qualification required or not

While a pre-qualification requirement is more common in privatizations of incumbent operators, or licence and frequency competitive bids, most UAS subsidy competitions do not require pre-qualification. Pre-qualification adds one more step into the process and thus extends the time required for the bidding process. However, requiring pre-qualification might be helpful in instances when the government is unsure whether and how many national operators have the required qualifications, for example, for a large backbone investment.

One stage or two stage approach

A two-stage bidding approach means that the first request for proposal (RFP) asks for technical proposals from bidders, without prices. The RFP does not contain specific detailed technical requirements, but it is rather designed to elicit innovative approaches from operators. The operators issue technical bids in accordance with their best proposal for providing the service. After having seen the technical bids, the government prepares the second stage detailed bidding documents based on elements it liked from the first-stage technical bids operators submitted. Bidders then respond anew including their financial bid.A two-stage bidding approach is useful in instances where the government is unsure about a) market response to issues of bundling of areas or services, specific technologies, etc., and b) the specific UAS project design and wishes to be presented with various options of how to do a certain project. Again, typically UAS competitions do not use a two-stage approach to bidding, but each country has to choose in which instances this may be beneficial and outweighs the disadvantage of a longer tender process.

One envelope or two envelope approach

A one envelope approach contains both the technical and financial proposal in a single envelope, while a two envelope approach requires the technical bid and financial bid in separate envelopes. The two-envelope approach means that the technical bid is opened and evaluated first, before the financial bid is opened. The advantage is that the evaluation cannot be influenced by the price of the bidder. In the case of the one-envelop approach, commonly used for UAS competitions, the financial and technical bids are contained in the same envelop and the financial bids are read out at the opening ceremony. The advantage is that bidders know immediately what their competition has bid and there is a high level of transparency. Also, in UAS competitions, what is most important is the subsidy request, while meeting the technical, corporate and services requirements.

Bidder and consortia eligibility criteria

There are typically several bidder and consortia eligibility criteria that must be met. First of all, bidders are required to be free of a conflict of interest. A conflict of interest could be if a bidder is being controlled by an affiliate which is also a bidder; or a bidder that receives or has received any direct or indirect subsidy from another bidder; or a bidder has the same legal representative for purposes of the bid; or participates in more than one bid in this bidding process, or a bidder participated as a consultant in the preparation of the design or technical specifications of the UAS project. If the bidder is a joint venture, it must meet a number of requirements to be eligible, including it needs to provide a clear allocation of responsibilities among members, have a formal joint venture agreement for a certain duration in place, furnish details of the ownership interests in the joint venture and the financial contributions of each member, and have arrangements in place governing managerial control by the joint venture over the operation of the UAS service provider.

Financing capacity and operational experience

Another eligibility requirement is the financing capacity and operational experience of a bidder. The tender documents should require bidders to demonstrate financial stability, with adequate cash flow and satisfactory net worth. In general, bidders should be required to demonstrate from the record of the previous two years of communications service provision that they are able to deploy and operate the network investments proposed for the UAS operation. The actual requirement in this regard is recommended to be discussed with the industry and should be set by the UASF at the time of preparation of its tender documents. Another important qualifying requirement is demonstrating operational experience. The operational experience requirement makes sure that the winning bidder has rolled out and operated a network of a certain size before or has provided very similar or the same services required for the UAS project. Often operational minimum requirements include having operated a telephony or Internet network for a minimum of 2 years, with a minimum number of customers which is similar to the customers in the expected UAS project. This requirement of operational expertise does not need to deter or limit new entrants. New entrants without operational experience can partner with an entity or person that has that experience. However, in order to make sure that this partner is not just a partner on paper, typically the requirement is that, if the operational expertise of the partner is to qualify the bidder, the partner needs to have at least 25 per cent ownership of the UAS service provider; in some cases this can be higher. It also needs to be demonstrated that the partners' expertise is actually used in the running of the UAS service provider e.g. through a management position.

Incorporation of bidder

Bidding documents can either require that the bidder is incorporated as a company in the respective country at the time of bidding or incorporate within a certain timeframe after bid award e.g., before the contract or licence is signed and made effective. The decision to incorporate at the time of the bid is more onerous to new entrant bidders, as they may not win the bid. However, incorporating after the bid award may take time or could have unexpected complications.

Bidder selection

In most UAS competitions, the bid selection method is that bidders have to comply with the required eligibility criteria, technical, financial and corporate requirements on a simple pass or fail basis. Amongst bidders that pass the eligibility and other detailed requirements, the bidder with the least amount of subsidy requested wins, as long as it is not above the maximum subsidy. There are other methods in which, for example, bidder selection is based on price plus some measure of coverage/investment proposed, or a point system. Both those later methods allow to favour a bidder that provide certain investments or services beyond the minimum requirements, i.e., find a good balance between costs and quality. However, these methods require a higher level of complexity and very careful design so that the bid is still transparent and gives bidders a clear understanding of how to win.

Details of contract or licence

If the winning bidder is an existing national operator, it does not necessarily require a licence, unless it is not authorized to provide some of the required UAS services. However, in case a new entrant is winning the bid, it does need a licence unless the country has already moved to simpler authorizations. Ideally, the bidding documents grant the winner automatically a licence or authorization or at least describe clearly what is required and how long it will take. The same applies for required radio frequency spectrum. Also, the bidding documents should specify whether the provider will have the right to build its own international gateway or not. These decisions have an influence of the likely subsidy requested by bidders. The contract and licence can have differing durations, for example five or ten years. These are elements which need to be decided in advance and be taken into account when calculating the maximum subsidy.

Bid and performance bonds

A bid bond is a bank guarantee provided by the bidder, ranging from 1 to 5 per cent of the maximum subsidy, which the bidder will have to fortify if the bidder withdraws its bid. The purpose of the bid bond is to deter companies that are not serious bidders.A performance bond is a bank guarantee over a certain amount of money, provided by the winning bidder that guarantees satisfactory completion of the project or the bidder may loose part or all of the money. Instituting a performance bond will ensure that the operator carries out its UAS requirements as established in its service agreement. The bond provides an additional security to the government, over and above the fact that the subsidy payment will be paid out on a milestone by milestone basis. In determining the amount of the performance bond, the regulator needs to be conscious of the fact that the performance bond limits the liquidity of the winning bidder or might require the bidder to borrow money. Also, the cost of securing a performance bond might be quite high, especially in developing countries. Thus, as much as possible, the performance bond should be kept to a minimum and ideally be a point of consultation with the industry before finalizing the bidding documents while at the same time provide a level of security and leverage for the government. It is likely that an appropriate performance bond amount differs from market to market. The amount of the performance bond can be between 10 and 25 per cent, of the subsidy to be awarded.It is recommended that the performance bond be in the form of a stand-by letter of credit from a reputable bank. This will provide the government with the highest level of certainty that their security will be honored without second-guessing, negotiation or arbitration.

Related Materials

Module 3, "Authorization of Telecommunication/ICT Services", Section 4, "The Competitive Licensing Process"

Reference Documents

- Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region

4.7.1.4 COMPETITION AND APPLICATION PROCEDURES FOR SMALLER ICT PROJECTS

The bidding documents for a universal access and service (UAS) competition provide complete information on the following four key elements of the UAS bidding programme:

-
    - The context and background of the UAS bid (e.g., the UAS policy, overall programme and government commitment), including a detailed description of the particular UAS project for which the tender is called;
    - The detailed requirements and obligations of the UAS service provider (i.e., the winning bidder);
    - The rules and procedures of the bidding process itself; and
    - A draft contract, also called the UAS Service Agreement, and a draft license (including spectrum license and numbering rights, if required).

In many cases the bidding documents also include specific forms, or templates, to be completed by the participating bidder. The purpose of including all these elements is to provide the bidders with as complete and comprehensive information as possible in advance of the project. This will solicit well-prepared bids and provide a transparent process with no ambiguities, especially in regards to the bid evaluation and bidders' qualification rules. The following table provides an overview of key topics and elements typically covered in UAS bidding documents.

Table: Overview of key topics and elements covered in bidding documents	
Introduction and Overview	
Purpose of bid	e.g., to bring phone service or Internet (or both) to certain areas/ communities; to provide broadband throughout the country
Background	e.g., UAS Policy, government strategy or commitment, overall UAS programme, source of funds
Project overview	Area/ communities to be served, maximum subsidy, services to be provided, tariffs if relevant, time period and other requirements
Time schedule	For bidding process, contract award, project implementation & completion
Contact	Contact persons and details, communication protocol
Requirements, obligations and rights of UAS service provider	
Market rights	Extent of freedom which the operator will have to provide additional services, both in the licensed areas and nationally; Usually UAS providers are not granted any exclusivity rights Information on future liberalization dates and plans
Specific licensing provisions	Information for new entrants on what licence they could obtain, to which conditions, if they were awarded the tender, incl. reference to relevant sections of the enabling law and licence fees and levies
Operating area	List the specific areas(s) for the project(s), incl. roll-out period
Minimum service obligations	State in tabular fashion as applicable: • e.g., the number of public telephones required for each area, Internet POPs or any other UAS requirements • e.g., broadband fibre links, interconnection points • e.g., coverage or private service requirements
Quality of service specifications	State all minimum quality standards which must be met such as: • Service availability requirements e.g. 98 per cent • Minimum and mean time to repair • Upload and download speeds for Internet • Bandwidth capacity of broadband networks
Maximum subsidy	Maximum subsidy allowable for each project or area, incl. subsidy payment schedule
Demand data	Information on available demand data or study
Technology specification	While tenders should be technology neutral, in some cases

◂ Overview of Key Topics and Elements Covered in Bidding Documents

Source: ITU-infoDev ICT Regulation Toolkit - UAS Module

	some minor technology requirements might be necessary, such as: • whether or not all transmission media are allowed (e.g., including satellite) • whether or not IP telephony will be allowable
Radio frequencies	Clearly state the policy on radio spectrum usage, radio frequency co-ordination, and the process required for radio frequency approvals • Any frequency bands which are definitely not going to be allowed should be declared • Required radio frequency licence charges and spectrum and numbering fees (where applicable) • Whether or not national roaming is allowed • Whether or not spectrum trading is allowed • Whether or not infrastructure sharing is allowed
Tariffs	Statement of the tariff regulation and rules – typically maximum allowable tariffs
Interconnect	State the physical interconnect rules/rights, and any other details of interconnect agreements and regulation (whether or not there is a public Reference Interconnection Offer (RIO); possibility to have geographically asymmetric or other favourable interconnection agreements, etc.) Any scheduled plans for cost-study or potential changes to the interconnect formula and regulation
Monitoring and reporting requirements	Format and timing for reporting of in-service and operational statistics UASF monitoring rights and expectations
Regulation of UAS provider	Any other relevant regulation such as numbering and type approval and the applicable law(s) and regulations
Other legal provisions	Transfer of ownership or change of control of the UAS service provider; access to public and private land; force majeure, dispute resolution; technical auditor; compliance with law (many of these are detailed in the actual contract later)
Rules and procedures of the bidding process	
Proposal preparation	Content & format of proposal Part 1 – Qualification and service proposal (Technical proposal) Part 2 – Subsidy proposal Compliance checklist Bid bond Period of validity of proposals
Qualification of bidder	Applicant eligibility Rules for consortium applicant Financing capacity Operational experience
Bidding process	Pre-proposal (or pre-bid) meeting Communication, comments & requests for clarification Submission of proposal Delivery of proposal Opening of proposals Evaluation period Award and Letter of intent
Evaluation of proposal & selection of successful applicant	Responsiveness of proposals 1) Demanded requirements; required information and bid bond (pre-qualification) 2) Least subsidy request Grounds for rejection of proposals Fraud and corruption Subsequent disqualification and ineligibility
Other provisions	Confidentiality of proposals Use of proposals Cost of proposal and bidding Reservation of rights Legal and formal requirements
Annexes	Proposal forms Bid bond form Compliance checklist Dispute resolution terms Draft contract – UAS Services and Subsidy Agreement

Generally, qualification criteria for bidders should be limited to ensuring applicants have the financial, technical and managerial resources and experience to successfully develop and execute the planned project. It is important to establish clear, rigorous and proportionate qualification criteria, explicitly stated in the bidding documents. Depending on the planned project, the qualifications may vary, but need to be developed by the funding agency. The input from various interested bidders during the consultation process might help to clarify key qualifications, since the most appropriate qualifications may vary from project to project, with market size, etc.

Draft contract

In general, the bidding documents should include as an annex the draft contract, also called a UAS service and subsidy agreement. Details of its typical contents are shown in the following table:

Table: Draft contract – UAS Service and Subsidy Agreement

Article One	Interpretation (Definitions, extended meanings, currencies, schedules)
Article Two	Provision of UAS services (Implementation arrangements; service availability and quality, and tariffs)
Article Three	Ownership and control
Article Four	Implementation and service failures (penalties, remedies)
Article Five	UAS subsidy payment
Article Six	Performance bond [2]
Article Seven	Insurance
Article Eight	Technical auditor (appointment, role and co-operation)
Article Nine	Reporting
Article Ten	Dispute resolution (escalation process, arbitration or court proceedings, costs)
Article Eleven	Representations and warranties
Article Twelve	Indemnification
Article Thirteen	Force majeure
Article Fourteen	Confidentiality
Article Fifteen	Term and termination (bankruptcy, material breach, remedies)
Article Sixteen	General (governing law, entire agreement, subcontractors, notices, etc)
Article Seventeen	Compliance with environmental laws
Schedule A	Mandatory services, availability and quality specifications
Schedule B	Tariffs and other charges
Schedule C	UAS service area
Schedule D	Implementation and subsidy payment schedule
Schedule E	Material events of default
Schedule F	Performance bond

◂ **UAS Service and Subsidy Agreement**

Source: ITU-infoDev ICT Regulation Toolkit - UAS Module

Practice Notes

- Uganda's application process for rural schools to have Internet access

4.7.1.5 COMPETITION AND APPLICATION PROCEDURES FOR SMALLER ICT PROJECTS

The competitive subsidy bidding approach, described in the previous sections, is essentially designed and appropriate for universal access and service (UAS) projects that involve:

- Large capital investments in networks;
- Large sums of subsidies to be disbursed (e.g., starting from several hundred thousand dollars to several millions); and

- Have companies as recipients.

Funding processes for smaller ICT projects can be provided through either a simplified competitive process or an application process for grants. The former, for example, could be used for smaller pilot projects, (e.g., USD 50,000 to USD 200,000). For pilot projects, minimizing cost might not be the foremost objective but rather, the sound testing and evaluation of a particular concept, programme or application in the ICT field. Therefore, a fixed-budget competition process might be used, where the amount of subsidy is given (fixed) and the evaluation is based on specific, pre-published criteria, including a pre-published point system for various elements of the proposal.An example for when to use a fixed-budget competition award might be the specific funding for Internet access in rural schools (after the backbone infrastructure is available), or for funding the start-up of individual public Internet access points/ telecentres.Similarly to the process for the competitive bidding, this process would go through the same sequence:

- Formulation of project objective and outcome;
- Public consultation with stakeholders and potential applicants;
- Preparation of application form;
- Transparent invitation process;
- Qualification and evaluation; and
- Bid award.

The Practice Note *Uganda's application process for rural schools to have Internet access* summarises the requirements and process for applicants wishing to provide Internet access to schools and their selection. In general, applicants should be required to prepare an acceptable business plan (or sustainability plan) that outlines the sponsor's vision, objectives, need for funding, and demonstrates long term sustainability. These simplified qualification requirements could be used for similar small projects.

4.7.2 BIDDING & SUBSIDY DISTRIBUTION PROCESS

One of the cornerstones of a fair and successful competitive bidding process is transparency. Transparency requires that the process should be conducted openly and that the selection of the winning candidates be based on criteria published in advance. Key features of transparent processes include:

- Advance publication of the bidding documents, with process rules, qualification requirements and selection criteria;
- Separation of qualification and selection processes; and
- Public opening of proposals including separate sealed financial offers from qualified applicants.

The funding agency needs to ensure that participants in the competitive processes, as well as the general public, perceive the process to be fair.The various steps of the competitive subsidy bidding process are as follows:

- Marketing and official publication of the bidding opportunity as described in **Section 7.2.1**;
- Conducting a pre-bid meeting that allows bidders to request clarifications and make possible suggestions for modification, discussed in **Section 7.2.2**; and
- Bid opening, bid evaluation and selection, and subsequent bid award, presented in **Section 7.2.3**.

In order to allocate subsides to pilot projects, it is recommendable to require business or sustainability plans, as outlined in **Section 7.2.4**.

Reference Documents

- **Edgardo Sepulveda, Minimum Subsidy Auctions for Public Telecommunications Access in Rural Areas, in ITU Trends in Telecommunication Reform 2003: Promoting Universal Access to ICTs - Practical tools for regulators**

4.7.2.1 PUBLICIZING THE OPPORTUNITY

Publicizing a competitive bidding opportunity for a universal access and service (UAS) project effectively increases competition and will likely lead to a better outcome (i.e., lower subsidy to be paid, suitable winning bidder). There are several ways to publicize and market a UAS bidding opportunity. They are as follows:

- By direct invitation to all relevant licence holders within the country. To avoid the perception of favouritism, it is important to notify all the various eligible licence holders. Depending on the number of relevant licence holders, this might be either a practical or unpractical approach (i.e., in a small market, it is practical to contact between 10 to 50 licence holders whereas in larger markets this might not be appropriate or effective).

- Placing an announcement in the main national newspaper that has wide circulation among the business community. Ideally, it is placed in two national newspapers or trade journals. Also, it is helpful if the advertisement runs for at least two to three days.
- The bidding opportunity should be published on the web page of the industry regulator, and the relevant ministry could also have links to the announcement. Web-notices, increasingly important, will also help market the opportunity internationally.
- If the bid is open internationally, as discussed in **Section 7.1.1**, notices or advertisements also need to be placed in international industry or business magazines, newsletters, newspapers and other relevant media. As well, international or regional industry conferences can be used to market a UAS bidding opportunity. It might also be appropriate to contact a certain number of potentially interested international bidders as long as it is more than two or three, in order to avoid any favouritism.

Typically, a country will use a mix of the above options to advertise the bidding opportunity depending upon the specific UAS project and market situation. For example, a small pilot or Internet project below USD 0.5 million might not need to be advertised internationally. Notices of bidding opportunities can be short but should contain the following vital information:

- Who is calling the competitive tender;
- What area shall be served with which service;
- What is the maximum subsidy offered; and
- Information on how to obtain the official bidding documents.

Public tender documents should be offered for sale to prospective bidders for a specified sum. These are typically kept low for accessibility by interested parties, while at the same time are priced high enough to cover the costs of photocopying, binding, mailing, etc., which will also reduce the number of requests received from non-relevant parties to the bid. The notice and the public tender documents should be issued with at least two months lead time, allowing for bidders to investigate, research and prepare detailed proposals. Depending on the complexity and size of UAS project and whether it is likely that companies need to conduct some site surveys, it might be advisable to give three months lead time.

Reference Documents

- **Nepal- Request for Applications for a Licence to Provide Rural Telecommunications Service (RTS) in the Eastern Development Region**

4.7.2.2 PRE-BID MEETING

At a set date that is specified in the bidding documents, the regulator or Universal Access and Service Fund (UASF) department typically holds a pre-bid meeting. The purpose of the meeting is to allow potential bidders to ask questions and request clarifications. It should also be seen as a last chance to make some modifications to the UAS project and bidding documents, based on suggestions and comments from potential bidders. These changes are likely to be minimal, as the industry had the opportunity to make comments and suggestions during the earlier public consultation process. The pre-bid meeting can be open to all interested parties, or it can be restricted to companies that purchased the bidding documents. Both options are fine, and deciding on either is more dependent on logistical issues such as location and meeting room size. However, typically all participants are required to register (i.e., provide their name, position, company and contact details). This enables the regulator later to distribute the pre-bid meeting minutes. Attendance at the pre-bid meeting is typically not mandatory. However, pre-bid meeting minutes which might include amendments to the bidding documents (either to clarify or modify based on feedback) are distributed to all entities that purchased the bidding documents as well as all additional entities that were represented at the pre-bid meeting. It is helpful to start the discussion at the pre-bid meeting through a brief introductory presentation outlining the main features of the UAS project and the key elements of the bidding process and bidding requirements. The pre-bid meeting should be held early, e.g., two to three weeks after bid document availability. This allows potential bidders time to thoroughly review the bidding documents and gives them enough time to prepare the proposal once they have received important clarifications, if applicable. The bidding process should also allow for written requests for clarification or comments, but this should be limited to a certain deadline similar to the process involved in the pre-bid meeting. Answers to written requests are published jointly with the pre-bid meeting minutes, or a separate document is issued and distributed to all potential bidders. Typically the written questions are treated anonymously.The bidding documents should also include a date at which operators are required to register their intent to participate in the bid or to decline. The written clarifications of the questions can include a reminder of this deadline. While this cannot be legally binding, it is helpful for the regulator to see early on, if there is sufficient interest among operators to bid.

4.7.2.3 BID EVALUATION, SELECTION OF WINNING BID AND BID AWARD

There should be a public opening of the tenders on the published date. The names of all bidders and their respective subsidy offers should be announced at the tender opening ceremony. Attendance can be open for all interested parties or bidders only. Sometimes, a quick preliminary bid compliance check is conducted during the public bid opening, in order to verify that the contents of the bid envelope are complete, have been signed by the proper authority (e.g., power of attorney included), the bid bond is valid, etc. If this is not feasible during the ceremony, it is usually conducted shortly thereafter as a preliminary examination process, prior to the detailed examination i.e., evaluation.The tender can use a single envelope format or separate envelope format for each of the components i.e., the technical proposal and the financial proposal. Best practice is to split the evaluation into two stages, as follows:

- Pre-qualification of the technical proposal, which includes information on how the bidder meets the corporate, financial and operational requirements as well as how the bidder meets the service and quality requirements, among others; and
- The financial proposal which is the required subsidy amount.

Only those bidders who meet the stipulated technical pre-qualification thresholds will have their subsidy request considered by the regulator.Tender evaluation criteria should be described clearly in the tender documents to be purchased by interested prospective bidders. Furthermore, the documents should be based, to the greatest extent possible, on objective factors to avoid favouritism or subjectivity in the evaluation process. Also, the tender documents should contain a clear schedule including the duration of the evaluation period and the date on which results are announced. Depending on the complexity of the bid and required internal approval processes (e.g., by the board of the regulator), the evaluation period typically varies between four to six weeks.

Technical proposal evaluation

The evaluation team should be drawn from within the regulator and ideally should include various subject experts e.g., an engineer, a lawyer, a financial expert or accountant, an economist, somebody with a business background and possibly a procurement specialist. Sometimes consultants or other outside experts (e.g. an academic) are part of the evaluation team to add international expertise and provide an added independent view. The team should be led by a senior figure of the Universal Access and Service Fund (UASF) or regulator. Ideally, each member of the evaluation team will review each technical proposal separately and independently and come up with an assessment as to the suitability of the bidder. These evaluations are then compared and discussed in a group meeting, any uncertainties or questions in regards to the compliance of a bidder removed, and a conclusion reached whether the technical proposal is compliant or not.The evaluation can be carried out with a simple compliance checklist covering a number of criteria and coded or coloured as follows:

- Compliant (green colour);
- Clarification required (yellow colour); and
- Non-compliant (red colour)

Evaluation criteria are the same criteria that are spelled out in the bidding documents, which need to be met to satisfy the technical requirements. The compliance checklist of the bidding documents should cover all the necessary criteria, and can be used by the bidders to check if they have covered the criteria as well as the evaluation team. The regulator typically reserves the right to reject bids that do not conform to all minimum requirements. To summarise the process, bidders' proposals should be announced as acceptable or unacceptable based on the criteria set out in the bidding documents. These criteria include but are not limited to the following:

- Does the bidder meet the minimum corporate qualifications such as a minimum net-worth, financing capacity, proper incorporation and operational experience;
- Has the minimal service level target been offered;
- Has the required quality of service level been guaranteed;
- Are the proposed tariffs within the allowed limit set by the regulator;
- Is the technical solution allowable in accordance with current law and regulation; and

- Is the technical solution field-proven, deployed in at least two reference projects (in the country or worldwide), and providing the service required in the bidding documents?

Within a stipulated period after tender closing (e.g., maximum of one month) the universal access and service (UAS) department director and his evaluation team should determine which bidders have met the minimum service obligation requirements and the minimum corporate, financial, technical, operational and quality standards.

Financial evaluation

The second stage relates to the least amount of subsidy required by the bidders. All qualifying bidders who have met the publicised qualification criteria will be evaluated in the second stage only with regard to the amount of funding they require. The lowest bid for a subsidy wins.Bidders who do not meet the minimum standard in all the required criteria in their technical proposal will not have their financial offers considered.

Bid award

Once the evaluation team has determined the winning bid, a letter of intent is sent to the winning bidder, notifying them of the award and requesting acknowledgement and willingness to enter into contract negotiation. After the winning bidder acknowledges the award, the evaluation results can be made public to all participating bidders. Bidders that did not qualify have the opportunity to obtain information on why they did not qualify and may lodge a complaint if they are not satisfied with the reasons given to them. With a pre-published draft contract and firm universal access and service (UAS) requirements, room for actual contract negotiations is rather limited. The competitive tender would be unfair if the winning bidder can change UAS requirements. Also, as the draft contract is an appendix to the bidding documents, bidders have had the opportunity to comment or question any particular provisions of the draft contract beforehand. The only changes in the contract might refer to minor issues such as a modified implementation and payment schedule (as long as the overall completion date does not change) and modifications in monitoring, reporting or technical auditor processes and communication protocols. Once the contract is signed, the bid bond is returned to the winning bidder as well as to all other bidders. Typically, at the time of contract signing or shortly thereafter (but before the bid bonds are returned to the bidders), the winning bidder has to furnish the performance bond, as per the bidding documents.

4.7.2.4 BUSINESS OR SUSTAINABILITY PLANS AS PRE-REQUISITE FOR FUND ALLOCATION

Business plans are important to any ICT venture. Donors or Universal Access and Service Funds (UASF) should request a business plan before they support larger pilot projects. This business plan ideally meets certain minimum criteria and demonstrates sustainability of the project concept, as well as its development impact or outputs. This is particularly important when the allocation of funds does not involve a competitive tender. A business plan (or sustainability plan) for a pilot project should always describe the project’s rationale, demand basis, costs, expected revenues and financial performance, which need to be met to qualify. The following is an illustrative list of business plan elements which a donor or UASF may require, as appropriate to the particular project:

- The project purpose and mission statement – a brief introduction to the project idea, the need or opportunity and how the project addresses the opportunity.
- Sponsorship & ownership - a clear outline of the ownership structure and participants in the project, and whether the project will be a franchised or independent business, a community co-operative, an arm of local government, etc.
- Market and beneficiary assessment - a demand assessment (based on demographics, interests, economics, needs and affordability). The assessment should include a market description that assesses the role of the project compared to the availability of other competitive services (e.g., for a public access project, identify other phone shops or Internet cafes), and the specific needs of the region, including the kind of information or services needed by the local community. Explain how they will benefit and how they will justify paying for the services. This should include an estimate of the expected usage (e.g., number of calls, Internet minutes of use, messages, pages printed, photocopies, forms delivered, or whatever mode of information and service is to be offered).
- Legal and regulatory framework, licences and authorizations – a summary of the status of the project proposal with respect to licenses and authorizations. Does the project, or the site owner(s) require a license or special authorization to proceed and have these been granted. If special authorization is required, describe the steps taken and the likely outcome, the conditions attached or the outstanding issues to be resolved.
- Marketing and sales plan – an explanation of how the market potential will be realized, people sensitized and made aware of the service(s) and, if appropriate, drawn to the site(s).
- Competition – an assessment of how the market and sales assumptions could be affected by other similar installations, networks or alternatives, and the impacts on the project target.

- Technical assessment - an assessment of the area's access to communications infrastructure, the topography, the access technology and other systems (e.g., power) required. This assessment should recommend the most suitable technology for the characteristics of the site(s), and the initial and ongoing costs to connect and maintain the facility or facilities.
- Financial worksheet - this should contain start-up expenses and start-up costs, as well as projections of number of users, traffic usage, prices and revenues, expenses, financing costs, operational costs and salaries, etc. Financial schedules, showing breakdown of costs and revenues for each major item, unit, department or service (e.g., telephone, fax, computer, Internet & email, training, photocopying, etc.) should be included. Amortization of costs, depreciation and replacement strategy should be shown.
- Financial bottom line analysis - this must show the profitability calculation or any variations from profitability explained, justified and projected into the future to show how the situation will improve.
- Funding requirements – a summary of funding requirements and of financial contributions, including in-kind contributions, from all sources. The scale of the investment and the scope of services proposed must be justified.
- Operational plan – an organizational chart with clear responsibilities, staffing plan, equipment and facility plans and assessment of possible problems and solutions.
- Training, capacity building and any other human resource development – the needs of the project and the assigned effort, plan, costs and partnership(s) to meet all stated goals for staff or users.
- Community inputs - if appropriate, an assessment of support from the local community to confirm that the requirements are understood by the community and the sponsor(s).
- Partnerships – after assessing all of the market, technical, operational, financial and human resource development needs and challenges, clearly outline the nature of partnerships required and secured for successful project implementation. Examples could include a selection of the following: a business with local operating experience; local merchants; telecom operator; Internet service provider; NGO and community organization specialising in training; university; international or national donors, government, etc.
- Risk and sensitivity analysis – how is the project's performance and success affected by various market, sales, cost, pricing or operational scenarios, especially the worst cases.

In addition to the above, other requirements dealing with the impact of the project and the project's development outputs also need to be considered. A practical guide of how to approach these requirements in an application for funding can be found in the table below:

Table: Development rationale	
Vision and objective	• What is the project's core idea, specific objectives and key outputs? • Describe the before/after picture (e.g., 250 villages which previously had no access to telephone services will now have public phone shops and available private services; 25 institutions serving rural communities and addressing specific social issues will have high speed access to the Internet through five new regional Internet POPs.)
General development focus	• Is the project consistent with development goals that have been identified by policymakers or other development participants in the country or countries where the project will take place? • Does the project have the potential to influence larger development agendas within the telecom or ICT sector (e.g., market liberalization) or further afield (e.g., break new ground in education or health)? • Will the execution and success of the project promote sustainable and equitable development?
Project beneficiaries	• Is the project targeted on any specific communities, classes of people, income groups, age groups, gender? • How will the project address the needs and demands of its target groups?
Nature of the benefits	• What is the value of and how useful are the services provided? These should be explained in detail with targeted outcomes described. • What is the primary nature of the benefits of the project? e.g., access to voice communications, business information, health information, education, government services. • Will the project have any impact on employment, working conditions or quality of life? • What secondary impacts will the project have? e.g. better delivery of social infrastructure services (education, government, business & finance, health & welfare)? • How will the project affect culture, values, freedom, democracy, etc.?
Distribution of benefits	• What specific benefits or opportunities will various income classes, especially the poor, derive from the project? • Will the project help to empower the poor, vulnerable or disadvantaged groups and contribute to poverty reduction, and how? • What will be the degree and nature of local participation in the project design, implementation and ownership?
Gender & accessibility considerations	• Does the design and methodology of the project take into account different gender roles, perspectives, interests, and priorities? • Is the project's potential impact assessed from a perspective that recognises gender inequalities and imbalances? • Will research data, demand and expected impacts be broken down by gender? • Do the project's capacity-building features reflect gender considerations? • What is the specific value of the services to women, e.g., in facilitating better access to information, assistance, credit and business opportunities? These should be cited as specifically as possible • Are services accessible to people with disabilities and are their special concerns considered in the project design?

◂ **Development Rationale**

Source: A rural ICT toolkit for Africa, Andrew Dymond, Sonja Oestmann, infoDev 2003

For smaller ICT projects such as small or micro-entrepreneurs applying for grants to open a telecentre or phone shop, the above requirements are obviously too onerous and complex. See **Section 7.1.4** and its Practice Note Uganda's application process for rural schools to have Internet access for guidance on simpler

4.7.3 INSPECTION, PAYMENT, MONITORING AND EVALUATION

Successful universal access and service (UAS) programmes need the following:

- The supervision of the implementation of individual UAS projects and the inspection of milestone achievements by a technical auditor for payment release, as discussed in **Section 7.3.1**;
- The monitoring of UAS projects which is helped by reporting requirements by the UAS service provider in order to have an early warning system of problems and sufficient data on which to evaluate projects later, elaborated in **Section 7.3.2**; and
- The evaluation of individual project performance in terms of their impact as well as a strategic review and evaluation of the UAS programme and Universal Access and Service Fund (UASF) performance outlined in **Section 7.3.3**.

4.7.3.1 INSPECTION, PAYMENT AND TECHNICAL AUDITOR

The main two purposes of a technical auditor are to inspect and certify that specific milestones set out in the payment schedule for the universal access and service UAS service provider are met (or have not been met), and, in the case of a force majeure event (e.g., weather damage such as lightning, storms, earthquakes; industrial disturbances such as strikes, or civil disturbances such as war, terrorist actions, and epidemics), certify that a force majeure event has occurred and make proposals for an amendment of the UAS project implementation and service provision in light of the force majeure event. The inspection and certification process of the achievement of milestones is very important as it plays a role as a notary, certifying the provision of the required service and hence allowing the UASF administrator to legally release the funds.In general, the technical auditor position should be contracted outside of the regulator, using a competitive process, based on detailed terms of references and expertise requirements which are in agreement with the bidding documents and the contact signed with the UAS service provider. In smaller projects, staff from the regulator might be able to perform the milestone inspection and certification, to save time and resources. However, this could be based on the premises that if a dispute or force majeure event occurs, an outside and independent technical auditor is contracted to solve the issue. Timeliness of milestone inspection and milestone certification is of the utmost importance to secure timely payment and a smooth roll-out of any UAS project.

4.7.3.2 MONITORING AND REPORTING REQUIREMENTS

To assist with the monitoring of universal access and service (UAS) projects, reporting obligations of the UAS service provider are typically already outlined in the bidding document and are carefully specified in the actual contract. These requirements relate to the project implementation schedule, which is often related to a network being rolled out and becoming operational, and then to the quality of service requirements. The two tables below give an example of typical reporting requirements.

Network status and roll-out

The department in charge of UAS within the regulator should require regular reports from operators that show network and service status and roll-out statistics. This provides a record of total network achievement as well as monitors the operator's performance against their service contracts. These reports might be monthly or quarterly, as appropriate. Typically the frequency decreases after the implementation is complete. Categories for reporting will typically be, as a minimum, those shown in the table below.

Table: Network or project implementation status report	
Indicator	**Measure**
Total existing customers	E.g., Private phones; business/institutional, residential and public access phones Internet customers (corporate, business, residential, classified by service and speed)
Network extent & coverage, total and district-by-district (or other appropriate administrative unit)	District population within coverage of service No. of public access phones, Internet POPs or public Internet centres built and in service Broadband facilities
Percent completion	Percent of total network obligation in service Percent of localities with total UAS service requirements completed
Current status of obligation achievement	Work remaining to complete next milestone Expected date to reach milestone

◄ **Network or Project Implementation Status Report**

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Service qualityThe department in charge of UAS should maintain a database of service quality requirements and operator compliance, in order to:

- Ensure that subsidised operators provide an acceptable grade of service in accordance to their UAS service agreement;
- Determine the need for remedial action; and
- Create competitive pressure towards good performance.

Typical minimum quality related issues to be monitored and recorded are listed in the table below:

Table: Service Quality monitoring	
Indicator	**Typical indicators or required activities**
Required quality standards	To be made publicly available on websites, etc.
Complaints	The regulator typically has a public (toll free) number to call for customers or service retailers and to lodge a complaint regarding the service of the operator in their area and a subsequent complaint and resolution process. Data on each operator, including a UAS service provider, should be kept separately, and can be recorded in a database or spreadsheet format to facilitate both quantitative and qualitative analysis and response.
Faults and repairs	Operators and service providers will be required to organize and publicize their own retailer and customer toll free service centre numbers, and establish an operational support & customer care system that can facilitate good response, and to report to the UASF fault statistics, fault diagnosis and time to repair.
Traffic or usage	For telephony - incoming and outgoing traffic should be reported, as well as major categories of calls (e.g., international, national, fixed-to-mobile, mobile-to-mobile, etc.) For Internet – usage data, number of users and/or subscribers, bandwidth (available and used), major traffic destinations
Quality of service statistics	For telephony - service availability, call completion rates, congestion level, etc For Internet –service availability, peak and average down- and upstream rates
Billing and public phone manager support	Operators must be able to deliver, to their public telephone retailers, complete summaries of per-call outgoing and incoming call times, and monthly summaries, showing calls, average call time, total call time, outgoing and incoming financial amounts owing, and account balance
Public Internet centre statistics	Actual opening hours, availability of PCs, number of users per month (incl number of female users and disabled), data on service usage (i.e., for several services on offer), availability of training and technical support, etc.

◂ **Service Quality Monitoring**

Source: ITU-infoDev ICT Regulation Toolkit – UAS Module

Enforcement, recourse & penaltiesWhen appropriate, UAS department project officers should:

- Conduct random and routine checks of field performance to verify operating statistics and fulfillment of contractual obligations; and
- Prepare consolidated monthly internal reports to summarise project progress, achievements, explanations and reasons for variance from norm, and recommended further action.

The indicators listed in the tables above, as well as other criteria included in the UAS service contract, should be used as a basis for the UAS department to monitor progress and to enforce the minimum stipulated quality standards on operators and service providers receiving subsidies in the UASF sponsored programme. Once successful bidders for UAS projects have commenced operation, they should be subject to regular audit. Failure to meet minimum acceptable standards, as spelled out in their UAS service contract, should lead to notification that the provider should improve their level of service within a stipulated period of time or to meet contractual obligations. Failure to do so should carry the jeopardy of financial penalties, as provided for in the UAS service contract, and should include the reclaiming of subsidies already paid out.

4.7.3.3 STRATEGIC REVIEWS & EVALUATION STUDIES

Individual ICT projects as well as national universal access and service (UAS) programmes benefit greatly from periodic reviews and evaluations, and also help to increase public knowledge about experiences, impacts and pitfalls.

Evaluation of the UAS programme

National UAS programmes are ideally subject to a strategic policy and management review in regular intervals, for example every three years. The same applies for Universal Access and Service Funds (UASF) in the cases where a country chose to use a UASF to fund, manage and implement its UAS policy and programme. The review is typically commissioned by the relevant ministry on behalf of the government and is ideally carried out by an independent entity (with relevant expertise in the fields of universal access and service, project finance, and operational management).Without limiting the terms of reference of the review, which should be prepared by, or on behalf of, the government, the evaluation should consider:

- The achievements of the UAS programme and, if applicable, of the UASF against its objectives;
- The impact and contribution of the UAS projects and services on the development of the country and the reform, liberalization and development of the telecommunications sector;
- The role of the commercial sector and of development or financing partners in contributing to the UAS programme

implementation;

- If applicable, the collections and disbursements of the UASF against projections and the costs and effectiveness of the UASF's management and management structure;
- The strategic options for future development of the UAS programme to further meet its objectives;
- The financial requirements to meet these objectives, and recommendations with respect to future levies if applicable, fund raising and partnerships; and
- Other strategic recommendations regarding the direction of the UAS programme and management of the Fund, if applicable.

The government can use the results of the study and its recommendations to guide future UAS policy, renewal and revision of its objectives or, where applicable, the mandate of the UASF for a further three to five year period.

Evaluation of ICT projects

There is a great variety of what exactly is evaluated in an ICT project, with which evaluation methods and by whom the evaluation is done, in addition to the variety of ICT projects itself. The following illustrates various approaches to ICT project evaluation, without attempting to be comprehensive.

Evaluation focus:

- Impact on poverty reduction;
- Improved government services provision;
- Impact on education;
- Impact on macro-economic situation;
- Social diffusion and use of ICT services;
- Financial sustainability;
- Social development impact;
- Stakeholder impact e.g., on organizations that manage or own the project; and
- Impact on entrepreneurship and innovation.

Evaluation methods:

- User and usage analysis (e.g., user demographics and how services are used, for what purpose, frequency, etc.);
- Beneficiaries or stakeholder interviews and analysis;
- Observation; and
- Measuring changes in income or job creation.

Evaluators:

- Academia;
- Project sponsors;
- International development agencies;
- Social investors;
- NGOs;
- Commercial associations; and
- Private consultants.

It is helpful to already develop an evaluation approach at the ICT project planning stage, which is tailored to the project objective, has a practical evaluation method and uses defined indicators and measurements to assess the particular project impact. It might be required to conduct a baseline study before the project is implemented in which certain key indicators are measured in order to assess the changes after project implementation. It is also advisable to choose in advance the time of evaluation i.e. to make a determination of how long it will take for impacts to take effect. The listed reference documents provide further insight on evaluation approaches and success of evaluations.

Reference Documents

- Integrating Social Development and Financial Sustainability: The Challenges of Rural Computer Kiosks in Kerala
- Monitoring and Evaluation of ICT in Education Projects A Handbook for Developing Countries
- Social Impact and Diffusion of Telecenter Use: A Study from the Sustainable Access in Rural India Project
- Using Stakeholder Theory to Analyze Telecenter Projects
- Using the Livelihoods Framework to Analyze ICT Applications for Poverty Reduction through Microenterprise

4.8 TECHNOLOGIES FOR UNIVERSAL ACCESS AND SERVICE

Developments in technology affect the cost, acceptability and feasibility of services and have a direct impact on universal access and service (UAS). Because technological developments influence regulators' expectations and users' technology preferences, minimum requirements for and expectations of UAS increase over time.UAS policy needs to be resilient and forward looking as it takes emerging technologies into account, but it should aim to be technologically neutral. Regulators should be informed observers regarding technologies, but they need to allow UAS providers to choose which technologies are cost effective. As an overall principle, it is important to note that technologies are neither isolated from market, nor solely the determining factor in successful service provision. Country by country, whether a particular technology is an appropriate solution for UAS and rural areas, and for low income people, depends strongly on these market factors:

- Competition (the market position of the providers, their service packages and pricing strategy);
- Demand and affordability;
- Customer density; and
- End user terminal distribution and availability.

Such factors should not be overridden by governmental preferences; technological choice should be left to service providers and the regulator should focus on providing equal opportunity for participants.

This Chapter provides an overview of relevant trends and issues for UAS.

Module 7 - New Technologies and impacts on Regulation provides a more comprehensive coverage of trends, with references where applicable. Module 7 describes in detail the four main streams of technology development - Internet and Internet Protocol (IP), Mobile Communications, Next Generation Network (NGN) infrastructures, and Convergence. These trends create a new ICT network paradigm for the Information Society and imply that there is a need for UAS policy interventions to encourage network and service build-out in directions that are regionally balanced and ubiquitous. However, just as the mobile revolution has driven progress in achieving UAS for telephony, it would be advisable for regulators to give high regard to fundamental market developments taking place in the broadband field also.

In summary, policy makers and regulators need to recognize the following:

- The requirement for UAS has moved from pure telephony to include broadband [1] (thereby allowing access to different types of content and ICT applications);
- The trends in Internet and IP development, NGNs and Convergence are giving impetus to the emergence of a "broadband revolution." Commercial and market forces in this development promise to be just as dynamic as those which drove the mobile revolution;
- UAS policy needs to harness the principles of competitive market regulation and technological openness/neutrality to encourage the most economic and sustainable deployment from among the plethora of technologies available for ICT.

Reference Documents

- Universal Access & Service (UAS) and Broadband Development

4.8.1 TECHNOLOGY AND SERVICE NEUTRALITY

Historically, services were often regulated according to the different types of technologies; for example, wireless fixed telephony has had different licence obligations from wire line fixed telephony. Resources like phone numbers, radio frequencies and rights of way have often been regulated in ways that restrict the services using them; for instance, certain radio frequencies are historically reserved for fixed wireless (e.g., CDMA) or mobile (e.g., GSM) telephony. Regulators now aim for technology neutrality within service definitions, as explained in **Module 6 Section 4.3.1** and outlined in the Practice Note Service neutrality in the allocation of scarce resources. Neutrality helps service providers react quickly to technological changes, whereas tying phone numbers, radio frequencies, operating licences or universal service/access obligations to the use of particular technologies (such as PSTN, GSM or CDMA) could impede progress. In the field of Universal Access and Service Funds (UASFs), subsidies have traditionally been allocated in service-specific ways (e.g., for fixed telephony payphone services). This has been changing recently, with more and more countries allowing service-neutral competition (e.g., fixed or mobile) as well as technology-neutral competition (e.g., between GSM, CDMA, WiFi, WiMAX and VSAT) for UASFs.Universal access and service (UAS) policies and funding strategies that are technology-neutral should be based on service targets and quality of service (QoS) standards, within which UAS providers are free to choose the most cost effective technologies. The targets and standards should reflect user demand and preferences, preferably based on results of a consumer/user survey, as described in Section 5.3 of this module. ICT Quality of Service Regulation: Practices and Proposals discusses how these standards should be selected and defined. Regulators might need quality of service standards for UAS that differ slightly from those for the national service (as well as from those for UAS in other countries), depending on cost, feasibility and how uniform the service is intended to be across the country.In practice, technology neutrality has limits and issues that need to be taken into consideration. Different technologies may offer similar services, but customer demand and quality standards, and required service growth, need to be well defined at the outset. Without clear specifications, less than optimal results can arise. These might include:

- National service compatibility – Internationally, open competition is best practice for UAS tendering. However, even though the most economic choice is made, competition for telephony to rural areas between fixed and mobile, established and new entrant providers, each with alternative technologies, could give a sub-optimal outcome for customers. For example, service from a dominant mobile operator with a national network might offer the preferred outcome for users who want to use their handset and service wherever they travel in the country, but if the UAS tender was won by a new entrant with an alternative technology and little national presence, and with uncertain (though competitively determined) future build-out, customers may end up with inferior service.
- Service quality and scope – UAS competitions that allow satellite VSAT operators to compete with mobile operators for public access services are limiting the potential for market expansion as well as access to affordable private service for customers. If mandatory private service provision is also included as a required scope of service, VSAT operators will not be able to comply and thus be discouraged from bidding. Such a requirement (as included by the Ugandan regulator in its Rural Communications Development Fund (RCDF) universal access tenders) may effectively limit competition to mobile or fixed wireless services, but is more effective at using funds to help promote market growth and service sustainability in rural areas and thus foster universal service.
- Data speeds can dictate technology choice – Broadband service with as high a bandwidth as feasible is the ultimate target for UAS to the Internet in rural districts. The market currently offers a wide range of possible access network technologies (e.g., EDGE, WCDMA, CDMA2000 1xRTT, CDMA2000 1xEVDO, HSPA, WiFi and WiMAX) [*]. Some are currently only available in urban areas and are unlikely to migrate out to rural areas until the demand is perceived to be significant. Universal Access and Service Fund (UASF) strategists could dictate the highest speed available, though in doing so they may actually be limiting the number of bidders as well as long term service sustainability. Setting the requirement to meet standards commonly available today from the network operators most capable of providing commercially sustainable service could be the most practical strategy for ultimate growth of the broadband market. Very often, the most practical bandwidths will have a huge impact in terms of service and application availability in any case. Once advanced services are established through the initial competition, bandwidths will subsequently increase further, in stepped fashion, as the technology trends and market sustainability dictate.
- Backbone selection – Some governments want network build-out into rural areas using fibre backbones and are considering the subsidization of investments from UASFs or government sources. On the other hand, as noted in **Section 8.2.3**, terrestrial radio may have sufficient capacity for all realistic levels of broadband demand into many areas, as well as offer economic synergies for operators wishing to expand mobile coverage. Generally, the market should decide on backbone selection, but in some cases mandating the use of a particular technology (e.g., fibre) might be justified. The decision as to whether this is economically and strategically justified should be based on a feasibility study, as well as on industry consultation. Chile has used UASF funds to finance fibre infrastructure [*] and India's USOF is also expected to offer subsidies for fibre build-out. In the meantime, the USOF is also funding passive terrestrial infrastructure (towers) in remote rural areas, which will doubtless be linked together mostly by microwave systems (see **Section 3.4.6**).

Regulators should maintain technological neutrality as much as possible; market players should determine the viability of technology choices. It is not necessarily possible for UASFs to influence technological choice if the long term business case dictates otherwise and is not able to demonstrate sufficient demand. Newer technology is only better than older if it improves UAS goals. This point is stressed in Information and Communication Technologies, Poverty and Development: Learning from Experience.

Practice Notes

- Service neutrality in the allocation of scarce resources

Reference Documents

- ICT quality of service regulation
- Information and Communication Technologies, Poverty and Development

4.8.2 TECHNOLOGY CHOICES

The main network technologies, and their economic characteristics, are described in **Module 7 Section 2.2.2** on networks innovations, are:

- Copper based access networks
- Cable TV
- Optical fibre
- Power line communications
- Mobile Networks
- Wireless networks (other than mobile)
- Satellite
- Key point and recommendations

This section describes the network technologies that are most suitable for underserved and rural areas, following the same typology as in **Module 7 section 2.2.2** . Some of these technologies are appropriate for last mile telephony or Internet access, while others might be suitable for backhaul from rural and remote areas.

4.8.2.1 OPTICAL FIBRE

Optical fibre, with its unsurpassed capacity, is particularly suitable for backbone networks and plays a key role in migration to broadband services. Optical fibre is also used for access networks to major business customers in city or town centres, and increasingly in developed countries, for residential access, with the fibre reaching to:

- Street cabinets (Fibre to the Cabinet – FTTC);
- Curb / Kerb (FTTC / FTTK);
- Buildings (FTTB – largely businesses and residential apartment blocks); and
- Home (FTTH).

The cost of fibre is becoming competitive with copper wire, but installation is expensive. The considerable costs of labour for fibre installation makes it as expensive as copper in the local loop. Fibre may therefore not be economically justifiable over existing copper plant except for advanced broadband applications in new greenfield situations, or as replacement for obsolete cable at the end of its useful life.Fibre is appropriate for trunk and long distance inter-city transmission. It is favoured over terrestrial radio (microwave) transmission systems when the usage level is high enough to justify fibre’s higher capital and operating costs. Some countries are considering the deployment of fibre backbone transmission systems under UASF funding. The Indian USOF is considering the subsidization of fibre networks into rural areas that are likely to have the greatest demand for broadband Internet service provision. In 2007, Chile’s Telecommunications Development Fund (TDF) subsidized the implementation of two fibre-optic transmission networks in southern regions of the country, that lacked mobile coverage or Internet service. The first project, the Fibra Óptica Austral Project, extended the national network to 31 localities in Chile’s Tenth and Eleventh Regions (Los Lagos and Aisén). The network cost 4.6 million USD in private and government investment with a subsidy of 2.5 million USD. The second project involved network extensions from the Eleventh Region into the Twelfth Region (Magallanes), which is the most southerly.Fibre is particularly important in Next Generation Networks (NGNs), which are inherently broadband. They are discussed in **Section 8.4.1**.

4.8.2.2 WIRELINE NETWORKS

Copper access networks

Copper has no application beyond local access. In the context of developing countries, copper is increasingly used solely for urban applications. Copper access, extensive in developed countries, has significantly contributed to universal service. Several countries where network penetration is high have designated incumbent network operators as their universal service providers; this has happened in much of the EU, and is described in **Section 3.1.2**. Some other countries, such as South Africa, have included such obligations in the licences of incumbent network operators. However, this practice is declining as market liberalization proceeds and customers are demonstrating that their preferences do not necessarily involve copper-based service. In many developing countries where fixed networks are no longer expanding, wireless technologies are likely to be preferred. Although copper access can achieve high data rates, wireless alternatives are increasingly able to compete.

Coaxial cable

The high capacity of coaxial cable has led it to be used for television transmission in many countries. In India, the density of cable television connections is very high, and there are many local cable operators in cities and towns who use coaxial cable. In principle, these cable networks could be used for distribution of broadband Internet and telephony together with television channels (Triple Play). In practice, many are inhibited from doing so by the nature of the network architecture (tree and branch) and the cost of upgrade. In cities and towns, most modern cable TV companies now use fibre at least to street cabinet level, and have architectures that allow easier migration to telecommunications service provision. While this can play a role in progress towards urban and semi-rural universal service, its potential role in providing universal access to less developed areas is generally very limited.

4.8.2.3 TERRESTRIAL RADIO

Terrestrial radio systems – ranging from VHF and UHF frequencies below 1 GHz to microwave systems up to 30 GHz – are central to universal access and service (UAS), supporting long distance backhaul, local point-to-point and point-to-multipoint connections and last mile access. Technologies such as GSM, CDMA, WiFi and WiMAX that play the largest role in the provision of universal access and service (UAS) to telecommunications and ICTs are discussed in **Sections 8.2.4** and **8.2.5**.Point-to-point microwave links, typically with hop distances between repeater terminals ranging from 10 Km up to 30 Km or more (depending on frequency, topographic and atmospheric conditions, as well as required service reliability) can adequately supply backbone services for both PSTN and mobile telephony or IP enabled links for hundreds of kilometres. Bandwidth or communications channel capacity may range from less than four E1's (8 Mbps or 120 voice channels) to STM1 (155 Mbps or 63 distinct E1's) and STM4 (622 Mbps or 252 distinct E1's). Currently, there are fewer microwave systems providing the sole means of backbone at the higher level of capacity as fibre is becoming favoured for high capacity routes. The bandwidth of fibre systems is virtually unlimited for many practical purposes. Microwave has the advantage of having repeater towers that can be shared by mobile or WiMAX base stations along major transmission routes. These routes often overlap with transportation routes that provide revenues for the mobile companies. However, the cost of operation and maintenance, including power supply and fuel to remote sites lacking commercial power supply, can be prohibitive in developing countries. This contributes to the economic justification for fibre systems on the heavier capacity routes, and often even on relatively light routes.

4.8.2.4 MOBILE NETWORKS

Mobile networks, together with fixed and other non-mobile wireless access networks (see **Section 8.2.5**), have become favoured for universal access and service (UAS) applications for the following reasons:

- Mobile networks are generally less expensive and quicker to deploy than conventional wireline solutions (lower civil engineering costs), and are readily deployed and maintained over many terrains;
- Mobile second generation (2G) experience has demonstrated that service can spread rapidly due to high user demand and also contributes to economic development;
- Mobile networks can resist damage and theft better than wireline networks;
- Mobile networks are more able to provide both public and private access, and share capacity between many users in an area;
- Both mobile and non-mobile networks can easily exploit resources (i.e., radio frequencies) that are often underused in rural and remote areas; and
- Considerable development effort is going into reducing costs, which will enable mobile operators to expand

economically into sparsely populated rural areas.

Mobile operators have an increasingly recognized role in providing UAS and are being allowed to participate in UAS funding competitions. The role of 2G services – both GSM and CDMA - in voice telephony is clear and has been well documented. The role of 2G/2.5G and 3G will be less clear in the provision of universal access to Internet services, since more choices are emerging from WiFi and WiMAX networks in particular. The choice depends on the economy of scale most appropriate to the situation. This section provides information on the following mobile technologies and adaptive measures that relate to UAS:

- 2G and 2.5G Networks
- 3G Networks
- CDMA450 Networks
- Cost reduction trends for rural areas

2G and 2.5G Networks

2G and 2.5G based services are well suited to national UAS deployments, since the cost is mitigated by the pre-existence or deployment of a main network. Thus the required investments are for incremental extension only. Most mobile networks support text messages, typically through the Short Message Service (SMS), as well as voice calls. Many applications have been designed to use text messages; for example, to contact people who do not read well, the senders of messages can create voice messages and simply send short text messages to alert the recipients of the voice messages, as used in Bangladesh. There are also systems that convert between SMS messages and voice messages (and systems that convert between SMS messages and email), for transmission to users on other networks. Such systems could do much to improve the accessibility of communications to people who have impaired hearing, speech or vision, as illustrated in the Practice Note *Communication possibilities for people with impairments in the UK*.GSM also offers the Unstructured Supplementary Service Data (USSD), which differs from SMS by using immediate communications (instead of store-and-forward communications rather like email) and having its special own addressing (instead of conventional phone numbering); because of the differences from SMS, USSD is sometimes preferred for banking applications. SMS and USSD are often regarded as data services (at least in the accounts of mobile network operators), though they do not use IP. In some countries, text messages are as popular as voice calls, if not more so. Network operators in the Philippines, offer schemes for prepayments that are small enough to pay for several messages but which are not enough for a single call. This has created revenues for text messages equal to those of voice calls, and is examined in What works: Smart Communications – expanding networks, expanding profits. Text messages are also important in the development of financial services for the poor, as discussed in **Section 1.6.4**. Universal access obligations might mandate that text messages be supported and that local public phone operators offer them.In developing countries, data and multimedia services using 2G technologies are less widely provided though there might be a business case for wider use, as explained for GPRS in Internet for Everyone in African GSM Networks. It is important however, to take into consideration that the pace of later developments such as EDGE (Enhanced Data rate for GSM evolution) will soon leave GPRS well behind. Purely 2G data technologies such as GPRS can only offer transmission rates comparable with those of dial-up access, suitable for many text applications, email, financial transactions, and some audio applications such as music downloading and voice mail; their data rates are typically not high enough for good quality VoIP or web browsing. Also, price of data services on mobile can make VoIP and other applications expensive, especially for low-volume users. Mobile network operators often prefer applications that increase voice revenues above what normal VoIP does; possibilities include voice mail and push-to-talk [*]. Internet access technologies can now readily be offered by UAS providers that are mobile network operators and in many countries they are becoming available. 2G technologies such as EDGE and CDMA2000 1xRTT (which are sometimes called “2.5G” or even “2.75G” technologies) offer higher speed Internet access and are derived from the widespread 2G technologies. They are often simple enhancements of existing 2G networks for telephony which already require much of the same network infrastructure. Since 2002, many new networks and phones have been able to use these technologies. They could be important for universal Internet access.For the ITU, EDGE and CDMA2000 1xRTT formally qualify as 3G technologies under the umbrella of International Mobile Telecommunications (IMT), but they are often regarded as 2G technologies. This can raise a regulatory issue, since occasionally services based on EDGE have been prohibited on the grounds that 3G licences would be needed; this happened in Egypt [*].

3G Networks

3G technologies such as WCDMA, HSPA and CDMA2000 1xEVDO are evolutions of 2G and 2.5G technologies intended for mobile broadband Internet access. 3G networks can use many parts of 2G networks; also, WCDMA can be replaced by HSPA (in the forms of HSDPA and HSUPA) largely through software upgrades. Regulators need to consider whether universal Internet access might evolve similarly through step-by-step upgrades and geographic expansion of existing network capabilities. For broadband Internet access, multiple choices are emerging. In developing countries, 3G networks may exist in urban areas but often do not extend to rural or remote areas where the business cases for them are not proven. 3G may require heavy investment or subsidies to extend service from urban cores to nationwide coverage, since the networks require major bandwidth enhancements to the 2G/2.5G infrastructure. However, there are signs that 3G networks can be rolled out more rapidly than 2G networks, since they can exploit the existing infrastructure and experience. Japan took eight years to achieve 100 per cent coverage with 2G mobile networks, but 3G coverage was accomplished in just four years, as noted in ITU World Information Society Report 2006.Countries in which extensive 2G/2.5G networks are not available may find difficulties in attracting investors for greenfield 3G development, though these cases are reducing with time. 3G may participate in universal broadband and Internet access in the following ways:

- 3G network operators could contribute to UAS funding through the sales receipts for governments of radio frequencies (or possibly operating licenses) or paying levies on 3G revenues as per the standard practice in relation to Universal Access and Service Funds (UASF).
- 3G network licenses could include modest build-out obligations into less-urbanized and regional areas in exchange for lower license fees. The objective would be to test how well 3G can meet the demand for competitive service from rural based fixed and semi-fixed customers such as vanguard institutions, e.g., schools, government, NGOs and leading businesses. Many governments have included coverage requirements in the license obligations of 3G mobile operators. In Sweden, the telecom regulator reports that the country's high 3G population coverage is due to regulatory obligations, with roll-out faster than purely commercial conditions would have dictated: the regulator allowed 3G network sharing but required services to be offered to 7 million people (out of a population of 9 million) by the end of 2004, 8 million by the end of 2005 and 8.5 million by the end of 2006.
- 3G network operators could offer their IP backbone networks on fair commercial terms for other uses such as competitive ISPs and VoIP operators using the public Internet. This might be opposed by the operators on the grounds that it weakens network security, because 3G services have walled gardens (controlled network environments) that deliberately exclude the public Internet. However, some 3G network operators are coming to terms with the Internet by demolishing walled gardens and providing public Internet access with simple pricing models, just like conventional ISPs.

3G technologies can have data rates comparable with those of DSL. Besides offering major speed improvements over 2G and 2.5G technologies for applications such as file downloading and web applications, 3G technologies can support further audio applications such as VoIP and some video applications.

CDMA450 Networks

By using the lower 450 MHz frequency range, CDMA technology allows larger cell sizes, which are appropriate for rural areas. In turn, this means reductions in installation costs, as fewer base stations are required. CDMA also supports high-speed transmission of data, so the advanced 2.5G and 3G CDMA Internet capabilities can be deployed. A number of countries have already deployed CDMA450 networks both commercially and as part of their UAS programmes. A total of forty-five countries have CDMA450 commercial networks. In addition, smaller regional operators in Russia have made use of CDMA450 [*]. However, the single largest hurdle to the development of the CDMA450 market is commercial. The low number of handset options available, their higher price and the fact that even fewer available handsets offer multi-band capability, prove to be an impediment to growth of the technology. At the same time, the development of innovative approaches to rural network design and marketing by the GSM operators limits the market for CDMA450. The International 450 Association [*] and a number of mobile operators have created an alliance to aggregate purchases in a bid to drive down costs via volumes and to nurture a market for entry-level devices.

Measures to reduce mobile network costs for rural areas

The greatest challenge operators face is the cost of network expansion and operation in low population density areas with poor electricity and transport infrastructure and challenging topography. While operators may increase revenues through deeper coverage, average marginal revenues may decrease with geographic expansion.Operators have to identify every component of cost – capital expenditure (Capex) and operating expenditure (Opex) – and minimise the total cost of ownership (TCO) of the network through addressing each significant component. Whereas minimising Capex is important, Opex is increasingly dominant in areas of rural expansion, for at least three reasons:

- Where Capex per customer is high due to low population density, ongoing Opex is driven higher because of its direct relationship with Capex (typically a reasonably fixed percentage of Capex);
- Some Opex may be higher in rural areas because operation and maintenance requires longer journeys and higher transportation costs; and

- Some specific Opex (e.g., diesel fuel) is higher because a larger proportion of sites in expansion areas may be without commercial power supply.

Operators' cost structures include business operating and network costs. Business operating cost reductions apply across the entire operation and are typically applied in both urban and rural areas to increase or maintain financial margins in the face of competition and the transition to lower average revenue conditions.

Network costs

Network operations

- Operation & Maintenance
- Spares
- Power supply (incl. fuel)
- Transmission backhaul Opex
- Site rental
- Support & training
- Network performance efficiency technology (AMR, SAIC, etc.)

Capex / Depreciation

- BTS Equipment
- Transmission Equipment
- Other site Equipment – Power Gen
- Civil Works – Towers, Shelters, A/C
- Licences

◂ Cost Reduction Measuresin Mobile Networks in Rural Areas

Table: Cost reduction measures in mobile networks for rural areas				
Measure	**Impact**	**Benefit**	**Capex**	**Opex**
Improved ventilation, cooling and/or heat tolerance of BTS electronics	Eliminate or reduce air conditioning requirement, with consequent lower power requirement	Reduce external electric power supply, or Eliminate or reduce requirement for diesel generator and fuel supply, or Enable more economic use of solar panels	 ✓ ✓	✓ ✓
Improved ventilation, cooling and/or heat tolerance of BTS electronics, *as well as* smaller size for outside installation	As above	As above	✓	✓
Enhanced radio transmission performance	Improved and balanced "link budget" and longer signal range for "strong" signal coverage	Fewer BTS sites, resulting in lower Capex and Opex costs	✓	✓
Enhanced network voice and data carrying technology, e.g., AMR [6]	Improved quality and capacity on existing networks and maximum growth efficiency	Fewer BTS sites, and improved revenue versus cost relationship on existing and expansion networks	✓	✓
Enhanced radio & antenna technology to achieve extended range	Larger cell size applicable to and tailored to low density areas	Fewer BTS sites in very high cost and low density areas	✓	✓
Enhanced transmission technology to achieve lower interference, e.g., SAIC [7]	Optimum signal processing performance & user capacity with lower transmitter output power	Lower power consumption for equivalent network performance		✓
Smaller BTS equipment cabinet size	More portable and easier to install, easier site acquisition	Smaller shelters, more rapid deployment	✓	
Shared antenna configuration	Base stations expanded without the need for additional antennas	Reduced tower space	✓	
Mobile "softswitch" in appropriate regional location	Enables traffic to be switched locally or within a region	Minimising the need for backhaul transmission of all traffic to a central MSU		✓
Advanced pre-paid platform architecture update	More service features, automated support, etc.	Enables wider range of segments to be supported economically		✓
Market responsive site placement	Strong local community relationships	Reduced need for security guards and more rapid deployment		✓
Common backbone and tower infrastructure	Shared sites with common infrastructure has the potential to reduce build-out costs	Reduces the cost of transmission and some BTS costs	✓	✓

Clearly, no single or set of measures is superior or appropriate in all situations but there are certain strategies and technologies that reduce the costs on all networks while others are specific to costly rural environments. Operators are guided by the market, by geographical and population density, by local requirements, and sometimes by the need to standardize system-wide on a limited number of technical solutions to minimise organization and methods operations and maintenance costs.Governments and regulators can also play a critical role in promoting cost reduction and commercial network expansion through regulatory and fiscal / tax regimes that encourage operators to employ cost minimization and increase efficiencies.

Reference Documents

- **Internet for Everyone in African GSM Networks**
- **What works: Smart Communications – expanding networks, expanding profits, (WRI, September 2004),**
- **World Information Society Report 2007**

4.8.2.5 FIXED AND OTHER NON-MOBILE WIRELESS ACCESS

For Internet as well as developing VoIP services, newly emerging non-mobile networks may have niches in various situations, competing with 2G and 3G mobile. Their position could strengthen. The choice depends on the economy of scale most appropriate to the situation. Non-mobile technologies such as WiFi and wireless mesh networks built from WiFi are more suited to local initiatives for which large and expensive centralized organisation are unnecessary. Typically, non-mobile technologies can support VoIP alternatives to 2G telephony if regulation allows and if user terminals are sufficiently inexpensive.Four forms of non-mobile wireless that may be considered for universal access and service (UAS) are:

- Wireless local loop (WLL)
- WiFi
- WiMAX
- Wireless Mesh Networks

Wireless Local Loop (WLL)WLL is a fixed wireless service used for telephony and broadband applications, in which copper-based local loop is replaced by a wireless connection. This is described in **Module 7 Section 2.2.2**. When first introduced WLL had great promise, especially in developing countries, as an economic solution to reach areas beyond the reach of the copper-based network. In a few cases, such as Ghana Capital Telecom's use of WLL, these hopes have been partially realized.Generally, WLL for telephony was eclipsed by the success of 2G Mobile networks. WLL did not achieve the same economies of scale. Furthermore, even though it was initially believed that most users in developing countries did not need mobility, the lack of ability to roam from urban to rural areas with the same handset have proven to be a serious shortcoming for WLL operators. Many of these were using CDMA technology that is capable of full mobility operation, but regulations governing fixed and mobile licensing created the restriction. In the case of CDMA, the growth in mobile networks has been accompanied by reductions in the cost of wireless access generally. Nevertheless, other factors which have limited the success of WLL are developments in regulation such as roll-out obligations on mobile network operators and their inclusion in competitive tendering for Universal Access and Service Funds (UASFs). Together these changes have stimulated the use of mobile services even in areas where WLL would have otherwise been a natural solution. In South Africa, mobile network operators were obliged to provide fixed public payphones. In other countries, such as Uganda and Ecuador, mobile network operators have installed public payphones without being obliged to do so, because the incremental costs are small where base stations already exist. In contrast, India's two large CDMA network operators received subsidies from the universal service fund to provide WLL service. One network operator has provided service to 600'000 users and 40'000 villages in two years through these subsidies [*]. However, pressure grew for the CMDA networks to be cut free from their fixed status, first to limited mobility (single cell or single area) status, and then to enable them to provide mobility throughout the network. The pressure to cut WLLs free from fixed points is one reason why unified licences, as described in **Module 6 Section 4.3.1**, were introduced in India, as well as in Nigeria and elsewhere. Increasingly around the world WLL providers, those using CDMA at least, are likely to use these licences to make their services fully mobile, with the result that conventional WLL will continue to decline as a provider of telephony service.WiFiWiFi (Wireless Fidelity) is a popular name for implementations of the IEEE 802.11 standards. **Module 7 Section 4.2** provides a brief account of WiFi; this section considers WiFi more specifically as a technology that is relevant to UAS because it has been chosen in several projects to provide Internet points of presence in rural and remote areas.The advantages of WiFi for developing countries include:

- High data rates (compared with many 3G technologies).
- Flexibility for small networks to develop outside of large centralised organisations.
- Use of radio frequencies that are exempt from licensing in many countries (because the ITU radio regulations intend those frequencies to be used by equipment with very limited range and indoors operation, for which interference does not need control through licensing).
- Use of cheap standard equipment that is readily available and has type approval for many countries.

WiFi, with potential data rates of 11 Mbps and 54 Mbps, was originally intended to link computers over Local Area Networks (LANs) in homes and offices. It was then used to make LANs publicly accessible at indoor and outdoor hot spots and then to make long distance point-to-point connections. To reduce interference in licence-exempt WiFi use, power emissions are restricted so signals do not go far; WiFi in a typical home or office might have a range of 100 m. With directional antennas and higher power emissions, WiFi can have a range of 8 km. Some networks (e.g., in Indonesia and Peru) sometimes use a range of 50 km, and experimental demonstrations have reached several times that far [*]. Longer ranges make deployment more difficult and expensive. However, there is WiFi standard equipment that now offers five times the data rates and twice the ranges over the original intentions for LANs.The use of WiFi hot spots with connections to the Internet led to the development of municipal networks offering wireless broadband public access throughout large parts of cities and towns. Two of these networks are described in the Practice Note *The municipal wireless broadband networks in Knysna and Tshwanein in South Africa*. Because municipal networks may compete with, or reduce investment in, commercial networks, they are often obliged to offer open access to all service providers. This is discussed in Study On Local Open Access Networks for Communities and Municipalities.In Singapore, the Infocomm Development Authority of Singapore (IDA), has initiated a programme known as "Wireless@SG", in which Singaporeans have access to free wireless connectivity at speeds up to 512 kbit/s, in almost every part of the country. The programme is run by three private local operators who are investing approximately 65 million USD; IDA is defraying around 19 million USD of the total cost. The programme aims to increase the number of public WiFi hotspots in the country and by March 2008, more than 6,900 places offer the service in cafés, libraries and fast-food restaurant. Wireless@SG's basic tier is free until December 2009, but there are premium features such as higher connection speeds, that people can subscribe to for a small monthly fee [*]. WiFi enables community networks in rural and remote areas to develop without large centralised organisations, even though the administration responsible may find rapid or widespread growth difficult to manage. Two well-established examples of WiFi community networks are described in the Practice Notes *The rural wireless broadband network in Myagdi District in Nepal* and *The rural wireless broadband network in Chancay-Huaral Valley District in Peru*. An example of a guide to planning and building these types of networks is Wireless Networking in the Developing World. When networks grow they need to be scale-able and to cover long distances and offer enough resilience without making their operations disproportionately complex. In this scenario, WiFi can be used with WiMAX or even mesh networks. It could then play a major role in providing universal Internet access through centrally organised networks, as well as through community networks. Though WiFi is intended for licence-exempt use, some countries require licences where deployment is outdoors and there is an extended range. This was the case in Indonesia for many years where, as discussed in WiFi “Innovation” in Indonesia: Working around Hostile Market and Regulatory Conditions, the use of WiFi by Internet service providers was widespread but illegal. There are still legal obstacles to the use of WiFi and related technologies in some countries [*]. In particular, licences may be needed for operating an Internet service provider that offers VoIP, using frequency bands that elsewhere are licence-exempt, or that deploys equipment (even after stringent type approval testing elsewhere). Obtaining such licences can be expensive and slow, especially for community networks. Often these licensing requirements are becoming obsolete and could be easily abolished.

WiMAX

WiMAX, (Worldwide Interoperability for Microwave Access) is a popular name for implementations of the IEEE 802.16 standards. **Module 7 Section 4.3** provides a brief account of WiMAX. This section discusses WiMAX in relation to UAS because it has been marketed widely as a technology for providing broadband in fixed and mobile networks, especially in rural and remote areas. For the ITU, WiMAX formally qualifies as a 3G technology under the IMT umbrella, but is usually regarded as separate from the 2G and 3G technologies widely used by mobile network operators. WiMAX is intended for fixed networks as well as mobile networks, but unlike many fixed wireless technologies, it may benefit from economies due to its standardisation. In fact, WiMAX shares many of the advantages for developing countries that are listed for WiFi. WiMAX was originally envisaged for links from base stations to homes, offices and vehicles. Its role in providing UAS needs scrutiny because expectations about its performance have often been unrealistic. WiMAX might have data rates of up to 40 Mbps and a range of 8 km for fixed networks, and data rates of up to 15 Mbps and a range of 3 km for mobile networks, however data rates can fall to 2 Mb/s because of restrictions on the frequency bands and base station locations. With directional antennas and line-of-sight links, WiMAX can have a data rate of 2 Mbps and a range of 50 km, so it is suitable for backhaul. Eventually, WiMAX might take over the role of WiFi as computers will have both WiFi and WiMAX interfaces.

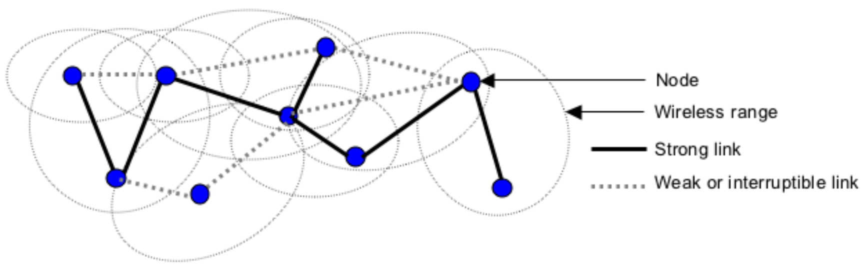
Because of its mobility and VoIP provision capabilities, WiMAX can serve as a last mile application. As the potential for economic WiMAX deployment grows, policy makers and regulators will be faced with difficult decisions about whether to allow WiMAX for last mile access. Whereas 2G and 3G technologies might be better suited to the available infrastructure and levels of demand, regulators ultimately must take a technology and service neutral approach and allow operators to decide which technology is the best competitively.WiMAX is being licensed in many countries. However, working examples of commercial networks are few and far between to date; the most notable ones are the following in Pakistan and Spain:

- Wateen Telecom, Pakistan (**www.wateen.com**) has implemented a service that offers Internet speeds ranging from 128 Kbps to 2Mbps and uses the 802.16e standard. The company says it signed up over 10,000 customers in the first 20 days of service. Service launched on December, 2007 in 22 cities.
- Iberbanda, Spain (**www.iberbanda.es**) is a broadband communications provider that offers high speed Internet, telephony, data transmission and value added services. Iberbanda has the most significant WiMAX network in operation in Europe and covers nearly 30 per cent of Spain.

While there is a broad interest and enthusiasm for WiMAX technology and its potential, the business case for WiMAX and its ultimate success is determined, as with other technologies, through the market relevant factors. These are competition, demand, affordability of services, customer density and price points and availability of end-user terminals. Some market observers and potential operators claim that the economics do not look as promising as the technology itself. Service providers are likely to make different choices in different countries, appropriate to local market conditions and potential. WiMAX faces fierce competition from 3G technologies and the cost of WiMAX end-user terminals compared to mobile phones can be a potential hurdle. For licence-exempt use, WiMAX power emissions need to be limited which results in limited range and mobility. License-exempt use could therefore lead to licensed use: companies would first validate their business cases using license-exempt frequency bands and then provide their services widely using licensed frequency bands. “Balancing the Use of Licensed and Licence-exempt Spectrum” is identified as one of the three *Regulatory Principles Applied in Ireland to Successfully Promote Wireless Broadband*.WiMAX has to co-exist with other wireless technologies in both licence-exempt and licensed frequency bands, however using WiMAX and WiFi in the same frequency bands can reduce WiFi performance. WiMAX nodes transmit without checking whether doing so interferes with WiFi and other wireless nodes. While network operators should be free to select the wireless technology they want, their choice should not interfere with the choices made by others. Where congestion might occur, licence-exempt use might require consideration (politeness) of other service providers and their technologies. The relation between licence-exempt use and congestion is discussed in **Module 5 Section 1.5.3**. As in other cases, frequency harmonization can help reduce costs by creating economies of scale and reducing end-user terminal complexities. This in turn improves the feasibility of serving rural areas and low-income customers. Coverage could also be increased by using frequencies below 1 GHz. *

Wireless Mesh Networks

Mesh networking is a way to route data and voice between multiple nodes. It allows for continuous connections and reconfiguration around paths that may be permanently or temporarily blocked by topographic or other obstacles, by hopping from node to node until the destination is reached. IP networks can do this anyway, but mesh networks can do it more rapidly, by using the ability of nodes to sense how good transmission are on particular links. An illustration of a wireless mesh network is provided in the figure below. The diagram illustrates that each node has a radio transmission capability, which differs in strength of reception due to topographic conditions. Solid lines represent strong signals, whereas dotted lines represent weak signals that may be blocked at certain times due to weather or other atmospheric conditions. Under all scenarios, the link from one edge of the network to the other is possible through one route or another. Line-of-sight is not necessarily required.



◂ **Figure: Mesh Network Architecture**

Mesh networks can adapt themselves to exploit all possible links between nodes that are not blocked. Because of this, mesh networks are highly resilient and can be given higher collective data rates just through connecting extra nodes, without much network planning. This is particularly useful in situations needing rapid actions, such as disaster recovery. Even nodes that are user terminals can relay signals rapidly. Generally, mesh networks can cover large distances easily.

Mesh networks may use wireline or wireless links, and may have fixed or mobile nodes. The most important cases of mesh networking have wireless nodes, and, often, mobile nodes. They are especially challenging, as the links can appear and disappear as the nodes move [*]. A potential use might include communication with nomadic people and keeping track of livestock. An experiment that may exploit mesh networks as a method for developing UAS is described in the Practice Note *Nomadic deployments in Norrbotten County in Sweden* .Some wireless technologies (such as CDMA or GSM) are not well suited to mesh networks because interference between nodes is difficult to control. By contrast, WiFi is often well suited to mesh networks. Many municipal WiFi networks have been structured as mesh networks.WiFi mesh networks, usually in urban settings, typically have many relatively inexpensive nodes close together, instead of few widely separated nodes with high performance antennas, radios and masts. They can work well in towns if equipment can be attached to buildings or lampposts and if damage and theft are unlikely. As they can adapt to use any available links, they might also be suitable in informal settlements or rural areas (where vegetation may grow to weaken the signals) if the nodes can be close enough together or very well sited. Still, their role in providing UAS is likely to be small compared with the roles of other technologies.

Practice Notes

- **Nomadic deployments in Norrbotten County in Sweden**
- **The municipal wireless broadband networks in Knysna and Tshwane in South Africa**
- **The rural wireless broadband network in Chancay-Huaral Valley District in Peru**
- **The rural wireless broadband network in Myagdi District in Nepal**

Reference Documents

- **Regulatory Principles Applied in Ireland to Successfully Promote Wireless Broadband Access (Comreg, November 2005):**
- **Study On Local Open Access Networks For Communities and Municipalities**
- **WiFi “Innovation” in Indonesia: Working around Hostile Market and Regulatory Conditions**
- **Wireless Networking in the Developing World**

4.8.2.6 SATELLITE

In addition to their use in broadcasting, satellites can be appropriate for universal access (public access points) to telecommunications and the Internet. However, their use is usually confined to Very Small Aperture Terminals (VSATs). The costs compared to alternatives such as terrestrial radio and wireless access networks limit VSAT applications to relatively remote areas. VSAT has a successful record for providing fixed public access telephony in many remote areas worldwide, including Chile, Peru, Colombia, South Africa, Nepal and Mongolia (consider Output-Based Aid in Mongolia: Expanding telecommunications services to rural areas). Associated with VSAT technology, satellites are also used as long distance trunking to a minority of remote rural exchanges and mobile base stations in a large and diverse number of countries. VSATs are also well suited for the provision of distance learning and tele-health applications in very remote or distant areas. The Practice Note *Distance learning using VSATs in the Solomon Islands* describes this type of scenario.

Practice Notes

- **Distance learning using VSATs in the Solomon Islands**

Reference Documents

- **Output-Based Aid in Mongolia**

4.8.3 BROADBAND AND THE IMPLICATIONS OF USING IP

There is currently a strong emphasis on using IP in the access and backbone networks to support all ICT services. This must be understood in the context of general trends towards deploying broadband networks. As noted in the introduction to this module, the deployment of IP and broadband networks is inevitable and commercially driven. The main reasons for the move to IP are:

- The Internet has demonstrated that IP networks can grow large, be used enthusiastically by the public and are capable of triggering the development of many new applications;

- Applications can exploit IP networks much more readily than they can exploit traditional telephone networks;
- Voice Over IP (VoIP), often in the form of voice over the Internet, is bypassing traditional telephone networks and has increasingly acceptable voice quality as well as low cost.
- IP Television (IPTV) and related applications can resemble existing conventional broadcasting but also offer extra capabilities through the use of software on personal computers instead of special-purpose equipment. The end user can pick and choose and not have to rely on the broadcaster to decide when and where broadcasts may be viewed. IPTV also leads to the concept of the end user becoming a content provider / broadcaster;
- Traffic for users of different services, and with different and changing capacity requirements, can be carried efficiently over IP networks; and
- The drift towards IP is making traditional telephone network equipment more expensive, and even impossible to buy, as equipment vendors are encouraging customers to invest in new networks.

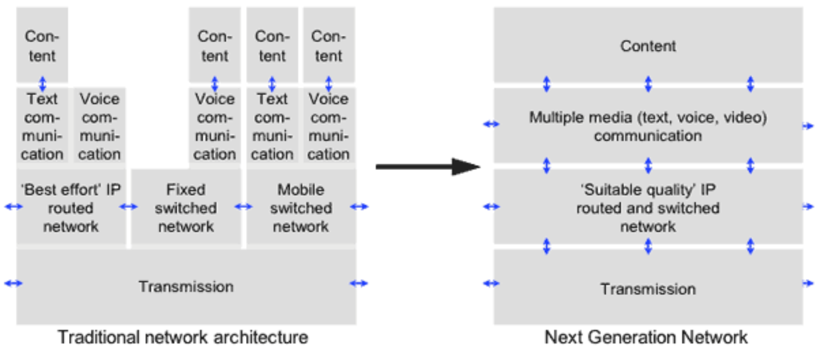
The overall implication of the above is that universal access and service (UAS) policies need to take into account the potential of the Internet and IP networks for much broader use than delivery of conventional telecommunications and Internet services. This points to the inclusion of broadcasting within a multi-sector, multi-media UAS policy (as well as within regulatory authority generally). Service providers recognise that future networks will be largely based on IP and that they will be required to support an increasing range of services of ever increasing bandwidth. This is central to service providers' interest in Next Generation Networks (NGNs). The migration to NGNs affects UAS policies in ways that are discussed in Section 8.3.1. For a deeper discussion of regulatory issues related to NGNs, see Section 2.5 of this module.The Internet can affect telephony policy, described in Section 8.3.3, as well as broadcasting, as described in Section 8.3.4. Universal Internet access itself – at least in the form of Internet Points of Presence throughout the country - must be included in the scope of UAS policies, at least for main population centres (e.g., district centres) and educational institutions. The implications of this for content provision are outlined in Section 8.3.5.

Reference Documents

- Universal Access & Service (UAS) and Broadband Development

4.8.3.1 NEXT GENERATION NETWORKS

In Module 7 Section 1.4, the term Next Generation Network (NGN) is used both broadly, to cover new technologies and services, and narrowly, to refer to a network using IP to deliver multiple services with quality of service guarantees. This section uses the term narrowly in looking at the effects of Next Generation Networks (NGNs) on universal access and service (UAS); the effects of new technologies such as WiFi and WiMAX are described in Section 8.2.5 and new services such as VOIP in Section 8.3.3. In the past, different services have been supported by different networks: specific transmission and switching networks have carried specific services. By contrast, NGNs support different services independent of the transmission network: they separate the services from the transmission network by using the transmission network to carry IP and the IP network to carry the services. Changing networks into NGNs gives them separate layers for transmission, IP, services and content. The figure below illustrates what happens when networks are migrated to NGNs.



◂ Figure: The separation of network layers in NGNs

Source: ICT quality of service regulation: practices and proposals, Robert Milne, ITU, August 2006.

NGNs' relevance to UAS is discussed extensively in What Rules for Universal Service in an IP-Enabled NGN Environment? and NGN and Universal Access. Issues with NGNs that may offer opportunities and changes are:

- Separation of services from networks. NGNs allow services to be independent of networks. This can separate the role of service provider from the role of network operator. In this environment, service providers are best able to determine rural revenues and business opportunities, but network operators make the main investments in NGNs.This can lead to a situation where one or several service providers might be willing to provide services but no network operator is willing to build a rural network. In these circumstances, policy-makers might consider distributing Universal Access and Service Fund (UASF) finance to either network operators to build networks or service providers to provide services; the latter then could in turn entice network operators to invest. Migration to NGNs will likely lead to additional hurdles to overcome and challenges for coordination between potential operators in rural areas and this may call for regulatory intervention.The degree of separation between service providers and network operators will vary between countries depending on the case and how NGNs actually evolve. UAS policies for use of funds need to be decided on a country-by-country basis.Service providers (fixed and mobile) in developing countries are aware of cost saving efficiencies associated with NGNs in core networks. In Brazil, India, Mongolia, Kazakhstan and Vietnam, providers have already announced plans to migrate to NGNs for their core networks. Also, in Argentina, Bangladesh, Brazil, Bulgaria, Pakistan, Venezuela and Vietnam providers have initiated fibre to-the-x (FTTx) projects. At this stage, however, the high costs and uncertain returns limit such projects to high population, high-income areas.
- Deepening of the digital divide. NGNs are expensive to build, even in urban areas. In fact, some network operators (e.g., in the United States) plan to sell rural assets to finance building NGNs elsewhere. Business cases for NGNs that depend on increasing revenues (not just on decreasing costs) are likely to assume that new services are provided only in selected urban areas. Other areas will not benefit from the NGNs unless their access networks can also support the new services. In particular, the data rates available in urban areas may need to guide the design of wireless networks for rural areas to avoid deepening the digital divide between urban and rural areas
- Requirement for broadband. Universal access to NGNs requires universal access to broadband. Though the impetus to increase the ubiquity of broadband networks has its own origins and does not depend on NGNs, many UAS policies have concenrated on increasing last mile access to telephony at low data rates. This is changing, but if rural areas are to benefit from NGNs, the NGNs are likely to require broadband backhaul, at least from district centres, public access points and educational institutions. The backhaul could terminate at Internet eXchange Points (IXPs) that themselves might depend on UASF finance.
- Need for suitable content. Introducing NGNs raises the importance of telecentres and other forms of public access to the Internet relative to payphones, provided that they make suitable audio and video content available (e.g., in relevant languages). If NGNs are to offer more than what is already available through telephony and broadcasting, the IP applications should fulfil the user requirements outlined in **Section 8.3.5**.
- Elaborate implementation. The standards for NGNs are complicated because they cater to fixed and mobile networks and for old and new services with good security and quality of service. Expertise in this area could take years to develop. Developing countries with very limited and old networks could find it difficult to leapfrog and implement these standards. On the other hand, precisely because many developing countries do not have extensive circuit-switched networks, they could possibly leapfrog to implement directly a fully IP-enabled NGN from the outset, as opposed to making a slow migration as in the case of more advanced countries. Irrespective of this, of course the complexity of technically implementing NGN standards as well as concerns regarding the level of investment needed remain.
- New interconnection arrangements. The introduction of NGNs typically changes the locations and functions of points of interconnection and requires interworking with legacy networks. Points of interconnection move from expensive town centres to less expensive business parks, and include equipment to convert between data recognised by IP networks and data recognised by other networks. The costs of these changes need to be shared equitably. Ultimately, both parties to the interconnection agreement are likely to benefit.Introducing NGNs also opens up the possibility of changing the pricing of interconnection to arrangements such as sender keeps all (as adopted in Internet peering). These arrangements are usually unsuitable for rural network operators, especially if they have historically enjoyed asymmetric interconnection pricing. Interconnection arrangements are examined in Interconnection Challenges in a Converging Environment: Policy Implications for African Telecommunications Regulators and NGN Interconnection and Access.
- Requirements to reduce regulation or to introduce regulatory forbearance. In some countries incumbent service providers have requested that regulators encourage investment in NGNs by reducing the effects of regulation. In Hong Kong, China, there have been suggestions that the cost of UAS provision should be calculated by combining the cost of the existing network and the cost of the NGN. The regulator has rejected these suggestions and will consider the cost of the NGN only where the change to the NGN stops the existing network from providing UAS [*]. Generally, investments in NGNs are motivated by the benefits derived from the convergences of dedicated

networks such as the PSTN, broadcast networks and the Internet onto a single network. This convergence saves costs through network consolidation and elimination of local exchanges, which means customer premises can be connected with higher-level data switching capabilities. NGNs also allow operators to increase revenues by making it possible to offer multiple services (e.g., voice, video, data) and innovative new services, over a unified network. Investments in NGNs should not affect UAS requirements (except, perhaps, by lowering cost). Regulators need to determine where the issues lie in each case.

- Scale, scope and monopoly. The EU regulators views expressed on these issues for access networks are provided in the ERG Opinion on Regulatory Principles of Next Generation Access. The ERG identifies as a significant issue for regulators the fact that economies of scale and scope are reinforced by NGNs. The report indicates that in some locations, there could be natural monopolies "in certain areas of the electronic communications value chain"; for example, one fibre, cable or duct, controlled by one service provider, might be enough for fibre to the curb. Since the effects of scale and scope will vary from country to country and even within countries, the ERG concludes that it is unlikely that a common regulatory approach would work for all countries – or even for all regions within a country. The impact of scale effects in different parts of a country could make the market structure more heterogeneous since NGNs would not be rolled-out everywhere simultaneously.
- Compliance with normal regulatory requirements for services: The transition to NGNs will be accompanied by increased use of VoIP whether a fixed line network or a mobile network is used. In the context of UAS, the migration to VoIP raises a number of issues that revolve around quality of service (QoS) and access to emergency services. Currently, VoIP calls differ in terms of quality and reliability from voice over the PSTN; VoIP is more susceptible to Internet-related technical problems and, in the case of fixed line VoIP, reliant on electrical power supply for calls. VoIP services normally do not include free calls to emergency numbers, the automatic rerouting of emergency calls to the nearest emergency call centres, or caller identification (see also **Section 8.3.3**).The shortcomings of VoIP in comparison to voice over the PSTN have led regulators to introduce a variety of different measures regulating the provision of VoIP [*]. But mandating VoIP to have the same QoS and emergency related features as voice over the PSTN increases the cost of providing the service. Given that the affordability of VoIP's makes it very attractive, light-handed regulatory measures may be more suitable to strike a balance between meeting consumer expectations and lowering costs.
- Enhanced competition. The expected advantages of NGNs are that users will have access to an increasing variety of service providers, assuming the number of viable service providers increases when they do not have to provide their own networks. This should stimulate price competition and incentives to provide new services.
- Fixed-mobile convergence: NGNs will also tend to increase the availability of multiple services through any kind of device, assuming the basic infrastructure becomes common to all. The Telecommunications Regulatory Authority of India [*], for example, estimated that 70 per cent of mobile calls are originated and terminated inside fixed locations. If NGN is implemented in end-to-end networks, such in-building or fixed-location mobile calls could possibly be completed on fixed networks, resulting in cost savings and more efficient utilization of scarce resources like spectrum. Of course, such concepts assume that users would be interested in switching from fixed to mobile on a price-basis [*].

Reference Documents

- **Challenges in a Converging Environment: Policy Implications for African Telecommunications Regulators**
- **ERG Opinion on Regulatory Principles of Next Generation Access**
- **Next Generation Networks and Universal Access: The Challenges Ahead**
- **NGN Interconnection and Access: Interconnection on an IP-based NGN Environment NGN Interconnection and Access: Interconnection on an IP-based NGN Environment**
- **What Rules for Universal Service in an IP-Enabled NGN Environment?**

4.8.3.2 CONTRIBUTION TO UNIVERSAL ACCESS FUNDS

Traditionally, the contributors to Universal Access and Service Funds (UASF) were the providers of voice telephony services, though both fixed and mobile operators have become much more than voice service providers. However, with the trend to use of VoIP, data and multimedia services, existing methods of funding universal access and service (UAS) may become unsuitable. The general trend for UASFs in developing countries is that levies should be made on all communications service providers, with the only exceptions being exemptions for companies below a certain level of revenue. Examples of issues that have arisen, even in relatively advanced countries, which are in fact exceptions to the general rule, are:

- In Hong Kong, China UAS is financed by a levy on the revenues from international gateway switches. Because international VoIP traffic does not use these switches (and because tariffs have been falling), revenues have been declining. As explained in Review of the Regulatory Framework for Universal Service Arrangements, the regulator has now decided that UASF finance will be provided by a levy on the quantity of telephone numbers (whether fixed or mobile) allocated to service providers. The decision treats VoIP providers in the same manner as conventional fixed and mobile operators, however, the regulator ignores peer-to-peer calls between computers, which do not access the public telephone network and which therefore do not use telephone numbers.
- In Canada, UAS finance were provided by a levy on the revenues from calls other than VoIP calls. As explained in Regulatory framework for voice communication services using Internet Protocol, the regulator adjusted the regulations to make them technology-neutral by introducing suitable obligations and rights for VoIP providers. In particular, the levy providing UAS finance is based on revenues from all calls except peer-to-peer calls, but is paid only by service providers that have revenues of at least 10 million USD.

Generally, UASFs can be compatible with the development of VoIP if contributions to them are calculated in technology-neutral ways. However, further revisions would be substantial if peer-to-peer calls between computers, which are typically made without charges to callers, were included. Thus they should probably not even be counted, let alone assessed for revenues.

Reference Documents

- **Regulatory framework for voice communication services using Internet Protocol**
- **Review of the Regulatory Framework for Universal Service Arrangements**

4.8.3.3 SUBSTITUTION FOR TELEPHONY

Voice calls and text messages alone do not need IP, but when other interactive applications are used, the case for using IP is clear. Even then, VoIP is likely to be the most popular broadband application for many beneficiaries of universal access and service (UAS). Surveys in The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction show how important voice calls and text messages are in poorer countries, compared with other uses of ICTs. However, providing VoIP in public access points (e.g., cyber cafés) might encourage people in these communities to try out other IP applications.Voice over the Internet (VoIP) takes various forms. One widespread distinction is between VoIP that uses managed IP networks (such as corporate networks and NGNs) and VoIP that uses the Internet (which is sometimes termed "voice over the Internet"). VoIP that uses the Internet does not have quality of service guarantees: calls may fail to be set up, become unusable or be dropped. Service quality guarantees are particularly significant when traffic is growing more rapidly than network capacity.VoIP is cheap, so it is popular despite limitations in the UAS obligations that it can satisfy. These limitations typically relate to emergencies: as outlined in **Module 7 Section 4.4**, many VoIP implementations do not work when the main electricity supply fails, do not connect emergency calls or do not automatically pass location information to emergency services. From the perspective of general quality of service as well as UAS, these limitations are serious in areas where users have expectations formed by fixed wireline networks. They are less serious, however, where users have expectations formed by mobile networks which often have similar limitations, or where emergency services are unable to respond rapidly for other reasons. Regulators need to protect users by ensuring that any serious limitations have sound economic or technical justifications and are explained carefully to users. VoIP for peer-to-peer calls between computers is likely to spread without any intervention by regulators beyond making it legal. Calls based on IP that access the public telephone network can be encouraged by making phone number allocations technology-neutral and service-neutral and by giving VoIP providers the right to negotiate interconnection agreements with other telephone network operators. There is a discussion of VoIP regulation in **Module 2 Section 4.4**.Regulators can support the use of VoIP in UAS in other ways provided they are convinced that the promotion of VoIP actually contributes to the policy objectives. In particular, they could allocate UASF finance to enhanced network capabilities including VoIP exchange points, which move VoIP traffic between networks, and ENUM (Electronic Numbering Mapping) systems (which map phone numbers into information for use in VoIP routing). VoIP exchange points and ENUM systems are best supported by regulators in ways like those described for Internet eXchange Points (IXPs) in **Module 2 Section 4.8**. Regulators should encourage VoIP providers to co-operate in developing such network capabilities. However, they should not impose particular implementations and might not need to provide funds. For instance, they should not require the use of ENUM systems as these are not necessarily the best way of mapping phone numbers into routing information.

Reference Documents

- **The Economic Impact of Telecommunications on Rural Livelihoods and Poverty Reduction**

4.8.3.4 SUBSTITUTION FOR BROADCASTING

Broadcasting is popular and widely available, often more than telephony. Radio and television can be powerful educational tools. Many countries recognise this by having universal access and service (UAS) policies for broadcast content, having public service broadcasting arrangements and obliging commercial broadcasting service providers to carry certain content. UAS policies should note that expanding telephony and broadcasting may, in some cases and during certain early phases of development, be more effective and less expensive than providing IP networks unless there are needs or demands for interactive applications and Internet access.However, the use of Broadband IP networks for television programme distribution is a development that telecom operators are seeing as an opportunity that enables them to offset revenue declines from traditional services as well as to "hit back" competitively, through telecom/media convergence, especially in broadcasting markets previously dominated by cable TV operators [*]. IPTV involves transmitting television programmes over IP networks [*]. As with VoIP, discussed in **Section 8.3.3**, there is a distinction between IPTV that uses managed IP networks and IPTV that uses the public Internet (which is sometimes termed Internet television or web television). IPTV that uses the Internet is likely to have no quality of service guarantees. In fact, in standards it is not regarded as IPTV at all, as mentioned in **Module 7 Section 4.5**.In their digital forms, radio and television can offer on-demand programmes and interaction with the user. In contrast, broadcasting does not offer the same variety or creativity as the Internet. Also, it usually confines users to walled gardens that allow access only to information chosen by the service providers. By contrast, providing IPTV might encourage users to experiment with other IP applications. In some countries, IPTV might be more beneficial for national development through UAS than digital television.

4.8.3.5 PROVISION OF CONTENT

IP supports many new communications applications, however several types of applications that are used extensively in urban centres may not be first choice in rural and remote areas of countries where people have little formal education and low literacy rates. Sometimes, radio and television, along with voice communications, are more effective in spreading information to these populations than email or web pages. In general, to have the greatest effect, content and applications specifically developed for rural areas need to consider the following requirements:

- Tolerance of inadequate links in networks. In some locations or at some times, applications might need to use narrowband networks instead of broadband networks. The narrowband networks might have poor quality phone lines, or short wave radio transmissions that support email but not web access, as described in the Practice Note Short wave radio in the Solomon Islands.Applications that can be used in these situations should minimize the data that is transferred across the Internet, by following guidance to make web pages compact [*]. Failing that, web pages can be read after removing graphics as demonstrated in the Practice Note The Loband web interface.
- Distinctiveness from existing alternatives. Applications should offer more than what radio and television offers. Unless applications are informational alone, involving searching for and displaying information, they should be interactive; applications might allow users to play educational games, undergo health checks, complete forms or take part in tutorials and on-line tests. However, as stressed in Section 1.6.2 in the case of government applications, there needs to be careful planning and designing of these types of applications if they are to be widely used.
- Acceptance of low levels of literacy. Applications should exploit the capabilities of ICT to avoid requiring high levels of literacy or knowledge of foreign languages. Typically, except where applications are designed for classroom use, they should provide spoken help messages and encourage spoken contributions to on-line forums. In fact, applications might be convergent; by exploiting multiple network technologies they could provide co-ordinated release and exchange of information in radio programmes and on-line forums.
- Robustness. In many places, applications and other programs will have unskilled users or inexperienced system managers who must maintain the stability of the terminals from as far as possible. When problems occur (because of viruses, for example) or software is to be upgraded, local people must be able to maintain terminals through simple operations (e.g., typically just by restarting them).
- Security. Security problems with applications on the Internet are so notorious that many people are willing to use more time-consuming and labour-intensive ways of doing business. These problems are discussed in the Information Technology Security Handbook and Cybersecurity Guide for Developing Countries.
- Assistive design. The content should also be planned to eventually incorporate features that are appropriate for use by people with disabilities.

Practice Notes

- Short wave radio in the Solomon Islands
- The Loband web interface

Reference Documents

- Cybersecurity Guide for Developing Countries
- Information Technology Security Handbook

4.8.4 TERMINALS

Advances in technologies as well as economies of scale are lowering the costs of user terminals or information appliances such as phones and computers. With the trend to convergence, technological advances are also blurring the distinctions between types of terminals. There are a range of different devices:

- handheld computers known as personal digital assistant (PDA);
- phones combined with video cameras and music players;
- mobile phones that are also Internet-enabled mini-computers (e.g. the Blackberry and other equivalent devices which enable e-mail and web-browsing among other wireless services); and
- powerful handheld 3G end-user terminals that provide “triple-play” services – telephony, Internet and IPTV and mobile TV.

For the purpose of universal access and service (UAS), this section focuses mainly on phones and computers.

4.8.4.1 HANDSETS: PHONES AND PDAS

With strong encouragement from service providers, equipment vendors have been developing low-cost mobile phones. In 2007, 2G phones were available for as little as 30 USD, and 3G phones were available for 130 USD. The 30 USD price for an individual mobile phone is still too much for at least 1 billion people, so some mobile phones are now being designed for sharing. In fact, entire systems for shared access have been designed [*]. These systems include not just the phones, but also power generators, marketing material, directional antennas, user guides and training. A power generator can be a solar panel or a human power generator (wind-up or step-on) as phones consume at most 5 W. Programs for sharing phones and the Subscriber Identity Module (SIM) that store tariffs and calculate the charge for each call make phone sharing easy, affordable and viable.Trials of systems for shared phone access indicate that typically 30 people share one phone. Some case studies of shared access are described in Development Fund Annual Report 2006. These systems illustrate one way in which countries can move gradually from universal access to universal service. As service becomes more affordable and people’s perceived or real need of a personal phone increases, the number of people sharing a phone can fall. Of course, even without specially designed phones, several people can use one phone on a commercial basis. This is common in several village phone programs around the world (see **Section 3.3.1**). Some regulators discourage the reuse of second-hand phones from other countries for various reasons (e.g., how to set (or lift) import duties for low priced, second hand phones raises issues which are not necessarily easily resolved; and some believe that the second-hand market increases the possibility of theft). However, the reuse of existing phones has helped to increase demand in various countries. In Burkina Faso, phones provided for reuse through an NGO in Switzerland sell for prices between 7500 CFA (15 USD) and 45000 CFA (90 USD), depending on the phone features [*]. The market grows faster when there are no unnecessary barriers to the use of phones. Common barriers include high import duties and laborious approval procedures. Type approval regulations are best designed to avoid inessential country-specific requirements and to allow mutual recognition of the testing and certification processes of different countries. As observed in **Section 8.2.5**, widespread type approval is one reason why WiFi is so popular.Personal digital assistants (PDAs) of various kinds have been successfully used as an inexpensive and, due to portability, more practical alternative to computers and conventional Internet connections in health applications. They are especially useful for data collection (such as on vaccination and on disease management) as well as for information dissemination (e.g. on disease treatment or prevention). Also, mobile phones, if equipped with a camera and able to send photos, can be used for applications such as remote diagnosis.

Reference Documents

- Development Fund Annual Report 2006 (GSMA, 2007)

4.8.4.2 COMPUTERS

Many projects have tried to develop and provide inexpensive computers using advances in display and storage technologies (e.g., flash memories) *. These computers are also designed to have low power consumption and thereby reduce the cost of power generation. One of the more prominent initiatives to provide low-cost computers is the One Lap-Top per Child (OLPC) initiative. Started in 2005 by faculty and researchers of the MIT's Media Lab, this initiative aims to provide children worldwide with new opportunities to explore, experiment and express themselves. The XO was designed to be flexible, low-cost, power-efficient and durable. It uses free and open-source software. The XO, originally intended to cost 100 USD, ended up costing 188 USD, mainly because little or no large quality purchases were forthcoming from governments as expected. The first production units were delivered in December 2007. Other small, inexpensive computers such as Intel's Classmate PC and the Asus Eee PC were also released in 2007 to address the demand for low-cost computers.Though computers can cost less than 200 USD, this is still too high for many educational institutions. Because of high costs for individual computers, there are projects for sharing computers just as there are projects for sharing phones. In these projects a single server computer, with a 2G or 3G modem, runs open source programs and stores data for multiple client computers connected over a LAN. This form of shared access should save costs by sharing the use of 2G or 3G links, open source programs and storage. Eventually, these savings (except those due to shared 2G or 3G links) might shrink as computer costs continue to fall. An example is the Jhai PC/ Jhai Network, which is currently field-tested. It is a thin client/ server technology based on the netPC system, providing a simplified desk-top for the end-user, while the operating system and applications are stored and accessed through the server. Advantages are that end-user terminals are cheap and consume little power, and that they are easy to manage and upgrade (as it can be controlled centrally by skilled staff). The disadvantage is that it requires a constant and fast connection to the server and that might not be available in some rural areas. It also requires a sufficiently sized server for the number of end-users. An alternative to the use of new computers is the reuse of used computers from other countries. However, these sometimes consume too much power (perhaps 120 W for a desktop computer and 80 W for an old display, or 40 W for a laptop computer), or are too fragile especially for rural and remote areas.Another consideration is that the cost of applications can exceed the cost of computers. Having said this, many applications and other programmes are available as open source software or even free software. Open source software is free for alteration, in that users can tailor it for their own purposes and is often also free of charge, though there may be (generally modest) charges for maintained and documented versions. Free software is not necessarily open source software; for instance, several web browsers, document readers, VoIP phones and other programs for client computers are free but not open source software.Open Source Software Perspectives for Development and Free/open source software (FOSS) policy in Africa: A toolkit for policy-makers and practitioners set the context for the use of open source software in developing countries. The Practice Note Examples of open source software lists some open source (and free) programs. These are only examples: they are not necessarily endorsed in this toolkit, and there are many other options.The cost of computers is not the only obstacle to their effective use. Often most of the equipment cost is due to the power generators, not the computers. The total cost of ownership must factor in not just equipment cost but also operating costs. Other considerations besides cost, are that there must be suitable applications, trained supervisors and motivated users *. An introduction to some of these issues is provided by Making the Connection: Scaling Telecentres for Development.

Practice Notes

- **Examples of open source software**

Reference Documents

- **End-user sharing**
- **Free/open source software (FOSS) policy in Africa**
- **Making the Connection: Scaling Telecenters for Development**
- **Open Source Software Perspectives for Development**

4.8.5 RELATIONSHIP WITH THE ENVIRONMENT

ICTs have a complicated relationship with the environment, having the potential for good or harm. This section considers that relationship of ICTs with the environment in terms of various specific topics. For all these topics there are implications for ICT policy and regulations, which may work with or against the achievement of universal access and service (UAS). This issue is included in the technology section since environmental requirements are typically applied at the equipment level, even though the impetus might come from policy.The effects of ICTs on the environment are often not reflected in immediate costs. In these circumstances, policies and regulations might need to depart from being technology-neutral, as explained in **Section 8.1**.

4.8.5.1 REUSE OF EQUIPMENT

Organising the reuse of existing equipment such as phones can be an effective way of making ICTs available to people who otherwise would not have them. Reputable organisations in developed countries make phones and computers available for re-use in developing countries. However, some schemes use these programs to simply dump largely worthless equipment. For example, between 25 per cent and 75 per cent of the equipment arriving for re-use in Nigeria is reported to be incinerated or dumped. Regulators in developing countries can help this situation by issuing lists of reputable organisations that distribute equipment that adheres to performance standards and limits on hazardous content. Sales and marketing practices can make equipment valueless or obsolete in a short time and potentially turn it into waste. For example, sometimes music (MP3) players are promoted as fashion items, or phones are subsidised by subscriptions or call charges as well as being replaced by new competitive offers on a periodic basis. Regulators could discourage or even in prohibit such practices, though it is not easy or advisable to interfere with competitive practices. Some market regulations can create beneficial results from cutting across common sales and marketing practices. For example, Finland in 2003, in contrast with many countries, did not have phone subsidies because there was a prohibition on locking phones to particular service providers. This probably contributed to the success of mobile number portability; once introduced there was an immediate impact in terms of subscribers changing provider, and resulting reduction in call charges. However, it is impossible to make a direct link between this and favourable environmental impact. Since the environmental impact interplay is often complex, it is not possible to generalize on the benefits of policy, though it would appear that this case might have had benefits to both market competition and the environment.

4.8.5.2 RECYCLING OF EQUIPMENT

Ultimately, all equipment fails or becomes obsolete and its components need to be recycled. Laws about unauthorised dumping of equipment are difficult to enforce. In some countries, users are likely to send equipment for recycling only if there is an incentive or obligation to do so. This is typically provided through regulations.The EU policy encourages users to recycle and places obligations on manufacturers, importers and distributors of electrical and electronic equipment (according to the producer pays principle). Manufacturers and importers must finance the collection, treatment, and recycling of waste equipment, and distributors must let users return waste equipment free of charge. To make recycling less hazardous, manufacturers and importers must limit the proportions of certain substances in equipment. Similar regulations apply to batteries and accumulators, with extra restrictions (e.g., untreated industrial and automotive batteries and accumulators must not be incinerated or dumped in landfill). The Practice Note Rules for the recycling and disposal of electrical and electronic equipment in the EU outlines regulations implementing the EU policy. The equipment itself should be designed to adhere to standards for environmental performance such as those summarised in the Practice Note The IEEE 1680 standard for the environmental performance of electronic equipment. In the EU, there is a systematic attempt to embed requirements for improvement of environmental effects in the very early stage of equipment design (e.g., there are codes of conduct to cut the power consumed during stand-by operation of equipment such as DSL modems, power supplies and televisions).

Practice Notes

- **Rules for the recycling and disposal of electrical and electronic equipment in the EU**
- **The IEEE 1680 standard for the environmental performance of electronic equipment**

4.8.5.3 ALTERNATIVE POWER SOURCES

Supplying power to remote ICT network sites is a significant cost element in any network serving rural regions. When network reach rural and remote areas ahead of the main electricity supply, alternative power sources are necessary. Diesel power generation is common, but technological developments have made it increasingly possible to consider renewable power sources that do not increase net greenhouse gas emissions. These energy technologies are becoming progressively less expensive and more practical. Solar, wind and water (micro hydro plants) generation is feasible in many places as are combinations of alternative energy sources (e.g., joint solar and window power generation in Namibia). For individual terminals, human power generation is sometimes used as in pedalling, where a human can generate 20 W or even 40 W fairly easily. A basic overview of the main alternative power sources, as well as network technologies, is provided in New Technologies for Rural Applications. However the following two web-based toolkits provide the most up-to-date and useful guidance on this subject:

- **www.eurorex.com/ugtoges/intro.htm** Users Guide to Off-Grid Energy Solutions by EuroREX is designed to help those who require energy-consuming equipment in off-grid (mainly rural) areas. A guide to multiple options are considered, including those appropriate for infrastructure systems as well as “audio-visual”, office and telecom equipment used at the user level, including telecentres. In each case, typical levels of power consumption are provided and the comparative suitability and cost of power sources, such as Photovoltaic (PV) systems, diesel generator, wind-turbine and micro hydroelectric plants considered. Particular attention is given to the costs and suitability of PV as an appropriate powers source. EuroREX is a network of European companies and trade associations focused on renewable energy solutions. It is partially supported by the European Commission.

- **www.dot-com-alliance.org/POWERING_ICT/** Powering ICT: An Energy Solutions Toolkit for ICT Projects is a resource developed by the DOT-COM Alliance (sponsored by USAID). The toolkit is designed to help users determine a cost-effective combination of ICTs and energy systems. This toolkit provides equally useful information on Photovoltaic (PV) systems, diesel generator, wind-turbine and micro hydroelectric plants. The toolkit focuses exclusively on the power needs of ICT equipment, mainly computers, local area network and ancillary equipment used for telecentres. It is therefore also an invaluable guide to provide both an understanding of the power options available a step-by-step cost comparison and decision guide. It includes a planning and costing guide for telecentres.

Biofuel power generation is also being tested for network equipment. This could conceivably cut out the costs of transport, storage and consumption of diesel in conventional generator plants. Well publicised trials in Nigeria and India are using oils from groundnuts and jatropha as fuel stocks for powering GSM base stations which might have power requirements of 1 kW each. However, this is controversial because using biofuels might destroy forests, reduce water supplies, raise local food prices and introduce genetically modified organisms. Using biofuels might even worsen climate change; palm oil is said to produce 10 times the greenhouse gas emissions of petroleum. Biofuel obtained from agriculture and forestry waste such as straw and woodchips raises fewer objections but is harder to exploit.Currently, research and development of battery technology aims to improve the lifetimes of batteries and reduce the dependence on heavy metals, however, progress is slow. Fuel cells based on converting biomass (including dead flies, in one case) are highly experimental and generate insufficient power for phones, let alone computers. Larger fuel cells, typically based on hydrogen or alcohol, might become suitable as back-up power sources for network equipment.

Reference Documents

- **New Technologies for Rural Applications (ITU-D Focus Group 7, ITU, September 2000)**

4.8.5.4 CONTRIBUTIONS OF INFORMATION AND COMMUNICATION TECHNOLOGIES

ICTs can have positive and negative effects on the environment, although the identifiable impacts tend to be positive or neutral, unless contribution to economic growth is considered to be negative. On the matter of recycling and waste, ICTs may improve waste collection by contributing to better management, but they also produce waste equipment. ICTs may often reduce the need for travel (e.g., a simple phone call may often replace the need to deliver a message personally). As well, ICTs can make it easier to travel (e.g., users are able to find out bus schedules more easily, or to better coordinate meetings and other travel related events). The balance between the good and the bad depends on policies in ways that are not yet fully understood, though a useful attempt to examine the balance for the EU is reported in The Future Impact of ICTs on Environmental Sustainability. There are some specific suggestions for positive programmes in a developing country in Using ICTs for Poverty Reduction and Environmental Protection in Kenya. More generally, even in developing countries, regulators, service providers and equipment vendors can take the steps listed in the Practice Note Simple actions for improving the environmental effects of ICTs.For regulators the principal actions involve:

- Ensuring that their own operations set good examples, especially in their use of buildings and travel;
- Encouraging the provision of services (including e-government, etc.) that use telecommunications to reduce travel, thus reducing polluting emissions (CO2, etc.);
- Requiring that equipment adheres to standards that limit environmental effects, through type approval or otherwise [*];
- Educating users about the strengths and weaknesses of applications that support secure on-line transactions and thereby reduce the use of paper; and
- Contributing to national environmental protection strategies, to ensure that sector strategies include the use of ICTs to reduce greenhouse gas emissions.

For service providers and equipment vendors, ICTs can affect the environment in ways besides those considered here. For instance, network construction and operation can degrade natural habitats by being noisy and ugly. The relevant authorities, who are not usually the ICT regulators, are likely to require an environmental impact assessment for any major project, using guidelines on mitigating impacts such as those in Environmental, Health, and Safety Guidelines for

Telecommunications.Many regulators, service providers and equipment vendors record their plans for environmental protection and periodically report on their actions. An example of an annual report, from the regulator in Hong Kong, China, is provided by Environmental Report 2006/07.

Practice Notes

- Simple actions for improving the environmental effects of ICTs

Reference Documents

- Environmental Report 2006/07 (OFTA, 2007)
- Environmental, Health, and Safety Guidelines for Telecommunications (IFC, April 2007)
- The Future Impact of ICTs on Environmental Sustainability (Lorenz Erdmann and others, IPTS, August 2004)
- Using ICTs for poverty reduction and environmental protection in Kenya

Next: 5 Radio Spectrum Management ➡

Radio Spectrum Management

Striking a Balance Between Market Flexibility and Regulation

In the last decade, there have been significant developments in both technological and regulatory approaches to spectrum management. The main challenge today is to strike a balance between the certainty of administrative approaches and the flexibility of market-based regulation. This Module gives readers a solid foundation in spectrum management, and includes specific sections on authorization, organizational, and monitoring concerns.

5.1 SPECTRUM MANAGEMENT OVERVIEW

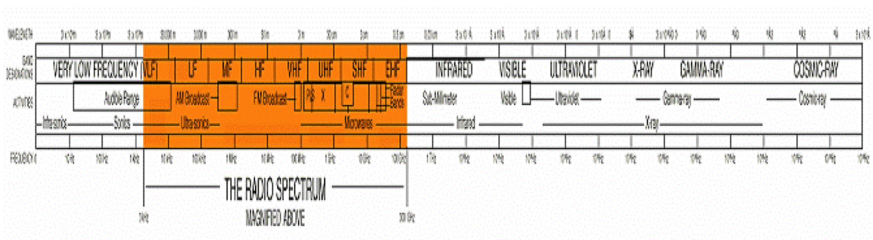
This section is an introduction to the management of the radio spectrum including the planning of current and future uses of spectrum; ensuring engineering compatibility of various uses and equipment; and authorization, licensing and monitoring of spectrum usage.

Reference Documents

- Telecommunications Research Project, Spectrum Management

5.1.1 INTRODUCTION TO SPECTRUM MANAGEMENT OVERVIEW

The radio spectrum is a subset of the electromagnetic waves lying between the frequencies from 9 kilohertz (kHz - thousands of cycles per second) to 30 gigahertz (GHz - billions of cycles per second) (see Figure 1). These support a wide range of business, personal, industrial, scientific, medical research and cultural activities, both public and private. Communications are foremost among those activities and, together with other radio services, are increasingly important to economic and social development.



◂ Figure 1: Radio Spectrum

Historically, access to and use of radio spectrum has been highly regulated in order to prevent interference among users of adjacent frequencies or from neighbouring geographic areas, particularly for reasons of defence and security. In the past decade there have been significant innovations in the theory of spectrum management along with gradual changes in practice of spectrum management and regulation. This gradual change follows a growing consensus that past and current regulatory practices originally intended to promote the public interest have in fact delayed, in some cases, the introduction and growth of a variety of beneficial technologies and services, or increased the cost of the same through an artificial scarcity. In addition to these delays, the demand for spectrum has grown significantly highlighting the need for efficient use of all available spectrum in order to avoid scarcity.

Those factors are making policy-makers and regulators worldwide focus anew on spectrum regulation with an increasing emphasis on striking the best possible balance between the certainty required to ensure stable roll-out of services and flexibility (or light-handed regulation) leading to improvements in cost, services and the use of innovative technologies. In developing countries in particular, where mobile communications users now greatly outnumber those using fixed line telecommunication services, it is widely recognised that the spectrum is a highly valuable resource for future economic development.

The Radio Spectrum Toolkit is intended to canvass those policy and standards issues as they touch on a broad range of spectrum management areas including basic principles of spectrum regulation, spectrum sharing and trading, spectrum pricing, monitoring and international coordination.

The international framework for the use of the radio frequency spectrum is set out in a treaty – the *Radio Regulations* - ratified by the Member States of the International Telecommunication Union (ITU), a specialized UN agency. Within that international framework, countries manage their national use of the spectrum. At the highest level, countries do this through establishing a National Frequency Allocation Table which sets out what radio services can use which frequency bands and under what conditions. Conditions of use vary widely, from inflexibly reserving particular frequencies for uses which are specified in detail, to considerable freedom in spectrum use for particular bands or services. For a more in depth discussion of International Affairs see **Section 7**.

Decisions are made at the international and national levels on the purpose or purposes to which particular frequencies will be put. This is known as making spectrum allocations on either an exclusive, shared, primary or secondary basis. These decisions are reflected in the International and National Tables of Frequency Allocations.

Assigning particular frequencies to specified users is the next stage in spectrum management.Because such methods of assignment rely on administrative decisions, such procedures are sometimes described as 'administrative methods'. The alternative is a process in which applicants bid for licences, for instance in an auction, or when spectrum licences change hands via the normal process of buying and selling assets. Here the spectrum regulator does not select the licensee, but the market does: hence the description of them as 'market-based methods'.

Additionally, some spectrum may be reserved for unlicensed use (a "spectrum commons").All users satisfying certain restrictions, for example on power levels and geographic range, might have access to unlicensed bands.

For a more in-depth discussion of allocation and assignment see Authorization: **Section 3**. As well, existing and new methods for improving spectrum sharing are discussed in **Section 4: Spectrum Sharing**. Spectrums pricing using administrative and market-based methods such as auction are discussed in **Section 5**.

Reference Documents

- **A Comparative Analysis of Spectrum Management Regimes**
- **Access to Spectrum/Orbit Resources and Principles of Spectrum Management**
- **Radiocommunications Inquiry Report, Productivity Commission, Australia, 2002 especially Chapter 2 and 4**
- **Review of Radio Spectrum Management- an independent review**
- **Value-focused thinking - strategic management of radio spectrum for mobile communications in Korea**

5.1.2 SPECTRUM AS A RESOURCE

Effective use of spectrum can make a big difference to a country's prosperity, especially where communications are heavily reliant upon wireless technologies such as mobile phones. Spectrum scarcity whether it is real or artificial can have an adverse impact upon prosperity. This section considers spectrum as an economic and technical resource, and spectrum scarcity.

Reference Documents

- **Mobile Telecommunications and Economic Growth: London Business School, John Cabot U, and U of T, May 2005**
- **Telecommunications Research Project, Spectrum Management**

5.1.2.1 SPECTRUM AS AN ECONOMIC RESOURCE

The production of goods and services involves the creation of output for end users (households and firms) from a combination of inputs. Traditionally those inputs are listed as labour, capital equipment and land. Clearly each of these can take on various uses; compare, for example, the use of land in city centres and for agricultural purposes.

Similarly, spectrum is one of these types of resources and can be used as an input in a multitude of services, whether for communications or other applications. Communications services encompass a wide range of forms, including narrow or broadband mobile telecommunications, broadcasting, aeronautical and marine communications, as well as communications for public bodies--such as defence or emergency services. Non-communication uses include military and civilian radar and scientific applications such as radio, astronomy and so on. It interesting to compare spectrum to other natural resources used in the economy such as land, oil and water (illustrated in the Table below), as it exemplifies its similarities to other exhaustible resources within modern economies.

Spectrum as an Economic Resource

	Spectrum	Land	Oil Reserves	Water
Is the resource varied?	Yes	Yes	Not very	Not very
Is it scarce?	Yes	Yes	Yes	Yes
Can it be made more productive?	Yes	Yes	Yes	No
Is it renewable?	Yes	Partially	No	Yes
Can it be stored for later use?	No	No	Yes	Yes
Can it be exported?	No	No	Yes	Yes
Can it be traded?	Yes	Yes	Yes	Yes

What flows from these characteristics of spectrum?

- Because frequencies differ in what they can do, there can be problems of matching them to particular uses. Land has similar characteristics. The task of allocating and assigning spectrum noted above are intended to accomplish efficient matching.
- Spectrum can be in short supply because there may be more potential users of particular frequencies than available spectrum. There is, therefore, a need for rationing its use and giving priority to more important applications. Nevertheless, a country can respond to a shortage of spectrum in particular frequencies by moving to other less favoured frequencies, or by developing the techniques, such as compression, which allow spectrum to be used more productively. These two responses is analogous to bringing less fertile land into cultivation and applying fertilizer to make existing cultivated areas more productive within the agricultural sector.
- Because spectrum is renewable and cannot be stored, there is no reason to hoard it for later use, as a country might save oil reserves for use or sale later.
- Because spectrum is locationally specific (specifically located?), it can only be used to provide services in a given territory. However, it can be traded, in the sense that property rights can be assigned to it.

The importance of basic telecommunications services - fixed and mobile - for economic growth and development has long been recognized in the international community. Telephone penetration (traditionally measured in terms of fixed or mobile voice equivalents per 100 population) is a standard metric for evaluating the quality of basic infrastructure, and the positive correlation between telephone penetration and economic activity (usually measured as GDP per capita) is well known,

Today, access to telephony services, while remaining essential, is no longer enough. Internet access--and this increasingly means broadband Internet access -- is now generally regarded as part of the essential basic infrastructure for society and the economy. Equally important is the centre of gravity for infrastructure growth in developing countries, which is clearly wireless. Chart 2 illustrates the recent rapid rise of wireless broadband subscriptions while Chart 3 illustrates the predominance of growth in mobile connections in developing countries.

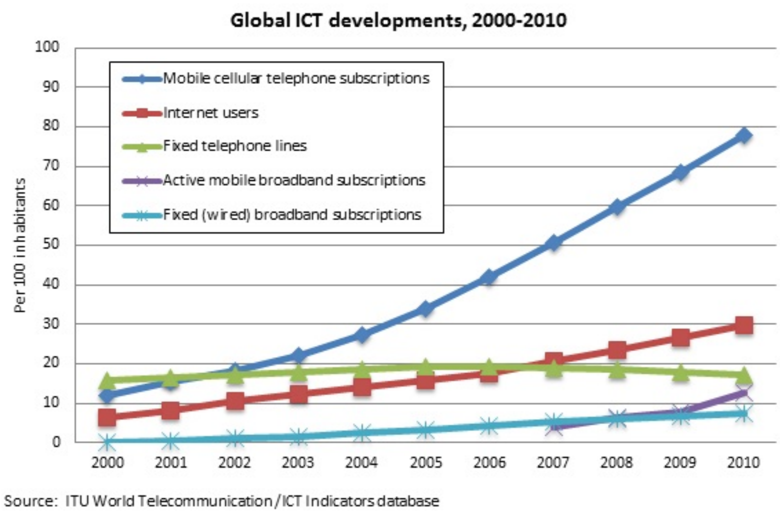
Measuring and quantifying the economic impact of ICT's on the economy and spectrum as an input in its application in mobile telephone, while important to policy makers, is very challenging for three reasons:

- Firstly, although investment in ICT represented a significant share of total fixed business investment in the United States (where most of the early research focused), it still represented only a small share of the total capital stock and, ICT-producing sectors, a small share of total GDP. [*]
- Secondly, measuring ICT inputs is notoriously difficult, in part, because of the very rapid pace of innovation and continuously declining prices. This phenomenom is known popularly as *Moore's Law*, where it isit is becoming increasingly difficult to measure the quantity and value of ICT inputs (and outputs) in appropriate quality-adjusted terms. For example, although more expensive the technological capabilities of a new Smartphone in 2012 are significantly greater than even in 2009.
- Finally mobile broadband can be viewed as a general-purpose technology, which is enabling companies-- especially service companies-- to introduce new products as well as change business processes such as supply chains. Capturing data and measuring outputs, similar to measuring inputs, are notoriously difficult.

Still, with these challenges being present several groups of economics have attempted to measure the impact of mobile telecommunications in general and mobile broadband specifically. A selection of these results are summarized below:

- Czernich et al. (2009) * used panel data for OECD countries from 1996-2007, and found that a 1% increase in broadband penetration raised GDP per capita growth by 0.09 to 0.15%.
- Franklin, Stam & Clayton (2009) * looked at a panel of 13 European countries on firm-level productivity from 2001-2005 and found that broadband enhanced employee productivity, but that this impact varied with the level of adoption, suggesting that critical mass is required to realize significant benefits.
- Katz and Avila (2010) * analyzed data for 24 Latin American and Carribean countries from 2004-2008 and found that a 1% increase in broadband penetration resulted in a 0.0178% increase in GDP. They also estimated that the same 1% increase in broadband penetration would increase employment by 0.18%.
- Koutroimpis (2009) * examined a panel for 15 European countries from 2003-2006 and concluded that a 1% increase in broadband resulted in a 0.038% higher GDP growth.
- The OECD (2011) * looked at a number of OECD countries and found that 1% higher broadband penetration resulted in 0.109% faster GDP growth. This study also looked at the relationship between IPv4 address growth and GDP and found a similar positive impact. This is interesting because it provides additional support for the view that broadband causes (rather than follows) economic growth.
- Waverman (2009) * used data for the United States and 14 European countries from 1998-2007 to conclude that a 1% higher broadband penetration raised productivity by 0.0013% in markets with medium to high levels of broadband penetration, but resulted in no significant measured impact for countries with low broadband penetration (providing further support for the notion that critical mass is important in order to realize significant benefits from broadband).

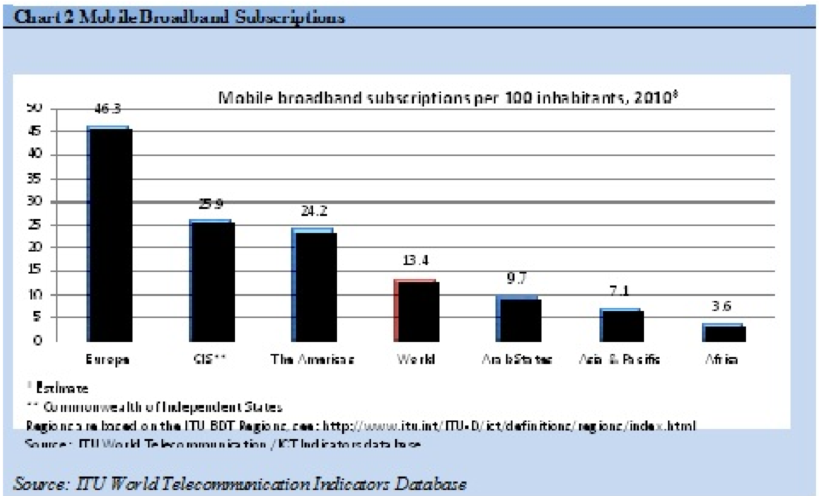
Chart 1 shows the buoyant growth in the ICT sector over the past decade, clearly illustrating the tremendous expansion in the penetration of mobile services with 5.4 billion mobile subscribers, which is enough to reach 78 per cent of the world's population. In addition to this, by the end of 2010, growth in fixed lines stagnated at nearly 1.4 billion fixed line subscribers.



◀ **Chart 1 Growth in penetration per 100 inhabitants of fixed lines, mobile cellular subscriptions, and subscribers to mobile and fixed broadband networks 2000-2010**

Photo: ITU World Telecommunications Indicators Database

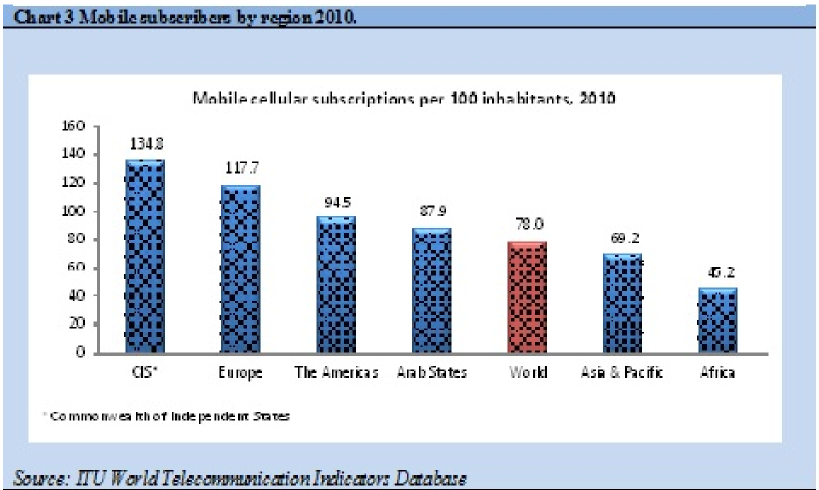
Penetration varies significantly between rich and poorer countries although the significant trend is for rapid growth in mobile usage in emerging and developing economies.



◂ Chart 2 Mobile broadband subscriptions per 100 inhabitants

Photo: ITU World Telecommunications Database

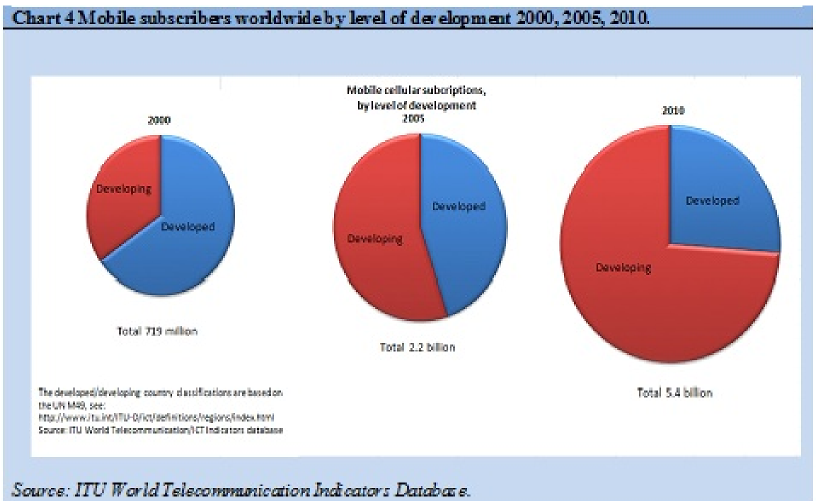
Mobile penetration in developing countries in Africa and Asia has reached approximately 45 and 62 % respectively with mobile penetration growing at a phenomenal compound annual growth rate over 22 % globally in 10 years. Indeed, amongst the least developed economies, mobile cellular subscribers outnumber fixed lines by more than nine to one. The balance has shifted between developed and developing countries with most of the growth mobile subscriptions occurring in developing countries.



◂ Mobile cellular subscriptions per 100 inhabitants

Photo: ITU World Telecommunications Database

Photo: ITU World Telecommunications Database



* Oliner, S. and D. Sichel (1994), "Computers and output growth revisited: How big is the puzzle?" *Brookings Papers on Economic Activity* (2): 273-317).

* See Czernich, N., O. Falck, T. Kretschmer and L. Woessmann (2009), "Broadband Infrastructure and Economic Growth," CESifo Working Paper No. 2861, University of Munich, December 2009.

* See Franklin, M., P. Stam, and T. Clayton (2009) "ICT Impact Assessment by Linking Data," *Economic and Labour Market Review*, 3(10), 18-27.

* See Katz, R. and J. Avila (2010) "Estimating Broadband Demand and Its Economic Impact in Latin America," *Proceedings of the 4th ACORN-REDECOM Conference*, Brasillia, May 14-15, 2010

* See Koutroumpis, P. (2009), "The economic impact of broadband on growth: A simultaneous approach" *Telecommunications Policy*, 33.

* See OECD (2011) "Economic Impact of Internet/Broadband Technologies," DSTI/ICCP/IE(2011)1/REV1, Working Party on the Information Economy, Directorate for Science, Technology and Industry, OECD, Paris, 30 May 2011.

* See Waverman, L. (2009) "Economic Impact of Broadband: An Empirical Study," LECG, a study prepared for Nokia-Siemens Networks as part of the *Connectivity Scorecard 2009*."

Reference Documents

- **Economic Versus Technical Approaches to Frequency Management Telecommunications Policy**
- **Mobile Telecommunications and Economic Growth**

5.1.2.2 SPECTRUM AS A TECHNICAL RESOURCE

Electromagnetic radiation is the propagation of energy that travels through space in the form of waves. It includes the visible spectrum (light), as well as infrared, ultraviolet and x-rays. The radio frequency spectrum is the portion of electromagnetic spectrum that carries radio waves. The boundaries of radio spectrum are defined by the frequencies of the transmitted signals, and are usually considered to range from 9 kilohertz (kHz - thousand cycles per second) up to 300 gigahertz (GHz - billion cycles per second). However, technical change is making use of even high frequencies viable. Table below depicts the some of the many uses of radio spectrum associated with various bands derived from their inherent propagation characteristics.

Radio Frequency Propagation

Band Frequency Range	Use	Bandwidth	Interference
VLF 3-30 kHz 1000's km	Long range radio-navigation	Very narrow	Wide spread
LF 30-300 kHz 1000's km	Same as VLF strategic communications	Very narrow	Wide spread
MF .3-3 MHz 2-3000 km	Same as VLF strategic communications	Moderate	Wide spread
HF 3-30 MHz Up to 1000 km	Global broadcast and Point to Point	Wide	Wide spread
VHF 30-300 MHz 2-300 km	Broadcast, PCS, Mobile, Wan	Very wide	Confined
UHF .3-3 GHz < 100 km	Broadcast, PCS, Mobile, Wan	Very wide	Confined
SHF 3-30 GHz Varies 30 km to 2000 km	Broadcast, PCS, Mobile, Wan, Satellite Communications	Very wide up to 1 GHz	Confined
EHF 30-300 GHz Varies 20 km to 2000 km	Microcell, Point to Point, PCS, Satellite	Very wide up to 10 Ghz	Confined

The key characteristics of spectrum are the propagation features and the amount of information which signals can carry. In general, signals sent using the higher frequencies have lower propagation distances but a higher data-carrying capacity. These physical characteristics of the spectrum limit the currently identified range of applications for which any particular band is suitable. Some spectrum (such as in the UHF band 300-3000 MHz) is known to be suitable for a wide variety of services and is thus in great demand.

Presentations delivered at the 2008 ITU World Radiocommunication Seminar, 8-12 December 2008, available at: **www.itu.int/ITU-R/index.asp?category=conferences&rlink=seminar-program&seminar=geneva-2008&lang=en**

Reference Documents

- Wireless Technology for Non-engineers

5.1.2.3 SPECTRUM SCARCITY

The demand for spectrum is increasing and many frequency bands are becoming more congested especially in densely populated urban centres. Spectrum managers are taking various approaches to improve efficiency; using administrative methods including inband sharing, changes to licensing such as spectrum leasing and spectrum trading, and use of unlicensed spectrum (the spectrum commons) combined with the use of low power radios or advanced radio technologies including ultra-wideband and multi-modal radios.

It is important to remember that where spectrum scarcity exists, shortages can be met in part by existing users through the use of more advanced radiocommunications equipment, for instance in the shift from analogue to digital television. However, as discussed in **Section 1.3.1**, sufficient incentives are needed to ensure frequencies will be used efficiently by existing users or as in the case of license-exempt spectrum reduction in the number restrictions and barriers on use.

Scarcity is not one-dimensional, since there can be differences between urban and rural areas with spectrum most likely being highly congested in urban areas. As well, scarcity can result from the types of services allocated in certain geographic areas such as maritime services in coastal areas.

Practice Notes

- **Underutilized License Exempt Spectrum in the UK**

5.1.2.4 SPECTRUM ACCESS

The past twenty years have given us dramatic improvements in telecommunications access and services accompanied by relentless and rapid changes including particularly:

- the development of nearly ubiquitous (and usually competitive) mobile voice networks now accounting for nearly six billion lines, as opposed to 1.2 billion fixed lines;
- the emergence of broadband as a general purpose technology affecting all aspects of economic and social activity – whether related to consumption, production or the delivery of government services – which could very likely match the spread of voice services in the next 10-15 years. In almost every part of the world, wireless data traffic is expected to double each year for the next five years.*

In emerging and developed economies, the key to continued development in telecommunications especially broadband over the foreseeable future will be access to spectrum, and a country's national broadband plan will depend crucially upon it. Abundant spectrum will be essential to promoting competition and innovation in telecommunications markets. In an opposite scenario, where spectrum access is inadequate the result will likely be higher prices for consumers, limited market entry, and constrained innovation. Successful national broadband plans will be almost inconceivable without strenuous efforts to add to available communications spectrum by all available means, including digital dividend, refarming and a willingness to be a ‘fast follower’ of new spectrum technologies associated with sharing frequencies.

As discussed further in Section 2.3: Spectrum Policies and Principles, it will be necessary to ensure that spectrum policies and principles connected with allocation and assignment procedures support both technical and economic efficiency while being properly balanced. Additionally, as discussed in Section 2.4.3: Planning for Future Use, the publication and adherence to a national spectrum use plan, the result of broad consultative process, and the incorporation of spectrum user views will help achieve efficient and effective uses for the spectrum resource. It is implicit that we know how spectrum is being used and by whom. Spectrum audits and spectrum supply and demand studies covering all spectrum users, especially government users, lead to steps which can result in new allocations and adjustments between users. These procedures are discussed in Section 2.4.2: Knowledge of Current Spectrum Use.*

5.1.2.4.1 SPECTRUM ACCESS - THE DIGITAL DIVIDEND

Generally speaking, the Digital Dividend resides in the ranges of broadcast spectrum – VHF (30 MHz – 300 MHz) and UHF (300 MHz – 3.0 GHz). The most common definition of the Digital Dividend is: the amount of spectrum in the VHF and UHF bands that is above that amount nominally required to accommodate existing analogue TV programmes and that might be potentially freed up in the switchover from analogue to digital television. Spectrum is becoming available since digitally transmitted broadcast services (principally, television) now require a smaller amount of spectrum than the amount needed to accommodate existing analogue transmissions.

Digital compression systems (DTV) allow six and even eight standard digital television channels (depending on the coding and modulation techniques) to be transmitted in the radio-frequency spectrum previously used by a single analogue channel. More content can now be carried for a given amount of spectrum. New technologies are likely to continue to increase the capacity of the current DTT multiplexes and hence allow more services to be provided without using additional spectrum that is in high demand for other uses.

Estimates of the size and value of the digital dividend vary by ITU region and national circumstances.

Table 1.2.1
The Digital Divident by ITU Region
Source: McLean Foster & Co., based on the ITU Radio Regulations 2007

Band	Region 1	Region 2	Region 3
698 - 806 MHz		698 - 806 MHz	
806 - 862 MHz		806 - 862 MHz	
698 - 790 MHz			698 - 790 MHz
790 - 862 MHz	790 - 862 MHz		790 - 862 MHz
Digital Dividend Spectrum	72 MHz	164 MHz	164 MHz

Notes: (1) Identified for IMT services on a primary basis past 17 June 2015.

(2) Identified for IMT services on a co-primary basis. Effective now with various dates set for DSO (USA, 2009; Canada, 2011; Mexico, 2022).

(3) Brazil has opted to allocate 698 - 806 MHz for IMT on a secondary basis.

(4) The USA had decided earlier in 2003 to vacate broadcast services from the 700 MHz band.

(5) China, India, Japan, New Zealand and Singapore opted to identify the 698-790 MHz band, in addition to the 790-862 MHz band, which was accepted by all countries in the region.

(6) The European Commission adopted the policy of analogue shut-off for 790-862 MHz to take place 1

Significant estimates of the economic value of the Digital Dividend in the EU have been made and are provided in the Table below.

Table 1.2.2 : Estimates in Value for the Digital Dividend
Source: Exploiting the Digital Dividend – a European Approach, Analysis Mason, DotEcon, Hogan & Hartson, 2009.

Use	Assumptions	Valuation
Digital Terrestrial Television	Six DTT multiplexes in each Member State requiring 48 MHz when using National SFN's (8 MHz channels per SFN) and 384 MHz when using MFN's (64 MHz spectrum channels per multiplex).	Between EUR 130 Billion and EUR 370 Billion discounted over 15 yrs
Mobile Television	One multiplex using either 8 MHz per SFN or approximately 48 MHz for an MFN.	Between EUR 2.5 Billion and EUR 25 Billion discounted over 15 yrs.
Wireless Broadband	Use of a 72 MHz sub-band within the 470-862 MHz band for wireless broadband services.	Between EUR 50 Billion and EUR 190 Billion discounted over 15 yrs.
Total		Between EUR 182.5 Billion and EUR 585 Billion discounted over 15 yrs.

Decision-making processes for digital switchover and potential uses of the Digital Dividend, along with spectrum re-allocation decisions, have been driven essentially by political considerations. In some cases, these decision-making processes have pitted one set of interests (telecommunication operators and service providers) against other influential and powerful interests, such as consumers who primarily bear the cost of replacing in-home equipment and stakeholders, such as government departments and broadcasters (e.g., the European Broadcast Union).

Two important considerations for politicians concerning the Digital Dividend are measuring the public value of broadcast services and reserving spectrum for future use.

When choosing how much spectrum to allocate and for whom, regulators also place emphasis on social, development and cultural goals. Market mechanisms do not necessarily take public policy priorities into account, and so in the case of broadcast, governments often intervene in allocation decisions to ensure that public-value broadcast content is available. Public values are often strongly defended and yet they are hard to quantify because it is difficult to measure in terms of incremental spectrum assignments.

In answering the question: Should some of the Digital Dividend be reserved for future use, it is necessary to consider two central issues:

- the uncertainty over the best use of the reserved spectrum both now and in the future and the lack of information available,
- the potential for regulatory decisions to have undesirable effects on the incentives for spectrum efficiency.

Ofcom in the UK conducted an assessment of the potential significance of a decision concerning the future which is portrayed in the following practice note.

Practice Note : Reserving the Digital Dividend for potential future uses: the view of the UK regulator

In Ofcom's view, a market-led approach to determining the uses for the Digital Dividend is superior because:

- Where considerable uncertainty exists over the highest value future use, market mechanisms can help to ensure that the spectrum is used by those who value it the most. Markets allow the superior information held by participants to be revealed and combined in order to identify those who have the highest value.
- Market mechanisms also help to resolve uncertainty because markets help to reveal information about how much a resource is worth to others.

Finally information about value and flexibility of use give users strong incentives to get the most out of the spectrum they own and hence to ensure efficient use in the longer term and promote innovation. The ability to make these changes and to be flexible in responding to unforeseen changes quickly is particularly important for promoting efficient spectrum use in the longer term.

Source: Ofcom UK, Digital Dividend Review 2007

5.1.3 OBJECTIVES OF SPECTRUM MANAGEMENT

Spectrum management reflects many separate activities, including planning spectrum use, allocating and assigning spectrum licences, enforcing licence conditions, interacting with a regional and international organisations and so on assignments and so on. Each of these will have its own key performance indicators. For example, an enforcement unit may have monitoring targets or a licensing department's performance may be measured by the number of licences granted or the average amount of time taken to issue a license. Such specific indicators can be separated from broader objectives relating to the key spectrum management role, which is deciding which frequencies should be put to use for what purposes.

Economic objectives relate to ensuring that spectrum is used in ways which meet the country's goals covering the efficient allocation of resources – that spectrum is employed by both private and public sector organisations in ways which meet the countries economic growth and other objectives.Technical efficiency objectives relate to the more specific goal of ensuring that service frequencies are used in ways which allow the maximum utilisation of the resource, avoiding, for example, both interference and unnecessarily large gaps ('guard bands') between adjoining users. High-level policy objectives relate to consistency in government policy on matters such as access, competition, non-discrimination, and equity and fairness in the manner spectrum is allocated and assigned to various users.

RELATED INFORMATION

New Technologies and Impacts on Regulation Module: Section 2.7.1 Objectives for Spectrum Management

Reference Documents

- **Facilitating Spectrum Management Reform via Callable/Interruptible Spectrum**
- **UK: Spectrum Framework Review - Ofcom's Views as to how Radio Spectrum should be managed, 2004**

5.1.3.1 HIGH-LEVEL ECONOMIC EFFICIENCY OBJECTIVES

The goal of economic activity is to provide goods and services to end users – whether they are bought in the market place or provided to citizens by governments.In defining high-level objectives for spectrum policy, it is thus sensible to take as a starting point the maximisation of value of outputs produced by the spectrum available, including the valuation of public outputs provided by the government or other public authorities.

Some important conclusions follow from this objective.Suppose a given quantity of spectrum is available for use in only two sectors, mobile communications and commercial broadcasting.How should it be divided between the two uses? Because end-users derive benefit from both services, allocating the entire spectrum exclusively to one or the other use may create an artificial shortage of spectrum. Some kind of compromise is required which reflects the value end-users place on both services, the cost of providing them and the amount of spectrum they require. In turn, relating use to value pressures all users, private and public, to make more efficient use of their allocated spectrum, thereby freeing up more spectrum for use generally.This is set out more formally in the accompanying practice note: Allocating Spectrum Efficiently.

Unfortunately, the problem of finding the most efficient allocation of spectrum is made harder by the complex interrelations among frequencies and their different uses. It requires the spectrum manager to have knowledge, or access to knowledge, about the relationship between providing an additional MHz of spectrum to a service and the net economic benefit of doing so.There are additional considerations to be taken into account including the following:

- In practice, many frequencies (subject to international agreement) can be used for more than two specific uses; hence using traditional approaches the spectrum manager will be making three or four - way splits, not just dividing particular frequencies between two uses;
- Uniform allocations of spectrum on a global basis benefits users since manufacturers of radiocommunications equipment are able to realize economies of scale sooner;
- Conversely, most services can be provided using a variety of frequencies, even if some are more accessible than others. This introduces more flexibility in spectrum management, but varying margins of substitution complicate the problem;
- It is often possible to replace spectrum in the provision of a service by other inputs – e.g. replacing spectrum base stations in a mobile telephony network.The technologies which use spectrum to provide services, the nature of these services, and their costs, are in many ways difficult to accurately predict.

This might be taken as implying that a spectrum manager must be omniscient to maximise the economic benefits (public and private) of spectrum use.Yet this is not necessarily so, for two contrasting reasons:

On one hand, means are available to harness the knowledge and opinions of all spectrum users (as well as those of the spectrum manager), and find a reasonably good solution to the problem. This involves the use of market pricing and information mechanisms to refer allocation issues to those with the best knowledge of the potential of spectrum to meet consumers' needs for service. These means are discussed in **Section 1.6**.

On the other hand, if the manager chooses to rely on administrative methods to allocate spectrum, the considerations set out above offer useful pointers:

In allocating spectrum, priority should initially be given to services which are highly valued by end-users, with end-users expressing the value to them directly by making individual purchasing decisions. In some cases, the government might express that value on citizens' behalf by providing the service publicly;

- However, this does *not* mean that certain services should be deprived of spectrum altogether. The aim is to equalise the benefit of an *additional* MHz in each competing use;
- As demand for services changes, it may be desirable (for example) to switch some services to higher frequencies and reform the spectrum for better-suited new services; and
- Adopting these principles can improve spectrum allocation considerably.Even if imperfectly done on the basis of incomplete information, the benefit can be considerable.
- A final implication follows from the approach of maximising economic benefits from an inexhaustible resource. Where spectrum is available, it should be put to use in the most productive way possible. Deliberately withholding spectrum in order to raise its price, or licensing a single monopolist to provide a service where that monopolist will withhold services to end-users in order to raise their price, deprives those end-users of the benefits which they would otherwise receive. The harm they will suffer will always exceed the extra revenue the government can derive from spectrum allocation or the extra profit the monopolist will make.

There is thus a strong case that spectrum should be made available to those firms prepared to use it efficiently.

Reference Documents

- **India: Consultation Paper on: Efficient Utilization, Spectrum Allocation, and Spectrum Pricing, 2004**
- **India: TRAI Allocation and Pricing of 3G and BWA Spectrum - A consultation report, 2006**
- **United Kingdom - Independent Audit of Major Spectrum Holdings, 2005**

5.1.3.2 HIGH-LEVEL TECHNICAL EFFICIENCY OBJECTIVES

At first glance, technical efficiency in spectrum use appears to be a self-explanatory benefit. Indeed, technical efficiency of frequencies suitable for a given purpose – whether it is the spectrum regulator's choice, or by firms - may rationally count as a leading factor in spectrum allocation decisions. Applying the matter in practice can, however, bring competing policy goals into play.

At the basic level, technical efficiency implies the fullest possible use of spectrum. For example, time is a component of several measures of technical efficiency, both in the sense of how constant or heavy usage is over a given period of time, and the speed in terms of bits per second that information is transmitted for a given spectrum capacity.

In practice, however, both of these measures have problems. Some uses are crucial, yet only occasional. In the absence of procedures for sharing spectrum with other users, which are very costly to implement, spectrum capacity, which is often left unused, may be essential for such uses.

Equally, the capacity measure fails to take account of the value of the information (signal or data) carried. A meaningless jumble might be sent very efficiently, but it would still be a meaningless jumble. This suggests that such measures make little sense, as they abstract from the key element of economic calculation described in **Section 1.2.1**. above concerning the value of the service which the spectrum is being used to produce.

It is clear that digital TV transmission is technically more efficient than analogue signaling leading to the Digital Dividend.. Based on studies done by ITU-D covering the 2006-2010 timeframe, digital compression systems for digital television allow the transmission of several (up to six, depending on the coding and modulation techniques) standard digital television channels of acceptable quality in the radio-frequency spectrum previously used by a single analogue channel. Simply put, more content can be carried for a given amount of spectrum, and this trend is expected to continue. New technologies will continue to increase the capacity of the current DTT multiplexes (more than 20 per cent is probable) and will allow more services to be provided without using additional spectrum that is in high demand for other uses. It will be difficult to measure the value of spectrum due to increases in technical efficiency alone without comparing spectrum use to the demand for services and alternate uses.

Resolving these issues clearly depends on a number of considerations including the value of scarce spectrum – expressed as the potential demand for alternative service provided with the spectrum, which would be released along with considerations, such as social, political or industrial development, international agreements, etc.

Digital efficiency is very important, but is not the sole goal in itself. Because spectrum is increasingly scarce, there is every reason to strive for technical efficiency in most circumstances. And of course, where spectrum is truly scarce (e.g. below 1 GHz), there are clear benefits from increasing utilisation, while also planning for future use of spectrum using all technical means to achieve this end in the interest of maximizing economic effects and welfare.

During the Digital Dividend debate in the EU, the European Broadcast Union strongly argued (with some success) at the political level for preserving digital dividend spectrum for digital terrestrial broadcast using non-technical arguments. The European Broadcast Union promoted the idea that preservation of TV channel provisioning was needed to support DTT becoming a viable competing platform:

The terrestrial broadcasting platform represents a unique combination of elements such as technical excellence and efficiency, favourable coverage and service characteristics, flexibility, market success and wide support across the industry as well as by the public in most European countries. It serves equally well public service broadcasters and commercial broadcasters as well as many other players in the value chain. As a result the terrestrial broadcasting platform generates significant social and economic benefits. It would be very difficult to replicate such a powerful mixture on another platform (European Broadcast Union, 2009).

◀ **Box Practice Note: Digital Divident European Broadcast Union**

Source: European Broadcast Union, 2009

Reference Documents

- USA: Spectrum Efficiency Working Group Report, 2002

5.1.3.3 HIGH-LEVEL POLICY OBJECTIVES

Governments design, implement and measure the effectiveness of policies to encourage economic, technical, and social development. This includes initiatives to promote competition and create preferences to rebalance opportunities for certain disadvantaged groups in society, and, in the case of radio spectrum, ensuring that sufficient amounts of spectrum are available and accessible for current and future needs, while meeting public safety and security requirements: including national defence, fire and security.

Policy design involves multiple dimensions and distinctions: current vs. future; absolute vs. relative, directional vs. influential; and public and private. As there are numerous trade-offs a central goal is achieving policy effectiveness. A central economic concept borrowed to guide the design of effective policy is Pareto Optimality, which is simply stated as follows:

- A change in policy should not provide an advantage to one individual or set of individuals and put others at a disadvantage.

Measuring and analyzing the impact of policy on individuals and the public is crucially important in determining effectiveness and yet it is both a complex and difficult process. Ofcom, the UK Regulator, in conducting its Digital Dividend Review developed the Total Value Framework to help resolve the analysis and measurement problems. See Figure 1.0 Total Value Framework for the complete model.

Setting policies does not occur in a vacuum either. Efforts to improve competition and ensure access to spectrum will be frustrated by reality, as in the case of competing interests between various stakeholders, such as existing users and new entrants (for more on market entry and new entrants see related sub-sections in **Module 2, Competition and Price Regulation**). Measuring the achievement of policy objectives

Picture 1 to add

General guidance on the framework for developing effective spectrum policy, its features and attributes and the steps needed has evolved to include the following:

- Integration with other dimensions of government goals, objectives and institutions;
- Founded on a realistic assessment of actual circumstances;
- Priorities are set (what comes first, what is most important);
- Establishes strategies and aims to meet clear objectives;
- Integration of policy, planning and implementation;
- Includes the full range of stakeholders (and expertise) in the development of policy;
- Measures and performance are based on outcomes not inputs.

◂ Figure 2.0 depicts the policy formulation process in terms of a hierarchy beginning with guiding principles, policies and strategies.

through specific spectrum management initiatives can be less precise than setting prices using market mechanisms or in establishing technical efficient parameters. It follows, then, that some adjustment may be required overtime.

Digital Switchover is a good example where the economic and technical efficiency goals are balanced by government's concern for social cohesion. Market mechanisms do not necessarily or easily take public policy priorities into account, and so in the case of broadcast, governments often intervene in allocation decisions to ensure that public-value broadcast content is available.

Picture 2 to add

Furthermore, effective policy statements are characterized by the following features and should be considered:

- Clear statement of goals and objectives;
- Description of strategies and implementation steps;

- Accountability framework;
- Tangible outcomes and measureable targets;
- Timeframe and milestones for achieving goals and outcomes.

Practice Notes

- **Spectrum Set-Asides for New Entrants – AWS Auctions in Canada**

Reference Documents

- **Radio Resource Management in Highly Populated Developing Countries**

5.1.4 STAKEHOLDERS

Spectrum management has an impact on almost everyone in society, since almost all of us consume or benefit from spectrum-using services. These services include marketed ones such as broadcasting or mobile communications, and non-marketed ones, such as national defence. Other firms and public bodies are more directly involved as direct users of spectrum.

These latter groups have knowledge and expertise about spectrum-using technologies and their potential. Services provided by private companies depend on people investing the capital necessary. For this reason alone, their views deserve consideration. However, the interests of service providers and end-users do not always coincide and regulators will continue to be involved in arbitrating between occasionally competing interests.

The overall universe of stakeholders includes:

- **End-users**. The interests of end-users, as purchasers of services and beneficiaries of public services, are pervasive. However, it may be hard to get them to participate in consultations. For one thing, most end-users have a small stake in spectrum-using services as consumers only, so their willingness to marshal their resources and make their interest heard may be small. Contrast this with the incentive for a firm such as a mobile operator which derives its livelihood from spectrum and thus from spectrum management. This is feature common to all regulation: concentrated sectional interests can outweigh dispersed consumers and the public interest.
- **Equipment manufacturers**. Traditional spectrum management has involved the assignment of spectrum to individual firms to provide services based on a specified technology and using specified apparatus. This clearly gives equipment manufacturers an incentive to promote proprietary technologies. For example, proponents of various versions of Wi-Max or mobile communications standard might provide information supporting the view that their equipment should be specified for a given spectrum allocation. Such information is valuable to regulators if they are adopting administrative methods of spectrum allocation and assignment, but they should recognize that it is not provided in a disinterested way. In a more flexible regime, where the spectrum regulator does not specify the technology to be employed, this issue does not arise.
- **Providers of commercial services**. Commercial licensees will quite properly pursue their own profits. This will involve seeking access to spectrum for their own use and preventing commercial rivals from gaining access to it and are thus likely to oppose awards to competitors. Also, when spectrum licences are auctioned licensees will argue to have limits placed on later awards of spectrum. They are thus likely to oppose awards to competitors. Also, when spectrum licences are auctioned, they will encourage the regulator to place a limit on later awards of spectrum. This may increase expected profits from the licences, and hence – to some degree – expected auction proceeds, but the cost falls on consumers, if in the later periods will have less access to competitive suppliers in the market place for services.
- **Providers of public services**. Much spectrum – about a third or more in many countries – is assigned to providers of public services such as emergency services or national defence. Regulators typically grant requests for spectrum from such bodies free of charge, or subject to an administrative charge only. This creates an incentive for public bodies to ask for spectrum which they may not strictly need, or may not need at the time of asking. Such requests can be justified as a precautionary measure – to accumulate spectrum for future use, or retain it in case it is needed later, but this arrangement does not encourage spectrum efficiency in either the economic or the technical sense (see **Section 1.3.2**). Audits or special incentives may be necessary to encourage efficiency in the use of public spectrum or better still, since public users pay market prices for other inputs should public spectrum use not be subject to the same spectrum usage fees as equivalent private user.

It is thus clear that a spectrum regulator will have multiple interactions with parties seeking to influence its decisions. The regulator's goal should be to engage with the stakeholders, understand what they want from the spectrum management regime, and gain as much accurate knowledge from them as they can, but maintain independence in making final decisions in the public interest.

There are numerous examples of industry fora where the needs of providers of public services put forward arguments for additional spectrum resources and in some cases explore both existing and predicted technical issues and problems such as interference to existing services resulting from changes to frequency allocations.

Reference Documents

- **Cayman Islands - Information and Communications Technology Authority - The Public Consultation Process**
- **India: TRAI Allocation and Pricing of 3G and BWA Spectrum - A consultation report, 2006**
- **Lesotho- Proposal for Licensing Procedures: Consultation Document**
- **Mauritius - Broadband Wireless Access Consultation**
- **United Kingdom - Independent Audit of Major Spectrum Holdings, 2005**

5.1.5 FUNDAMENTAL MANAGEMENT APPROACH

Historically, regulators have assigned frequencies by issuing licences to specific users for specific purposes – an administrative approach. The administrative approach can also be more or less prescriptive on the details of spectrum use. Often it has involved specifying what equipment a licensee can use and where, and at what power levels it can be used.

This is a good way to control interference yet such methods are often slow and unresponsive to new technological opportunities. They also assume a level of knowledge and foresight on the part of the spectrum regulator which it may not possess. Attention has recently been focused on creating genuine markets for spectrum and spectrum licences under which both the ownership and use of spectrum can change in the course of a licensee's operation. This is a major step beyond the auctioning of licences which are not subject to trading and change of use. It does, however, require the full specification of what 'property rights' to spectrum can be traded and utilized.

Some spectrum, especially for short-range use (Bluetooth, Radio Frequency Identification Device (RFID), microwave ovens, various remote control devices, wireless security systems, etc.) need not be licensed at all. This might be the case where users do not interfere with one another, or because new technologies can be employed which are capable of dealing with interference as it happens. If such coexistence can be achieved, the spectrum commons approach is desirable.

Regulators should look for the right balance among the three methods of administrative assignment, use of markets and commons. The choice will be based on such things as the general scarcity of spectrum in various parts of the country and in various portions of the spectrum, the human and financial resources available to the regulator; the various types of use – commercial or public service; and opportunities for innovation and commerce. The growing recognition that spectrum regulators may not be able to collect and process the information needed to make efficient administrative assignments is one of the factors promoting spectrum reform throughout the world.

As an illustration of the changing balance among methods of spectrum management the United Kingdom spectrum regulator, Ofcom, has decided upon a radical shift from administrative methods to a market-based approach, and a smaller expansion of the commons, over the period up to 2010, as shown in Table 3 below. An example of spectrum trading in Guatemala is given in the practice note below.

◂ **Table 3 Ofcom Market Based Allocations**

Spectrum management method	**% of Spectrum allocated in:**	
	Year 2000	Year 2010
Administrative	96%	22%
Market	0%	71%
Commons	4%	7%

Note: Table 3.0 is based on a particular method of weighting spectrum in different frequencies, described in the source document.

The three methods are reviewed, and some general observations made on the balance among them, in the following sections.

Reference Documents

- Group on Telecommunications Report - Mechanism of Spectrum Management
- Leadership and the Independent Regulator
- Marketplace Readiness of Narrowband/Broadband Wireless Access Systems in the 2.3 and 3.4 GHz Spectrum Bands
- Modelling the Efficiency Properties of Spectrum Management Regimes
- Review of Spectrum Management Practices
- Up the Revolution, 2005

5.1.5.1 THE ADMINISTRATIVE METHOD

The administrative method (or traditional method) is the overwhelmingly dominant form of spectrum management at the present time and has been over the past one hundred years, since spectrum first began to be licensed. It is practised by all spectrum management authorities.

In the administrative spectrum management method, a spectrum manager specifies detailed rules and constraints affecting how, where and when spectrum can be used and who has access to spectrum. Minimizing harmful interference lies at the heart of the traditional model which places an emphasis on the technical management of radio spectrum. As a consequence, different services are sometimes allocated to different frequency bands, although in most frequency bands, more than one radio service is allocated, and sharing between services takes place under specified technical criteria.

In the administrative method there are two stages involved in authorizing spectrum use:

- The allocation stage; and
- The assignment stage.

At the allocation stage, as described in Section 7: International Affairs, broad decisions on spectrum use are made on global and regional ITU radiocommunication conferences. National spectrum regulators prepare their own allocation tables on this basis, which usually impose further restrictions on spectrum use. The decisions are formalised in a National Frequency Allocation Table.

At the allocation stage, a key feature of the administrative method is that any restrictions on allowable uses of spectrum are made by the spectrum manager. Potential users of spectrum can make proposals for allocations - for example for new communication technologies, but without the allocation being made, matters cannot progress further.

Once an allocation has been determined, spectrum use is authorized at the assignment stage with the issuance of a license(s) which is assigned to particular user(s). Historically, assignments were made by methods such as first-come, first-served basis or by way of comparative evaluation (also known as 'beauty contests') sometimes involving public hearings and/or consultation rather than by market-based methods.

Reference Documents

- CTU Workshop: Administrative and Market Methods for Assignment, 2006
- ITU/BDT: GREX Seminar on Spectrum Reform: Administrative Methods, Extract of Presentation given by Dale Hatfield, 2006

5.1.5.2 MARKET METHODS

Market methods are being employed both at the initial issuance of a spectrum licence, when auctions are used (for a detailed discussion of Auctions see Section 5.5), and, more significantly, by allowing spectrum rights to be bought and sold in the lifetime of a licence and allowing a change of use of the relevant spectrum. Trading only involves the change of ownership of licences, whereas liberalisation involves giving greater flexibility in how spectrum is used to the user. We use term 'trading' to cover both change of ownership and flexibility.

Spectrum Trading

Spectrum trading is introduced here in this section and for a more detailed discussion of Market-based Sharing see Section 4.2.4 of this module.

Spectrum trading is a mechanism whereby rights and any associated obligations to use spectrum can be transferred from one party to another by way of a market-based exchange for a certain price. In contrast to **spectrum re-assignment,** in a spectrum trade, the right to use the spectrum is transferred voluntarily by the present user, and a sum is paid by the new user of the spectrum which is retained, either in full or in part, by the present (transferring) user. For example, in February 2010, Optus Mobile, an Australian mobile network operator, announced that it had entered into an agreement to purchase 3G spectrum licences from 3G Investments, a subsidiary of Qualcomm.[*] The spectrum licences are for 10MHz of paired spectrum in the 2100MHz band in eight regional capital cities in Australia.

Spectrum trading contributes to a more efficient use of frequencies because a trade will only take place if the spectrum is worth more to the new user than it was to the old user, reflecting the greater economic benefit the new user expects to derive from the acquired spectrum. These efficiency gains will not be realized, however, if transaction costs are too high and one of the aims of any spectrum trading regime should be to keep down transaction costs. After all, the goal is to facilitate transfers by establishing a swift and inexpensive mechanism. If neither the buyer nor the seller behave irrationally or misjudge the transaction, and if the trade does not cause external effects (e.g., anti-competitive behaviour or intolerable interference), then it can be assumed that spectrum trading contributes to greater economic efficiency and boosts transparency by revealing the true opportunity cost of the spectrum.

Furthermore, trading has other relevant indirect effects:

- it enables licensees to expand more quickly than would otherwise be the case;
- it makes it easier for prospective new market entrants to acquire spectrum;
- if spectrum trading were combined with an extensive liberalization of spectrum usage rights, there would be a considerable incentive for incumbents to invest in new technology in order to ward off the threat of new entrants in the absence of other barriers to entry (i.e., the unavailability of spectrum);
- this, in turn, would boost market competition.

Forms of Spectrum Trading

The European Commission identifies the following methods for transferring rights of use:

- Sale – Ownership of the usage right is transferred to another party;
- Buy-back – A usage right is sold to another party with an agreement that the seller will buy back the usage right at a fixed point in the future;
- Leasing – The right to exploit the usage right is transferred to another party for a defined period of time but ownership, including the obligations this imposes, remains with the original rights holder.
- Mortgage – The usage right is used as collateral for a loan, analogous to taking out a mortgage on an apartment or house.

In terms of the trade itself, there are a variety of mechanisms that can be used. These include:

- Bilateral negotiation: The seller and (prospective) buyer directly negotiate the terms of the sale and are not subject to any particular constraints set by the regulator;
- Auctions: Once a type of auction has been chosen and the rules have been decided by primarily the seller, prospective buyers have the opportunity to acquire the spectrum usage rights by bidding in the auction;
- Brokerage: Buyers and sellers employ a broker to negotiate, with their consent, the contractual terms under which the transfer of usage rights can take place;
- Exchange: This refers to the establishment of a commercial trading platform, similar to a stock market, where transfers take place according to specific rules established by the members.

These mechanisms are most likely to be used in combination. In the first instance an auction will be used as the primary means of assignment, tradable spectrum is listed on an exchange and either direct negotiation or brokerage facilitate the transfer of spectrum user rights. As we have discussed earlier band managers may be delegated responsibility for managing certain bands on behalf of the regulator.

Practice Notes

- **Check-list for implementing spectrum markets**
- **Review of the European Union Telecommunications Regulatory Framework, 2007**

- Spectrum Trading in Practice - ECOWAS

Reference Documents

- A Proposal for a Rapid Transition to Market Allocation of Spectrum, Federal Communications Commission, November 2002
- Designing property rights for the operation of spectrum markets, 2003
- Guatemala - Spectrum Trading
- Guatemala: The Guatemalan Experience, 2005
- Solving Spectrum Gridlock: Reforms to Liberalize Radio Spectrum Management
- Spectrum Trading in Germany, Austria and the UK: The influence of regulatory regimes and evaluation of criteria on competition in the European Mobile Telecommunications Sector, August 2003
- Spectrum Trading Increasing Efficiency of Spectrum Usage
- Study on the conditions and options in introducing secondary trading of radio spectrum in the European Community
- USA: Assigning Property Rights to Radio Spectrum Users, 1998

5.1.5.3 UNLICENSED SPECTRUM

License-exempt or unlicensed spectrum is free from centralized control in which anyone can transmit without a license while complying with rules that are designed to limit/avoid interference. The spectrum commons involves unlicensed spectrum although in practice what is referred to as a spectrum commons can have varying degrees of management. Licence-exempt bands (e.g. the ISM bands) are an example of a spectrum commons with some management in terms of power restrictions on individual users as applied in the US under the FCC Part 15 rules.

A detailed history of the development of unlicensed spectrum in the United States is provided in an FCC paper by Carter, Cahouji and McNeil (summarized below and also see the paper by Ken Carter). Broadly, the same history is true in other countries. In the 1920s, essentially all spectrum was unlicensed. The confusion and interference this caused, especially among broadcast stations, led to a licensed approach being adopted in the 1930s, although some spectrum was still set aside for unlicensed use.

Over time, the main unlicensed bands were those designated as industrial, scientific and medical (ISM). These were bands where there was non-communications use of spectrum, for example, for heating purposes, etc. Because this use generated interference, the ISM bands were generally not licensed. Hence, they were often made available for unlicensed usage. ISM bands under ITU Radio Regulation 5.150 pertaining to Region 2 include the following bands: 902-928 MHz (centre frequency 915 MHz), 2400-2500 MHz (centre frequency 2450 MHz), 5725-5875 MHz (centre frequency 5800 MHz), and 24-24.25 GHz (centre frequency 24.125 GHz).

In the past ten or so year's interest in greater use of unlicensed spectrum has grown sharply. This is the result of the following developments;

- Deployments of new technologies in the 2.4GHz band, particularly W-LANs have been commercially successful, leading many to ask whether further unlicensed allocations would result in more innovation and deployments.
- The development of ultra wide band (UWB) and the promise of software defined radio (SDR) have led some to question whether these technologies can overcome historical problems with unlicensed spectrum.
- Continuing development of low power devices and new applications.

Low power device frequencies refer to a whole range of frequencies from 160 KHz. to 10.55 GHz. which are used for a variety of radio communication and non-communication purposes. The ISM bands include low power devices, and some of these are listed below:

- 902-902.1 / 927.9 – 928 MHz. (rural radiophones);
- 902-928, 2400-2483.5 and 5725-5875 MHz. Note: specific technical standards around field strength and harmonics apply (> 50 millivolts/m);
- 902-928, 2435-2465 and 5785-5815 MHz. (Field Strength Disturbance Sensors):
- 5150-5350 and 5725-5825 MHz. (local area network devices).

Other commonly used bands for low power devices include:

- 174-217 and 608-614 MHz. (medical telemetry);
- 2900-3260, 3267-3332, 3339-3345, 3358-3600 MHz. (vehicle identification).

Used of unlicensed devices is expected to rise dramatically in the next 5 years and is illustrated in Chart 1. Around 1 percent of the total value from the radio spectrum comes from the use of unlicensed bands. This claim can be traced to a study undertaken by Europe Economics for Ofcom in 2006.

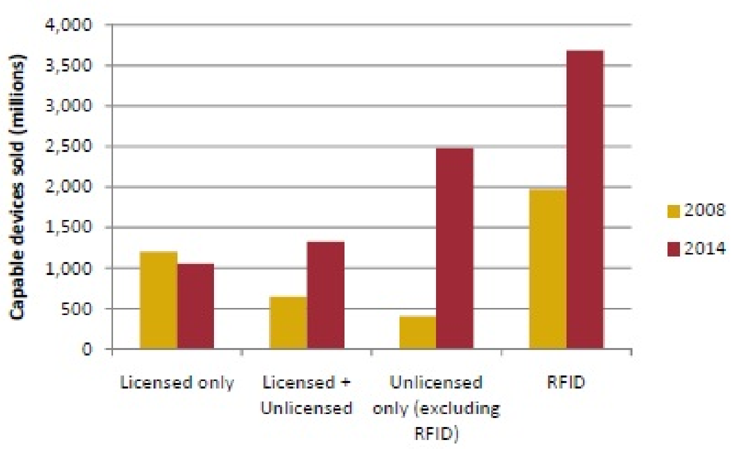


Figure 1. Global Sales of Unlicensed Devices

Photo: Perspective Associated 2009

In the USA the estimated yearly benefits derived by consumers and producers, in the form of consumer and producer surplus, for use of spectrum in a number of industry sectors was estimated at $277 Billion per yeae. The uses for spectrum reflect a range of public and private uses of spectrum:

- Public mobile – including cellular mobile, paging, public mobile data networks, and public access mobile radio;
- Broadcasting – including analogue and digital TV, and analogue and digital radio;
- Satellite links – meaning the operation of satellite links, such as VSATs and permanent earth stations;
- Fixed links – meaning the operation of radio fixed links, for example to substitute for or supplement cable links in telecommunications infrastructure;
- Wireless broadband – meaning the provision of Wi-Fi and other wireless access services;
- Private mobile radio – meaning mobile radio communications services provided for non-public use, such as by emergency services, taxi companies and transport companies,

The study results for the USA for an estimate of the value of unlicensed spectrum use for three main applications appear below in Table 1.

Scenarios (2009-2025) $Billion per Year	Low	Medium	High
Home Wi-Fi	4.3	8.4	12.6
Hospital Wi-Fi	9.6	12.9	16.1
Clothing RFID	2.0	4.1	8.1
Total	15.9	25.4	36.8
As a % of Total Estimated Value from the Use of Spectrum	5.7%	9.2%	13.3%

Table 1 Economic Values Generated by Unlicensed Applications in the US shows the currently unlicensed bands in the United Kingdom.
UK Unlicensed Bands

Source: The Economic Value Generated by Unlicensed Usage of Spectrum, Perspective Associates 2009 and McLean Foster & Co.

Generic Frequency Band	Application
9 kHz to 30 MHz	Short Range Inductive Applications
27 MHz	Telemetry, Telecommand and Model Control
40 MHz	Telemetry, Telecommand and Model Control
49 MHz	General Purpose Low Power Devices
173 MHz	Alarms, Telemetry, Telecommand and Medical Applications
405 MHz	Ultra Low Power Medical Implants Devices
418 MHz	General Purpose Telemetry and Telecommand Applications
458 MHz	Alarms, Telemetry, Telecommand and Medical Applications
864 MHz	Cordless Audio Applications
868 MHz	Alarms, Telemetry and Telecommand Applications
2400 MHz	General Purpose Short Range Applications, including CCTV and RFID. Also used for WLANs including Bluetooth Applications
5.8 GHz	HyperLANs, General Purpose Short Range Applications, including Road Traffic and Transport Telematics
10.5 GHz	Movement Detection
24 GHz	Movement Detection
63 GHz	2^{nd} Phase Road Traffic and Transport Telematics
76 GHz	Vehicle Radar Systems

Practice Notes

- **ITU Radio Regulation 5.150 - ISM Bands**

Reference Documents

- **Ireland: Use of Unlicensed Spectrum in Rural Applications**
- **RSPG Report on cognitive technologies**
- **Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and their Regulatory Issues, Federal Communications Commission, May 2003**
- **USA: Spectrum Efficiency Working Group Report, 2002**
- **Wireless internet access 3G vs. Wi-Fi, Lehr, 2003**

5.1.5.4 REGULATING CELLULAR AND MOBILE BROADBAND SERVICES

The centre of gravity of the telecommunications sector in emerging countries is profoundly becoming wireless instead of fixed. This is shown vividly in Table 1.5.4 which follows the number of mobile lines to the number of fixed lines, countries like India are 14 to 1; in Jordan it is 12 to 1; and in Vietnam the ratio is 6 to 1. Whereas, in developed countries such as the UK and USA the ratio is 2 to 1.

Sources: :(1) ITU ICTeye 2009 and (2) CIA Fact Book, 2011. (3) Census data for each country originating with national offices for statistics. * Estimate extrapolated to 2009. Available statistic based on 2000 Census. Compiled by McLean Foster & Co.

Country	Population (2)	# of Households (000) (3)	GDP/Capita/PPP/USD (2)	Mobiles per 100 Inhabitants (1)	Wirelines per 100 Inhabitants (1)
India	1,189 M	222,000	3,400	43.83	3.09
Indonesia	245.6 M	65,000	4,300	69.25	14.77
Jordan	6.5 M	1,193	5,300	95.22	7.94
Malaysia	28.7 M	6,270	14,700	109.74	15.70
Thailand	66.7 M	18,660*	8,700	97.33	10.63
Viet Nam	90.5 M	22,628	3,100	111.53	19.79

In these six emerging countries, the fixed network is for all intents and purposes a monopoly, whereas mobile networks are more numerous, ranging from two/three in number in some countries to a dozen in some regions ('circles') in India. The main reason for this is that mobile networks are much less capital intensive, at least in the radio access network. A mobile network is more scalable, in the sense that when demand is low, service can be provided with a relatively inexpensive 'coverage network,' the cost of which depends upon the frequencies which have been assigned. A mobile network can then be furnished with more base stations in a given area when traffic volumes increase. For this reasons, and for others competition in the wireless arena is not subject to the same structural barriers of entry that afflict fixed networks. Moreover, by certain measures of competition the mobile sector is highly concentrated which might create barriers to competition and lead to low levels of penetration. This has proven not to be the case. In this respect, emerging countries show a combination of high concentration and of high take-up or penetration.

The implications of these observations for regulators and spectrum managers are significant. For emerging economies, as well as developed economies, the availability of spectrum is key to telecommunications development over the next decade. In almost every part of the world, wireless data traffic can be expected to increase, even double by some estimates, year over year for the next five years. [*] Developing broadband will crucially depend upon spectrum availability. Abundant spectrum is essential in promoting competition and innovation in telecommunications markets. The opposite case, in which spectrum availability is inadequate will lead to higher prices, limit market entry for competitors, and constrain innovation.

Most successful efforts to improve availability begin with knowing how spectrum is being used and by whom. Spectrum audits and spectrum demand and supply studies which cover all spectrum users, especially government users, lead to steps which can result in new allocations and adjustments between users. See Section 2.4.3 Planning for Future Use.

It will likely be necessary to look at policies/principles connected with allocation and assignment procedures to ensure that both technical and economic efficiency are considered and properly balanced. [*]

5.1.5.5 STRIKING A BALANCE

Spectrum regulators have to exert judgement over how to combine the three methods described here. It may be sensible to start with defining the area for the commons by focussing upon the expected scope for relatively low-power, non-conflicting uses likely to emerge.

The major decision is where to settle between administrative and market methods in spectrum licensing.

Arguments in favour of the former are:

- it gives a high level of control
- it is 'safer' in terms of avoiding interference.
- it makes re-allocation of spectrum among radio services easier

Arguments in favour of the latter include:

- it is more flexible;

- it delegates decisions to those with the best knowledge;
- it can work speedily to make adjustments in spectrum use within defined criteria.

5.1.6 GOVERNANCE AND OUTSOURCING

High-level spectrum objectives have been discussed in **Section 1.3**. Here we discuss how best to position the regulator to achieve those objectives, and how outsourcing and delegation can assist.

The fundamental issue here is how to divide up spectrum management responsibilities amongst the government, an independent spectrum regulator, and private sector organisations to which some of these tasks can be subcontracted by outsourcing, and the licensees themselves, which can be asked to undertake some 'self-regulation', possibly on a co-operative basis.

This raises broad questions over what type of body should exercise power over spectrum management decisions, as well as narrower ones about how particular functions can most efficiently be performed.

The broader question over how power to regulate spectrum should be exercised depends upon a country's constitutional circumstance, its political and legal systems and possibly its stage of development and the nature of the demand for spectrum- in particular whether spectrum is a scarce and highly valuable resource, or whether it be made available to at least the bulk of demands placed upon it.

It is clear that strategic decisions about the regulation of spectrum should not be undertaken by operators themselves, which would naturally pursue their own special interests. This same principle is set out in the WTO's Reference Paper on Basic Telecommunications, which, in relation to regulation of telecommunications more generally requires that;

> "The regulatory body is separate from, and not accountable to, any supplier of telecommunications services. The decisions of and the procedures used by regulator shall be impartial with respect to all market participants."

The regulator's independence from government is a separate matter. There are arguments that a democratically accountable government is entitled to exercise key responsibilities over the development of a major sector of the economy, such as wireless communications, and there are concerns that there is a risk that such decisions will become politicised and that this will introduce uncertainty about regulation on the part of investors, which might in consequence fail to put up the necessary capital to build the networks.

The issue of the location of regulatory power is discussed in **1.6.1**; alternative approaches to spectrum management such as New Zealand's Management Rights system and Band Managers are discussed in **1.6.2**, and the more technical issues of outsourcing and the example of spectrum trading systems are discussed in **1.6.3** and **1.6.4.**

Reference Documents

- **De-regulating the spectrum - Implications for Technology**
- **Report of the Spectrum Rights and Responsibilities Working Group**
- **Utility Regulator's - The Independence Debate**

5.1.6.1 INSTITUTIONAL ARRANGEMENTS

A spectrum regulator is buffeted by representatives of private sector stakeholders, some of whose interests are not fully aligned with the public interest. It has to retain the capacity for independent decision-making. This clearly requires the necessary authority and access information necessary to make that authority effective.

Secondly, it is something desirable to make the spectrum regulator independent of government in its day-to-day operations. This has the effect of making spectrum regulation free from political interference. As a result, operators may be more willing to invest in spectrum-using activities if they are to some degree protected from political pressure.

In practice, the institutional arrangements for spectrum regulators differ throughout the world, but broadly fall into two categories:

  - The regulator is an independent agency, normally established by statute, with specified powers and responsibilities, and
  - The regulator is part of a government ministry.

In the former case, the regulator regime may combine responsibility for spectrum regulation with regulation of broadcasting and/or regulation of the telecommunication sector (converged regulator). In the United Kingdom, for example, the task of regulating all spectrum was transferred in 2003 from the Department of Trade and Industry (part of Government) to Ofcom. In the United States, the Federal Communications Commission is responsible for regulating broadcasting and telecommunications and for those spectrum frequencies which are *not* used by the federal government. In Canada, spectrum regulation is the responsibility of the Industry Canada, a government ministry, while the telecommunications and broadcasting sectors are independently regulated by the Canadian Radio-television and Telecommunications Commission.

Two remarks can be made about the efficiency in these arrangements:

- First, there is a good case for unified regulation of all spectrum by the same body to ensure a consistent and logical approach to all frequencies. This is shown by the adverse consequence of the bifurcated system in the United States, where there are two spectrum agencies, the FCC and the NTIA. The FCC is responsible for managing private sector spectrum including broadcasting and spectrum used by state governments; the NTIA is part of the Department of Commerce which is responsible for managing the US government's use of spectrum. The involvement of both the FCC and the NTIA in the use and management of spectrum has resulted in major problems of co-ordination.
- Second, combining spectrum regulation with broadcasting and telecommunications regulation creates a better basis for providing analysis of both sets of problems – for example – ensuring that spectrum is available simultaneously to support opportunities for new competitive broadcasting and telecommunication services. There is, however, the risk that the regulator of these two industries (broadcasting and telecommunications) may become captured by these two large groups of spectrum users to the detriment of other users of the spectrum with less contact with the regulator.

It must also be recognised that there are many gradations of independence from government. An independent spectrum regulator might be created, but it might be granted little authority over major allocation and assignment decisions, being instructed instead to focus, for example, on licence enforcement or monitoring. Equally, the staffing of an 'independent' agency might in effect make it an instrument of government.

Whether an independent agency or a government body is better for spectrum regulation is likely to depend on particular circumstances. In some countries, agencies may be more subject to capture by special interests, and regulation by government may be preferable while in other countries, government may be prove to interfere in regulatory decisions, for political or other reasons and in this may make it desirable to have an agency independent from governments, but operating within government policies guidelines making decisions.

Related Materials

Module 6, section 5.1, "What constitutes an effective regulator?"

Reference Documents

- **Impact of the Regulator's Independence on the Telecommunications Industry**
- **Leadership and the Independent Regulator, Public Utilities Research Centre, University of Florida**
- **Traits of an Independent Communications Regulator: A Search for Indicators, FCC International Bureau Working Paper Series, June 2004**
- **Utility Regulators – The Independence Debate, The World Bank Group, Private Sector, Note. No. 127, October 1997**

5.1.6.2 MANAGEMENT RIGHTS SYSTEMS AND BAND MANAGERS

New Zealand's Radiocommunications Act 1989 was pioneering and radically changed the landscape of spectrum management. New Zealand was the first country to create a management rights system whereby owners of blocks of "management rights spectrum" are free to issue spectrum licences for the specified part of the spectrum according to their own policies. In New Zealand's case, there are 209 management rights blocks with 70 reserved for the government covering services like broadcast. The other 139 blocks are reserved for essentially commercial services like fixed and mobile services.

Spectrum Licences granted by a manager of a block of management rights spectrum usually have the following characteristics:

- assigned for a defined period of time;
- non-specific to equipment or transmission methods; and
- define an envelope within which the licence holder is free to operate at his or her discretion.

Band Managers

A band manager will typically have assignment rights over, or be the licensee of, a block of spectrum, which it will then subdivide among many users. In many respects, a band manager can be thought of as a 'wholesaler' of spectrum, which it then 'retails' to individual users.

Use of a band manager may simply be a means of reducing transaction costs, if competitive tendering produces a manager which is more efficient in the relevant business process than the regulator itself. Band managers can also permit more efficient use of spectrum by pooling demand. Such policy is effective if:

- individual users have insufficient spectrum to achieve efficient usage, and
- different users of spectrum have demand patterns that peak at different periods.

New technological developments such as 'agile' technologies which allow transmitters and receivers to 'hop' across frequencies increase the potential role of band management.

On the other hand, band managers can become possessive of the spectrum which they have been awarded to manage, and this can thwart spectrum policy objectives, for example, when the spectrum regulator wishes to re-allocate the spectrum managed by the band manager to another purpose.

Practice Notes

- **New Zealand - Creation of Management Rights in the Broadcast and IMT Bands - 1999**
- **Types of band managers**

5.1.6.3 OUTSOURCING

Wherever a spectrum regulator is positioned, questions will arise – as with any activity – as to whether the organisation should perform functions in-house, or outsource them to others. In practice, almost all regulators outsource some activities. We are thus talking about choosing a point on a continuum, not making a single choice over whether to outsource. The decision criterion in each case should be efficiency: what arrangement yields the best outcome in terms of cost, quality and the independence of decision-taking?

In ascending order of significance, outsourcing may involve:

- i) Hiring consultants with specialised skills to perform discrete tasks, such as planning a particular band (see Practice Notes for an example of a tender for such a contract);
- ii) Using outside resources for certain support functions such as software development and operation or maintenance of computer systems;
- iii) Using outside resources to cope with short workload peaks;
- iv) Assigning a function, such as monitoring emissions in a particular region or interference investigations, to an outside organisation, which reports the results directly to the regulator;
- v) Assigning a client-facing function, such as enforcement of licence conditions to an outside body;
- vi) Assigning certain administrative responsibilities such as issuance of radio operator certificates to an outside body;
- vii) Assigning responsibility for a range of frequencies to a band manager, which will make assignments to individual users;
- viii) Delegating broader policy responsibilities.

Practice Notes

- **Types of band managers**

5.1.6.4 SPECTRUM TRADING SYSTEMS

The ability of regulators and licensees to keep track of current licences is an important component of market-based systems and can be facilitated by a publicly available database. Knowledge of the location of existing Tx's and Rx's (where feasible) will allow potential purchasers of rights to accurately model the existing interference environment they are seeking to enter and to enable them to properly assess the rights they seek to acquire. The database should:

- should enable regulators if called upon to adjudicate spectrum disputes and to enable them to track and assess the usage of spectrum in differing bands;
- Should include additional tools to analyze, data on spectrum historical occupancy/usage and to interpret alternative propagation models.

In the US, a spectrum auction and trading system is operated by Cantor-Fitzgerald, the Wall Street brokerage, providing an example of the sorts of capabilities that are needed at a minimum. See the following practice note.

Practice Notes

- Spectrum Trading Systems

5.2 SPECTRUM POLICY AND PLANNING

Spectrum regulators will have to make decisions about the uses of spectrum and on who should be allowed to use it (i.e., uses and users). The international framework for the utilization of the radio frequency spectrum is set out in the ITU's Radio Regulations. There is, however, considerable flexibility for the establishment of national policies following recommendations contained within the framework. The mechanism for determining who may use spectrum within a given country involves some planning. How much planning depends on the extent to which the regulator wishes to rely on the market. The greater the reliance on the market, the less planning will be required.

5.2.1 INTRODUCTION

In this section you find a discussion on the related topics of Spectrum Policy and Planning followed by Technical Standards and Allocating Spectrum:

2.2 Policy

2.3 Spectrum Planning

2.4 Technical Standards

2.5 Allocating Spectrum

For more information on these topics, please click the appropriate heading in the Table of Contents in the left navigation pane on this page.

Regulators of the spectrum have to make decisions about how it can be used and who should be allowed to use it (i.e., uses and users). While the international framework for the utilization of the radio frequency spectrum is set out in the ITU's Radio Regulations, there is considerable flexibility for the establishment of national policies within this framework.

Determining who may use the spectrum within a given country requires a certain degree of planning, the extent of which depends on how much the regulator wishes to rely on the market. The greater the reliance on the market, the less planning is required.

This difference is revealed if we contrast the emphasis on planning under administrative and market based spectrum management approaches. Four phases of planning are described in the ITU-R Report SM.2015 on Long-Range Planning referenced below. The four planning steps are:

- Determining spectrum requirements;
- Determining spectrum availability;
- Considering spectrum planning options;
- Spectrum planning implementation.

Under a market based approach and with the caveat that sufficient spectrum has initially been made available for the market to properly function, the regulator can be less active in leading the determination of spectrum requirements and availability since these adjustments will take place between users. Also with the advent of advanced technologies and the use of the spectrum commons, the requirement for band planning could be curtailed. For more a detailed discussion on market mechanisms and spectrum sharing see Section 5: Spectrum Sharing.

5.2.2 INSTITUTIONAL FRAMEWORK FOR SPECTRUM MANAGEMENT

International, regional and national regulatory frameworks significantly influence spectrum policy formulation, harmonization and implementation.

As reviewed in more detail in Section 7 - International Affairs, the ITU harmonizes the efficient use of the spectrum resource on a global basis on behalf of governments. Ultimately, the implementation – how and when recommendations and regulations are implemented – rests with national governments. Allocations of radio spectrum are agreed upon at the ITU World Radiocommunication Conferences (WRC) for each ITU Region, and the Radio Regulations are then revised. Agreements on changes to allocations made at WRCs have treaty status, and international harmonization and coordination of spectrum allocation are essential for many public sector services, such as transport.

Practices across regions vary and decisions made about spectrum allocation vary across the three ITU regions. Region 1 has multiple sovereign markets and attempts a unified approach. Region 2 is dominated by the US and often reflects a single market approach whereas there multiple sovereign markets and no real unified approach across Region 3 encompassing Asia-Pacific and Oceania.

In Europe, common positions in relation to WRC agenda items are developed by the European Conference of Postal and Telecommunications Administrations (CEPT); the CEPT includes 48 European member states. The European Union presents a particularly unique situation with broad policy in terms of goals, direction and timelines set on a pan-national basis, while the detailed implementation of policy is left to individual member countries. Much like North and South America, there is no formal process for setting a common agenda in Asia to coordinate and harmonize policy or spectrum use.

One of the hurdles in establishing coordinated policy at the national level is diverse regulatory framework for broadcast and telecommunications:

- in some cases, there is one regulator for both broadcast and telecommunications, and;
- in other cases, the regulation of these services is divided between separate regulators.

At the beginning of 2011, separate regulators had been established in more than 80 per cent of countries, totaling 158 regulators worldwide, up from 106 regulators a decade ago. Africa has the highest percentage of regulators (relative to the total number of countries in each region) with 93 per cent, followed by the Americas and Europe with 91 and 88 per cent, respectively. Moreover, Asia-Pacific has 73 per cent, Arab States have 71 per cent, and the CIS has the lowest with 50 per cent.

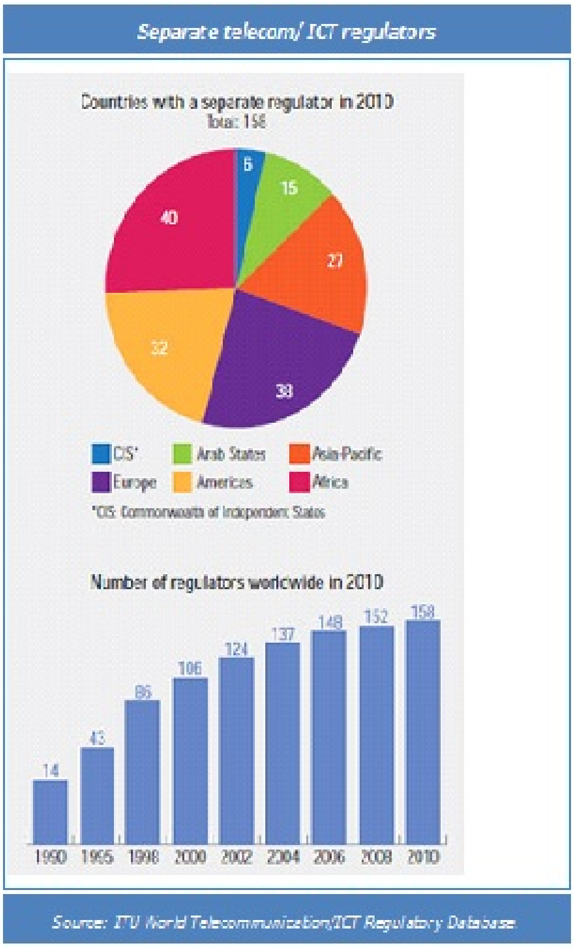


Figure 1 Countries with Separate Regulators, 2010

Photo: ITU World Telecommunication/ICT Regulatory Database

Countries with separate regulators have adopted different institutional and organizational frameworks to adapt to the fast-changing ICT environment. While the main trend in most regions has been to establish a sector-specific regulator, some countries have moved towards merging pre-existing separate regulatory authorities into a converged regulator, while others have expanded the mandate of the regulator to include posts, information technology, broadcasting content, or spectrum management. Figure 2.2 illustrates this issue by illustrating that there is no consistent pattern in regulatory mandate and function across the various regions of the globe.

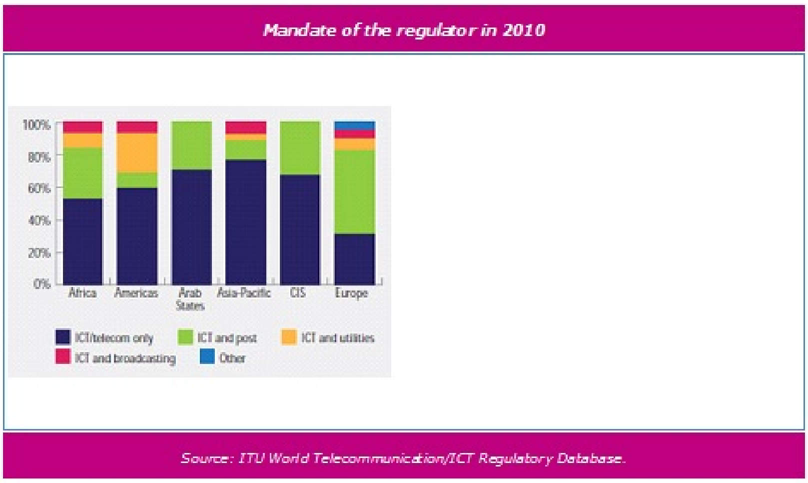


Figure 2 Mandate of the Regulator 2010

Photo: ITU World Telecommunication/ICT Regulatory Database

Several countries in the Americas, Europe and Africa have established multi-sector agencies, either when sector reforms were initiated or after their markets reached a certain level of maturity. In these cases, countries have merged pre-existing separate regulators of public utilities to oversee, for example, the telecommunications, postal, electricity, gas and railway sectors.

In several jurisdictions regulators are now responsible for regulation beyond their traditional core activities. These traditional functions consist of: regulating access to telecommunication/ICT infrastructure and services through licensing; managing scarce resources such as spectrum and numbering resources; dealing with interconnection issues; setting and enforcing quality of service standards; and managing universal access support programmes.

In 2010, 16 per cent of regulators had responsibility for broadcasting content, sometimes sharing that responsibility with another ministry. While Internet content is unregulated in more than 44 per cent of countries worldwide, it is around 13 per cent of telecommunication/ICT regulators' mandates. Information technology is included in the mandate of 30 per cent of regulators, a responsibility that is shared in 12 per cent of cases.

At the policy and standards level, the same diversity is evident. For example, for television systems different standards apply to various regions around the world where there are three dominant analogue television standards: NTSC, PAL and SECAM. There have been some intensive efforts made to achieve cooperation at the regional and trans-regional level to smooth out the process and simplify the inherent diversity. The Geneva Frequency Plan referred to as GE06 is a prime example of such an inititative.

5.2.3 SPECTRUM POLICIES AND PRINCIPLES

At the national level, there are a number of important policy questions to be reviewed and resolved affecting the regulation of spectrum. These policy questions include the government's own use of spectrum with the underlying concern that government departments can under utilize the spectrum assigned to them. Other policy matters include the extent to which market mechanisms should be used to assign spectrum and used to set the price for spectrum; and, what are the permanent or temporary property rights of licensed and unlicensed users. These and other policy questions are raised in the balance of this Section.

Spectrum Managers can assist the Government and National Regulatory Authority by leading the development and approval, after extensive and meaningful stakeholder input and consultations, of spectrum policies governing spectrum's use, its licensing, spectrum prices, and refarming. Good policies are essential for better decisions to be made more quickly, thereby reducing the risk of regulatory and market failure. Spectrum policies include pronouncements on regulatory direction for the following:

- Spectrum planning policies including the study and assessment of spectrum demand and supply for government and non-government uses, and requirements for band plans;
- Spectrum authorization policies including the use of spectrum auctions, development of spectrum user rights, technical and service neutral assignments and authorization;
- Spectrum pricing policies including objectives, use of incentives, basis for recovery, and implementation of market-based spectrum prices;
- Specific policies for refarming and re-allocation done in conjunction with the development of spectrum user rights, valuation and spectrum pricing.

Core principles should guide policy makers, regulators and ultimately the users of radio frequencies in the management of spectrum. Best practice core principles include the following:

- Spectrum should be allocated to the highest value uses or uses to ensure maximum benefits to society are realized;
- Mechanisms should be put in place to enable and encourage spectrum to move to its highest value use;
- Greater access to spectrum will be facilitated when the use the least cost and least restrictive approach is chosen in achieving spectrum management goals and objectives;
- To the extent possible, regulators and spectrum managers need to promote both certainty and flexibility;
- Balance the cost of interference with the benefits of obtained from greater spectrum utilization.

Harmonized spectrum use with international and regional allocations and standards will reap additional benefits in terms of access and economies of scale and should be pursued, except where Moldova's interests warrant a different determination

Practice Notes

- **European Parliament and Council Decision on a Spectrum Policy ProgrammeArticle 8a(3) of Framework Directive 2002/21/EC as amended by Directive 2009/140/EC**

Reference Documents

- **Chapter 2 of the 2005 Edition of the National Spectrum Management Handbook**
- **European Commission Communication on Next Steps in Radio Spectrum Policy, European Commission, 10 November 1999**
- **GSR 2012 Spectrum Policy in a Hyperconnected Digital Mobile World. Discussion Paper, ITU.**
- **ITU-R Report SM.2015 on Methods for Determining National Long-Term Strategies for Spectrum Utilization**

5.2.3.1 SPECTRUM POLICY REVIEW

Spectrum management policy and practice have been the subject of considerable debate and reform over the past decade and the debate is likely to continue into the future. Over the past decade, spectrum management practises have been steadfastly diverging from sole reliance on administrative approaches to a greater reliance on market based mechanisms. This shift in approach is most prevalent in the area of spectrum assignment and licensing where the use of auctions and more flexible spectrum authorizations - service and technology flexible licenses are becoming more common. Additionally, unlicensed (but not unregulated) spectrum commons are now common practice - See Section 1.6.3 Unlicensed Spectrum

Increased demand, spectrum scarcity especially below 2 GHz, rapid changes in technology, recognition of the high economic value of spectrum and the use of spectrum prices, and the important changes taking place due to the need for international agreements on harmonized allocations (Broadband and Digital Switchover) are driving the need for review and reform. Several country examples are listed below.

United Kingdom – Flexible User Rights and Spectrum Trading

OFCOM is currently shifting UK spectrum policy towards a flexible system of spectrum management. It is liberalizing spectrum usage rights and spectrum trading. A gradual approach is being adopted, embracing progressively more bands and greater flexibility but relying on competitive assignment methods. This progression is exemplified by OFCOM's intention to apply service and technological neutrality in a forthcoming spectrum assignment involving frequencies currently used to support terrestrial analog TV broadcasting. OFCOM also is proposing spectrum user rights in a forthcoming auction of the L band, and in other auctions.

The UK has also adopted a policy of extending market methods of spectrum management to public sector spectrum, giving public sector users the right to trade or lease their spectrum and the obligation to go into the market place to acquire additional spectrum. OFCOM is also extending the application of administrative incentive prices (AIP) to government agencies, requiring them to pay commercial prices for their existing spectrum, as set by regulators - See Section 5.8 Administered Incentive Prices.

India - Spectrum Management Review

In October 2009, the Telecommunication Regulatory Authority of India published a consultation paper examining a broad range of spectrum management activities and issues with central focus on:

- Spectrum Requirements
- Spectrum Licensing, and
- Spectrum Assignments

The consultation process completed in early 2010 and the TRAI has published a paper with recommendations on a range of issues on May 16, 2010.

Spectrum Requirements

The issues considered include:

- How much government spectrum should be refarmed and what are the suggested best methods for re-farming spectrum?
- What will be the impact of the Digital Dividend?

Spectrum Licensing

The issues considered include:

- Should spectrum trading be permitted and when?

- Should spectrum caps be used and what are appropriate spectrum block sizes?
- ppropriate conditions for spectrum sharing; and
- Types of spectrum authorizations.

Spectrum Assignment and Pricing

The issues considered include:

- De-linking spectrum licenses from telecommunication licenses;
- When to use market-based mechanisms?
- How should non-commercial spectrum be assigned?
- Should annual spectrum charges be used and how often should they be revised?
- How should the spectrum management organization be restructured to better reflect spectrum management recoverable costs?

5.2.4 SPECTRUM PLANNING

Spectrum planning processes provide direction and cohesion in support of policy formulation, and support future steps to achieve optimal spectrum use. Major trends and developments in technology and the needs of both current and future users of the frequency spectrum should be closely monitored and mapped. The types of user requirements for systems utilized to conduct frequency management activities, like monitoring systems, channelling plan techniques, and tools should also be planned and developed.

The various aspects of planning at both the international, regional, national and local level are discussed in this toolkit. Information on planning at the international and regional levels may be found in **Section 7 on International Affairs**.

5.2.4.1 PLANNING TIMEFRAMES

Planning is usually undertaken for long-term, medium-term and short-term timeframes. Long range (strategic) planning (10 to 20 years) is required to foresee spectrum requirements far into the future. Such long-term planning must take into account the need to accommodate uses that may not have been predictable at the time of inception. Determining those needs is best done by involving both spectrum managers and stakeholders, as the future needs of a given radio service and the various spectrum management approaches that might be applied are of interest to both of them. Medium-term planning (5 to 10 years) is needed to determine what changes should be made to regional, sub-regional, national and local spectrum policies to meet the changing needs of users and evolving technology that have already been identified. Finally, short-term planning (anything under 5 years) is important where, depending on the nature of spectrum governance in place, changes to spectrum policies can be made to adjust earlier decisions.

Reference Documents

- **ITU: Spectrum Management Systems for Developing Countries, 2006**

5.2.4.10 CONSULTATION WITH STAKEHOLDERS

Consultation with stakeholders is essential in virtually every aspect of spectrum management including the development of national legislation and regulations, spectrum policies, technical standards, etc. While it is seldom practical to consult with each individual spectrum user, effective consultations can take place by also allowing associations or bodies representing groups of users to contribute. In order to facilitate consultation on important spectrum management issues, it is important that the spectrum regulator's proposals be made public. In some countries, this is in any event required under broader national legislation governing all regulatory activities, perhaps by a requirement for setting out proposals in an official or widely-distributed publication. Sometimes, several options may be presented for public comment. It may also be helpful to allow for exchanges between interested parties. Often, meetings are held between the spectrum regulator and relevant stakeholders and the Internet has increasingly become a standard tool for such consultations. Regardless of the means for obtaining input, minimal guidelines allowing interested parties to contribute gainfully should be set, such as allowing for a given period of time, with a deadline by which comments must be submitted. In all consultations, transparency and fairness are paramount. While it deals with somewhat different subject matter, more information on the consultation process may be found in **Section 6.2 of Module 3 on Authorization of Telecommunication/ICT Services**.

RELATED INFORMATION

Authorization Module, Section 6.2.1: The Public Consultation Process

Practice Notes

- **Canada: Policy Statements - Planning, Consultation (National and International)**

Reference Documents

- **Hong Kong: Consultation on Spectrum Reform (refarming), 2006**
- **India: Consultation Paper on: Efficient Utilization, Spectrum Allocation, and Spectrum Pricing, 2004**
- **The Public Consultation Process - ICT Authority Consultative Document**
- **Venezuela: The Introduction of 3G Services - A Public Consultation Document**

5.2.4.11 DISPUTE RESOLUTION

It is quite likely the increased use of spectrum utilizing either market-based or administrative approaches will raise issues which need to be resolved between parties. In the past, this has involved intervention on the part of the regulator which has proven to be difficult in terms of time and cost.

There are two trends at work:

- Rapid changes in the telecommunications sector; and
- Changes in the realm of dispute resolution procedures.

The expansion of the global telecommunications market with its emphasis on innovative and fast-changing technology mechanisms for resolving disputes requires resolution procedures which are not only fast and flexible – but also suited for the types of disputes that the global telecommunications industry produces. In turn, the dispute resolution field is increasingly offering new models that may be useful to the telecommunications sector's new needs.

While most regulators decide between the positions of disputing parties, typically after a formal process that involves the presentation of arguments by those parties, there is a trend towards more flexible and consensual methods – alternative dispute resolution (ADR) including: negotiation and arbitration (for more on dispute resolution see the ITU World Bank report on Dispute Resolution) . Most telecommunications licenses include guarantees of access to arbitration. Even so, it is helpful to have developed guidelines for managing ADR processes such as those issued by Ofcom governing ADR between public telecommunications operators and the public that are:

- Independent and impartial;
- Transparent, providing regular communication to the public through out the process;
- Effective with an expectation that the disputes will be resolved within a reasonable timeframe;
- Able to properly investigate disputes and make awards of appropriate compensation.

Practice Notes

- **New Zealand: Devolution of Interference Management under a Management Rights System**

Reference Documents

- **Dispute Resolution in the Telecommunications Sector: Current Practices and Future Directions**

5.2.4.12 FINANCING OF SPECTRUM MANAGEMENT

Funds for financing the cost of regulating the spectrum can come from either general taxation revenues, specific telecommunications charges such as licence fees or other spectrum-related fees or from a combination of these two. It is generally felt that those who benefit from having access to spectrum should pay for the cost of its regulation. Revenues can be obtained in relation to those parts of the spectrum for which access is payable, no such revenue is forthcoming from unlicensed (free) bands. The funding requirement of regulatory activity or change related to these latter cases is probably most efficiently met through general taxation revenue. Such regulatory costs are usually low.

Allowing a spectrum regulator to establish its own charging regime, collecting all spectrum-related revenues, and retaining them to fund spectrum management activities can be a source of concern to policy-makers. In economic terms, the regulator is effectively a monopoly and has little incentive to contain its costs if it can increase its revenues by raising licence fees and other charges. Safeguards can be put in place to avoid such practices, such as putting limits on the growth of the regulator's expenditures.

In countries where spectrum revenues exceed the cost of spectrum management sometimes by a very large margin, governments view this as a spectrum dividend whereby the government, and hence all members of the public, reap the financial benefits of such royalties. However, attention must be paid to the broader legislation within a country, as spectrum revenues in excess of costs may be viewed as taxation. The power of taxation may be reserved by another government entity and the legislation dealing with spectrum management may or may not be constructed so as to allow revenues to exceed costs.

The cost of spectrum management immediately raises issues of cost accounting. For example, what costs should be included in the total cost of regulating the spectrum. What indirect costs or overheads should be included, etc.? For a more complete discussion of this, see **Section 5.2 Cost Recovery**, in this module.

Reference Documents

- **Policy on Service Standards for External Fees**

5.2.4.2 KNOWLEDGE OF CURRENT SPECTRUM USE

Broad decisions on spectrum use and changes to allocations are made at global and regional ITU radiocommunication conferences. World Radio Conferences (WRC) are held usually every four years. The last WRC held in 2007 resulted in major changes to IMT while the next WRC planned for 2012 will address a broad range of allocation issues across most of the bands. See Section 7.2.2 on Recent ITU World Radio Conferences.

Each country prepares its own allocations which usually impose further restrictions on spectrum use and decisions are then formalized in the National Table of Frequency Allocations. For a discussion and review of several examples see Section 2.4.6 National Frequency Allocation Table.

One of the spectrum manager's key responsibilities is to ensure the optimal use of the radio spectrum under its management. Radio spectrum is a major asset contributing significant value to the national economy each year and underlines many aspects of users lives. Radio communications is critical to areas such as air travel, emergency services, cellular telephony, sound and television broadcasting, defence and our utilities.

Many regulators have carefully considered the management of this vital resource. One example is the "Spectrum Framework Review published by Ofcom in 2005 which sets plans for radio spectrum through to 2010.

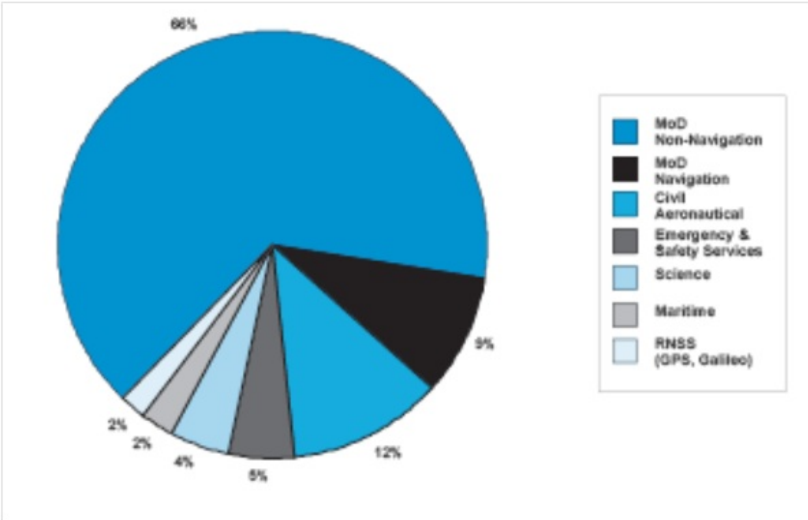
It is vitally important for the spectrum manager and stakeholders to know what are the current uses of spectrum before realistic planning for the future can take place. This can be ascertained from existing records of frequency use across the entire radio spectrum. Information may be held by various organizations and where national records are incomplete or unreliable, public consultation between regulators, service providers and users can help retrieve a complete picture.

For both emerging economies and developed economies, spectrum availability will be key to continued development of telecommunications capability over the next decade. In almost every part of the world, wireless data traffic is increasing year over year. Success with national broadband plans will depend crucially upon spectrum availability and is essential to promoting competition and innovation in the sector. Where spectrum availability is inadequate prices will be higher, market entry limited, and innovation constrained. Success with a national broadband plans is almost inconceivable without strenuous efforts to make spectrum communications available by all means, including refarming and sharing frequencies.

All successful efforts of this kind begin with knowing how spectrum is being used and by whom. Spectrum audits and spectrum demand and supply studies covering all spectrum users, especially government users, lead to steps which can result in new allocations and adjustments between users.

In the UK a Spectrum Audit was conducted in 2007 to determine how spectrum was being used. In addition a ground breaking and revealing study of the demand and supply requirements of the major government user of spectrum in the UK - the Ministry of Defence - was conducted.

As reported in the Independent Audit of Spectrum Holdings to the UK Government in 2005 (the "Cave Audit"), government holdings of spectrum approximated 50 per cent of the UK's spectrum below 15 GHz. Figure 2.4 below, illustrates the relative share of spectrum between various British government services.



◂ **Figure 2.4: Composition of Public Sector Spectrum Holdings below 15 GHz, United Kingdom 2005**

Photo: Independent Audit of SPECTRUM HOLDINGS: HM Treasury, 2005, Figure 1, page 13

MOD, as the single largest government user of spectrum in United Kingdom, has access to 30% of the spectrum between 100 MHz and 3.0 GHz. Its use is not exclusive – it administers civil applications and shares bands with other users

The most recent study was completed in early 2009 with the UK MOD conducting a forward view of spectrum demand covering 80% of its allocations (2010, 2015, 2027) in accordance with its agreement with Ofcom to perform such a review every 2 years. The study is very illustrative and instructive:

- It shows the depth of analysis involved in assessing demand across a range of services and spectrum bands;
- It demonstrates how spectrum prices based on AIP have resulted in two important changes which are noted in the report:
    - Prior to AIP, the MOD did not factor in spectrum pricing as part of investment and operational decision making
    - Prices reveal surpluses in spectrum leading to another important change where MOD now sees itself managing spectrum needs and not existing allocations.

Finally, a single national frequency register should be created if one does not already exist. Spectrum analyzers and computer-aided tools can be very helpful in conducting spectrum audits of selected bands to confirm occupancy and operating parameters.

Practice Notes

- Online Spectrum Registers: Canada and New Zealand
- Spectrum Audit: United States - 2003

Reference Documents

- Access to Spectrum/Orbit Resources and Principles of Spectrum Management
- Current and Future Spectrum Use by the Energy, Water and Railroad Industries
- European Commission Green Paper on Radio Spectrum PolicyGreen Paper on Radio Spectrum Policy in the Context of European Community Policies such as Telecommunications, Broadcasting, Transport, and R&D. COM (98) 596 final, 9 December 1998
- FCC Staff Study Report on NTIA's Study of Current and Future Spectrum Use by the Energy, Water and Railroad industries
- Technology leapfrogging in developing countries - An inevitable luxury?
- Technology leapfrogging in Thailand: Issues for the support of ecommerce infrastructure
- USA: FCC - Current Spectrum Uses, 2002

5.2.4.3 PLANNING FOR FUTURE SPECTRUM USE

Planning and forecasting future spectrum requirements is critically important activity for GNCC which is done to ensure future spectrum needs and demands can be met. Forecasting spectrum use is a challenge that can be overcome by employing various techniques. Projections based on historical growth of, for example, the number of land mobile systems is one method of forecasting growth. Monitoring new technologies and noting their spectrum requirements is another method. It is very important to consult with spectrum users since they are usually in the best position to forecast growth in their sector. One must temper such forecasts, however, as there may be a tendency to overestimate future needs.

An important planning capability exists at the international and regional level through the ITU World and Regional Radio Conferences which consider the impact of growing demand caused technological innovation and news services or improvements to existing services and the impact on planned changes to spectrum allocations. The objective is to ensure that adequate spectrum is available for future use.

Here we focus on two examples of information that are similar in nature and are helpful in determining future spectrum requirements:

- Future service areas enable by technology innovation; and
- Broad categories of drivers of increased demand for spectrum by band;

Future Service Areas using Whitespaces

- Rural Broadband ProvisioningBy upgrading to whitespace radio wireless internet service providers will be able to extend the range of their access points and remove the need for a line of sight between subscriber premises and the access point. This will lead to greatly reduced costs of installing a network infrastructure.

Municipal Wireless Networks

- Municipal whitespace networks could deliver good coverage with a huge reduction of the number of base stations, potentially making municipal networks profitable.

In-home media distribution

- Existing WiFi networks struggle to provide the high bandwidth and quality of service needed to support video streaming, particularly for high-definition video. The ability of whitespace radio to penetrate walls makes it an interesting technology for video distribution around the home.

Spectrum Drivers for Specific Services

Aeronautical and Maritime Services - Communications, Navigational Aids and Surveillance

There are several developments in new systems which will likely drive demand:

- Development and renewal of large scale applications for navigation and surveillance of aircraft and ships include ground based, airborne and ship borne radars, automatic dependent surveillance broadcast (ADSB);
- GPS augmentation systems (including capability for landing guidance).

Broadcasting - Radio and Television

One of the primary influences on the demand for spectrum will be Digital Switchover. Demand for spectrum in broadcast services will be primarily driven by changes in the way Television broadcast is delivered. There are typically three platforms used to deliver TV to households:

- Cable (coax or ADSL)
- Satellite
- Terrestrial Broadcast Networks

Where there are high levels of penetration using cable and satellite, opportunities exist to provide non-terrestrial DTV services either in a competitive model or as the sole provider of DTV services in rural markets.

Cellular

Mobile phones are becoming ubiquitous on devices for 24/7 communication and mini-computing. The recent success of Blackberry, iPhone and other smartphone variants have spurred operators to push ahead with their 3G plans and some will begin to plan for new technology types such as TD-SCDMA, LTE, WCDMA. This growth in demand for bandwidth creates additional demand for fixed links. It is quite likely that technological constraints will cause any additional demand to be concentrated in bands below 3-4 GHz.

Land and Public Mobile Radio

End user demand for new consumer oriented land mobile systems such as Family Radio Systems and GMRS (462/467 MHz) are increasing. In a not so recent study (NTIA 1995) of the importance of land mobile radio systems for public safety, a need for 200 MHz of additional spectrum within 10 years was identified based on a prediction that the number of systems was expected to double between 1995 and 2005 . Existing land mobile spectrum meeting increased demand for mobile communications continue to operate in very congested urban areas. Digitization of land mobile systems has created efficiencies and cost reduction, which have opposite effects on demand. Digitization leads to spectral efficiency while cost reduction promotes overall demand for systems.

Fixed Links - Backhaul Services

Demand for fixed links is driven by: cellular operators and utility operators. As the user demand increases for cellular services, wireless operators require more bandwidth for back-haul. Although fixed links are very important to utilities demand tends to remains fairly static.

Fixed Wireless Access Services

In many countries especially emerging economies, mobile broadband is all but displacing fixed broadband in new long-range high power deployments. Demand will be influenced by choice of markets (urban highly concentrated and highly penetrated markets and rural areas) and choice of technologies (WCDMA, WiMAX, LTE, FDD or TDD) and whether there are new entrants. End user demand has been characterized by increasing demand for data over voice with new applications appearing such as Video-MMS and Mobile TV, which require significant band width. Currently, spectrum is in higher bands, which permits re-use, but at a cost. Short range deployments continue to grow with rapid development of new technologies and devices using primarily unlicensed bands.

Practice Notes

- Canada: Pricing Policies Cost Recovery
- New Zealand - Reallocation of Commercial Spectrum Rights

Reference Documents

- Background paper - Radio Spectrum Management for a Converging World
- Hong Kong: OFTA, Frequency Bands for Broadband Wireless Applications, 2006
- Ireland- Consultation Paper – Future Regulation of Electronic Communications Networks and Services: Arrangements for General Authorisations
- ITU Workshop - Radio Spectrum - Briefing paper
- Spectrum Management for a Converging World : Case Study Guatemala
- Spectrum Management for a Converging World : Case Study United Kingdom
- Strategies and Policies for Wireless IT Promotion in Korea
- Wireless Networks for a Developing World : The Regulation and Use of License-Exempt Radio Bands in Africa,
- Wireless Networks for the Developing World: The Regulation and Use of License-Exempt Radio Bands in Africa

5.2.4.4 SPECTRUM IN TRANSITION

There are many new radio technologies exploiting the capabilities of the Internet: ranging from fixed to mobile devices that are capable of receiving audiovisual content such as movies, TV, and games. Technology is not the only thing changing. Consumer behaviour and technology used by individuals and whole segments of society are changing, and the lines between services such as telephony, computing, television viewing, radio listening, and media access (with mobile device options) are becoming increasingly blurred. Spectrum in transition focuses on Digital Switchover, Digital Dividend and Broadband, all of which are reviewed in this section.

Digital Switchover and the Digital Dividend

Digital Switchover and Digital Dividend are two related concepts. The Digital Dividend is a consequence of the Digital Switchover having taken place. Digital Switchover occurs when analogue television broadcasting signals are converted to and replaced by digital television services. Sometimes this occurs abruptly and is referred to as Analogue Shut-off whereas in other circumstances, analogue and digital signals co-exist for a period of time during the transition.

While digital signals are not necessarily better than analogue signals for recording or broadcasting, especially in terms of frequency response, signal-to-noise ratio, or dynamic range, there are, however, definite efficiencies to be gained through the use of digitally transmitted signals. Moreover, new broadcast services such as distinct simulcast programming can be offered using digital multiplexing.

The fundamental reason why the Digital Dividend spectrum is so important is its physical characteristics: an exceptionally attractive combination of capacity (bandwidth) and coverage. The Digital Dividend can be used for a very wide range of potential new services. These include additional television services delivered through Digital Terrestrial Television (DTT) (whether in standard definition (SD) or high definition (HD)), local television, new types of mobile broadband, mobile television, and wireless home networks, to name just a few. There are many new technologies exploiting the capabilities of the Internet: ranging from fixed to mobile devices that are capable of receiving audiovisual content such as movies, TV, and games.

Generally speaking, the Digital Dividend resides in the range of broadcast spectrum – VHF (30 MHz – 300 MHz) and UHF (300 MHz – 3.0 GHz). There are several definitions of the Digital Dividend. The most common definition is the amount of spectrum in the VHF and UHF bands that is above that amount nominally required to accommodate existing analogue TV programmes and that might be potentially freed up in the switchover from analogue to digital television. Spectrum is freed-up since digitally transmitted broadcast services require less spectrum than the amount needed to accommodate existing analogue transmissions (principally, television).

Technological advances are being accompanied by changes in use and behaviour, as well. Viewing behaviour is increasing because of the Internet, especially amongst younger audiences. Viewers now use a range of devices capable of receiving audio-visual content such as movies, TV, games, and so forth. The lines between television viewing and radio listening and between PC and mobile device options are opaque. These trends have been reported in several instances, particularly in developed countries such as in the Republic of Korea and in the UK, but also increasingly in developing countries:

- Since 2008, Ofcom (see Ofcom, Communications Market Studies) has been reporting an important reversal in trends in TV viewing for British audiences. Despite the growing choice in technology and services available, watching TV remains the activity that most adults would miss the most. Compared to 2007, a growing number of 16-24s (8 percentage points) and over 55s (7 percentage points) say that watching TV is the activity they would miss the most if no longer available;
- However, from 2003 to 2008, UK TV revenue as a whole contracted for the first time since 2003, down by 0.4 per cent in 2008 to £11.1bn. Net TV advertising revenue also declined by 9.6 per cent to £3.1 billion, which is the biggest fall since 2003;
- In 2009, the Korean Communications Commission (KCC) reported observing significant new trends. The number of IPTV subscribers in Korea is rising sharply while other forms of subscription television access are declining;
- Services like Terrestrial Digital Multimedia Broadcasting (T-DMB) are also making viewers move away from traditional television services. T-DMB first came on the air in 2005 in Korea and is a free service supported by advertisers. T-DMB had nealry 22 million subscriber in 2009. Today T-DMB is in operation or in trials in a number of countries including Mexico, Germany, Norway, Indonesia, and Malaysia.
- The global media market, valued at USD 1.3 trillion in 2009, is forecasted to grow at an annual average rate of 2.7 per cent to reach USD 1.6 trillion by 2013.
- Terrestrial TV advertising is expected to decline while global multichannel TV will grow and increase according to industry reports, with advertising expenditures growing 1.4 per cent in 2009 to hit USD 19.2 billion in spite of a slowing economy.
- The global trend in growth masks some sharp regional contrasts. The multichannel TV advertising market is expected to shrink 0.9 per cent in North America, but is forecasted to grow 0.6 per cent in Western Europe and 15.3 per cent in Eastern Europe and the Middle East.
- A milestone was reached in the UK in 2009. For the first time, advertisers spent more on Internet advertising than on television advertising, with a record £1.75bn of online spending recorded in the first six months of that year
- Digital Terrestrial TV – DTT;
- Broadcast Mobile TV;
- Commercial Wireless Broadband; and

- Commercial Wireless Broadband and Public Protection and Disaster Relief.

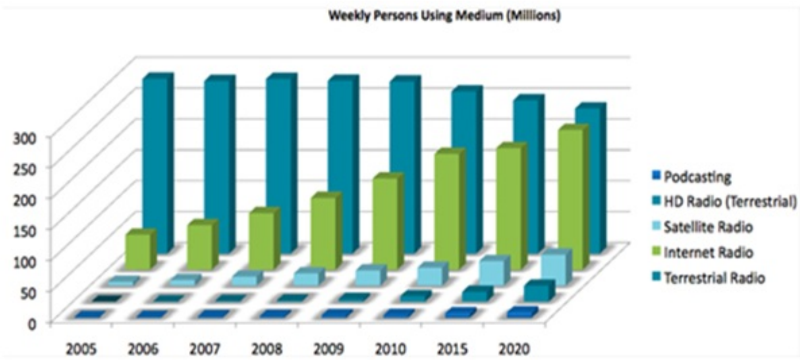
Overall global trends in media are clearly evident with some different regional tendencies:

Viewing behaviours and attendant revenues are not the only things changing. Methods for accessing television are changing, too. Generally, fewer people are accessing television broadcast through over-the-air means. Triple play take-up is on the rise as well, with more consumers moving toward converged service packages offered by telcos. In several OECD countries (Belgium, Luxembourg, Netherlands, and Switzerland), traditional over-the-air analogue broadcast transmission was, for the most part, already eliminated by 2007.

The trend diverging from accessing television through terrestrial means will likely continue in developed countries but less so in developing countries. In developed economies, new services such as Digital Mobile TV access represent an emerging market with possibly as great a potential as Internet Radio. The projections shown in Figure 1. illustrate the trend in the US. According to these projections, terrestrial radio will remain an important means of media access, showing some decline in total listening while substantial growth occurs in two services, namely Internet Radio and potentially radio over mobile phone (similar to T-DMB in the Republic of Korea). In developing countries, sales of traditional terrestrial radio receivers can be expected to show continued robust growth.

◂ **Box 2.4 Global Media Trends**

Source: Informa Telecoms & Media (2009)



◂ **Figure 2.4.4: Growth in Internet Radio**

Photo: Source: Bridge Ratings LLC, 2010.

Digital technology, ubiquitous digital media access, and new multi-media services have transformed markets creating new demands from consumers and businesses. These changes have also altered the map for both new and existing service providers in many ways. Traditional terrestrial television broadcast competes with and in some cases has been replaced by other wired and wireless means of access, which are gaining the upper hand. Terrestrial digital radio broadcast continues to hold its own against new forms of access in developed markets and is likely to grow in developing markets. Changes in consumer demand are not uniform across all markets, and the technologies used by different consumer groups are not the same. With the release of the Digital Dividend spectrum, new opportunities open for expanding existing services and introducing new services for end users.

Furthermore, different spectrum bands in each region are affected by the Digital Dividend. The International Telecommunication Union (ITU) has been leading global spectrum allocation efforts over the past decades. Analogue broadcast services traditionally occupied several frequency ranges in the UHF and VHF bands. The band plans and technical standards vary across the three regions of the ITU. Because markets are different and the bands and technologies used vary, different timelines for Digital Switchover have evolved (see Table 2.4.4 below).

Band	Region 1	Region 2	Region 3
698 - 806 MHz		698 - 806 MHz (2)(3)	
806 - 862 MHz		806 - 862 MHz (2)(4)	
698 - 790 MHz			698 - 790 MHz (5)
790 - 862 MHz	790 - 862 MHz (1)(6)(7)		790 - 862 MHz
Digital Dividend Spectrum	72 MHz (8)	164 MHz	164 MHz

◂ Table 2.4.4: The Digital Dividend by ITU Region

Notes: (1) Identified for IMT services on a primary basis past 17 June 2015.

(2) Identified for IMT services on a co-primary basis. Effective now with various dates set for DSO (USA, 2009; Canada, 2011; Mexico, 2022).

(3) Brazil has opted to allocate 698 - 806 MHz for IMT on a secondary basis.

(4) The USA had decided earlier in 2003 to vacate broadcast services from the 700 MHz band.

(5) China, India, Japan, New Zealand and Singapore opted to identify the 698-790 MHz band, in addition to the 790-862 MHz band, which was accepted by all countries in the region.

(6) The European Commission adopted the policy of analogue shut-off for 790-862 MHz to take place 1 January 2012. COM(700)2007.

(7) The EC approved harmonized technical rules for the use of the 800 MHz band (790-862 MHz) for mobile broadband 2010/EU/267.

(8) In 2003 Ofcom allocated 112 MHz of spectrum for the Digital Dividend resulting from DSO..

Source: McLean Foster & Co., based on the ITU Radio Regulations 2006.

How the Digital Dividend is used varies from one country to another, owing to national circumstances such as geographical position, size and topography, penetration of satellite/cable services, and spectrum usage in adjacent countries.

The main uses for the Digital Dividend spectrum will include broadcasting and fixed telecommunication services, as well as a mix of both over mobile platforms:

Wireless Broadband

Broadband typically means having instantaneous bandwidth > 1 MHz, supporting data rates > about 1.5 Mbit/s over the traditional PSTN or cable networks or supporting speeds through a wireless interface (3G, WiMAX for example) that are roughly equivalent to broadband wireline. Currently there are two main options for achieving wireless broadband rates 3G and WiMAX. Both options are converging with common technology platforms.

Each is briefly described below.

Third Generation – 3G Telephony Systems

According to the International Telecommunication Union (ITU) International Mobile Telecommunications 2000 initiative ("IMT-2000") third generation mobile ("3G") system services started becoming available in the year 2000. In some analysts' view, market take-up really didn't commence until 2005-2006.

3G systems support high-speed bit rate data transfers of circuit and packet switched data and allows roaming access to a wide range of multi-media services. Although data rates are definitely higher than 2G and 2.5G (GPRS) systems they technically fall below broadband rates.

WiMAX

WiMAX, an acronym for Worldwide Interoperability for Microwave Access, based on the IEEE 802.16 standard, as a wireless digital communications system intended for wireless "metropolitan area networks." IEEE 802.16 is split between IEEE 802.16d, or "fixed WiMAX," which does not allow for handoff between base stations, and IEEE 802.16e, or "mobile

WiMAX," which allows fixed, nomadic, portable and mobile capabilities.

Evolution to 4G Systems - LTE

Ultimately 3G and WiMAX converge as 4G systems that utilize OFDM (orthogonal frequency division multiplexing). IP transport will be able to achieve high-speed broadband data rates and be capable of mobile communications.

It is worth noting that mobile WiMAX and the evolution of W-CDMA and CDMA2000 1xEV-DO (4G) towards enhanced broadband capability involve the use of common technological building blocks.

While Broadband Penetration and growth have been slow to get started wireless broadband subscriptions in OECD countries do exceed over half a billion by the end of 2010, an increase of more than 10 percent in six months (according to data from the OECD). Fixed broadband subscriptions reached 300 million, but growth slowed to 6 percent year-on-year. Penetration rates for wireless broadband are accelerating in developed and developing countries.

5.2.4.5 THE RADIO REGULATIONS

The ITU Radio Regulations incorporate the decisions of the World Radiocommunication Conferences (see **Section 2.3.3 Planning for Future Spectrum Use**), including all Appendices, Resolutions, Recommendations and ITU-R Recommendations incorporated by reference.

Practice Notes

- **ITU - The Radio Regulations - Edition 2008**

5.2.4.6 NATIONAL FREQUENCY ALLOCATION TABLE

For an explanation of spectrum allocations, spectrum designations and radio services, see **Section 2.5** of this module of the toolkit. Developing a national frequency allocation table is one of the first steps in long and medium-term planning. A national frequency allocation table should be developed within the framework of the ITU's Radio Regulations; Article 5 of those regulations sets out the international frequency allocation table for all three Regions of the world. The national frequency allocation table should be consistent with that country's regional allocations. That being said, the ITU allocation table will often contain more radio services than may be required or desired in a national setting and some aspects of the international regulatory provisions may not apply in the given country. Once a national frequency allocation table is developed, further sub-allocations or designations of use are often made in order to group like technologies or like users in a given frequency band. It is preferable to make sub-allocations or designations to uses rather than to users since users can sometimes view portions of spectrum as their bands. Generally speaking, greater spectrum efficiencies are obtained when uses with similar technical parameters share the same frequency band, for instance lumping high power applications with other high power applications. Further information on allocating spectrum can also be found in **Section 2.5** of this module.

Reference Documents

- **A Proposal for a Rapid Transition to Market Allocation of Spectrum**
- **Australia -- Five Year Spectrum Outlook, 2009-2013**
- **Australian Radiofrequency Spectrum Plan**
- **Canada: National Table of Frequency Allocations**
- **ITU: Radio Regulations, 2004**
- **Kenya -- Table of Radio Frequency Allocations, 2008**
- **Table of Radio Spectrum Allocations in Canada**
- **United States -- FCC Online Table of Frequency Allocations**

5.2.4.7 NATIONAL LEGISLATION AND REGULATIONS GOVERNING SPECTRUM USE

The legal basis for the regulation of the spectrum must be set out in legislation and detailed in regulations made pursuant to the legislation. Legislation should set out such things as definitions, powers of the Minister or head of the spectrum regulatory authority, the powers of others involved in spectrum regulation, offences and punishments and the organizational structure and framework for regulation of the spectrum, a discussion of which may be found in the spectrum overview of **Section 1.6 Governance and Outsourcing**. In addition to the legislation and regulations, there may be other publications issued by the spectrum regulator which provide guidance to a specific group or groups of users of the spectrum.

Something to consider when establishing the legal framework is the use of incorporation by reference. Since legislation or even regulations are usually not frequently amended, often incorporation by reference is used to give legal effect to subservient text or documents. Under incorporation by reference, texts in one document having a certain legal status, such as the legislation or regulations, may cite other documents which normally would not have the same legal status and depending on the nature of such reference, such incorporation may confer the same legal status on these other documents. For example, regulations may state that a certain standard, perhaps developed by an international body, shall apply in a given situation. Such incorporation by reference of texts can be of two types: static incorporation or dynamic incorporation. In the former, a specific document issued at a specific date is referred to in the legal text. In the case of dynamic incorporation by reference, the reference in the legal text is to a specific document but with a phrase like "as amended from time to time" which allows for changes without going through the entire legislation or regulation approval process.

In order to preserve clarity and authority in rule-making, such delegation should be clearly defined. Legislation and/or regulations must make clear who has authority to designate changing sources of external reference when these are not already specified in existing regulation. Such delegation should be set out in a delegation instrument approved by that institution. The development of legislation and regulations and all subservient documentation should be developed in a transparent way with full consultation of spectrum users.

ITU-D has a web site (**http://www.itu.int/ITU-D/ICTEYE/Regulators/Regulators.aspx**) where the legislation of many countries can be found.

Reference Documents

- **Australia - The Telecommunications Act, 1997**
- **Canada - Radiocommunication Act**
- **Canada: Radiocommunication Regulations, 2002**
- **European Commission Communication on Next Steps in Radio Spectrum Policy, European Commission, 10 November 1999**
- **Frequency Open Policy in Japan**
- **ITU: Radio Regulations, 2004**
- **Next Steps in Radio Spectrum Policy, European Commission, 10 November 1999**
- **Nigeria: Communications Act 2003**
- **Singapore - Info-Communications Development Authority of Singapore Act (2000)**
- **Singapore - Telecommunications Act**
- **USA: FCC - Notice of Enquiry and Notice of Proposed Rulemaking, 2003**
- **West African Common Market Project: Harmonization of Policies Governing the ICT Market in the UEMOA-ECOWAS Space**

5.2.4.8 PUBLIC USE SPECTRUM

Achieving public policy economic and social development goes beyond the existence of an applicable and compliant national allocation table. Doing so may require a change in the balance between government spectrum and spectrum allocated to commercial and private uses.

In a market economy, inputs such as land, labour and capital equipment are distributed throughout the economy via market processes: the provider of capital or employee moves to whichever activity offers the best rewards. Spectrum is one input among many others (e.g., water and electricity) in a variety of production processes. Market systems when workably competitive promote economic efficiency, as inputs are put to use where they yield the highest returns.

At first glance, it may seem incongruous to require a public sector body such as a fire service or a defence force to compete in a market place for spectrum with commercial providers of services such as mobile broadcasting. However, this is exactly how public sector organizations acquire other inputs – such as employees, vehicles, land, and office space.

The arguments for special arrangements for spectrum for the public sector seem to be that:

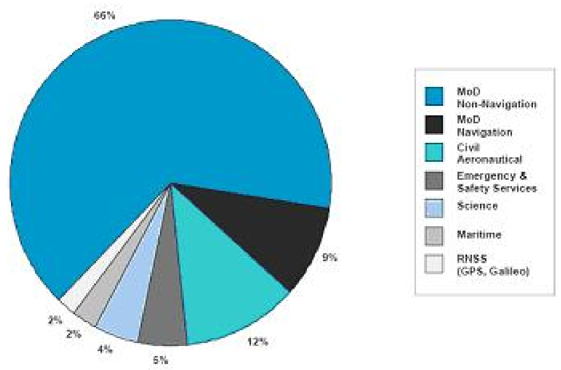
- it is indispensable to the provision of service such as defence radar;
- the service itself (such as an ambulance service) has a very high priority; and
- under past spectrum management practice, the only way to acquire spectrum was by administrative methods.

The use of markets to allocate other equally indispensable inputs into vital public services appears to negate the first two, and the third could be resolved by the development of a spectrum market place.

Government use of spectrum utilized to provide services similar to those provided by the private sector should be, at a minimum, subject to prices reflecting the market price or opportunity cost of spectrum. Where market prices don't apply, some negotiation will be necessary between those holding allocations and those desiring them, along with incentives to ensure the opportunity costs of spectrum are reflected in decisions

Several studies of the amount of spectrum held by government agencies have been conducted in recent years. As an example of leading practice, the United Kingdom table of allocations has allocations for Government Use on an exclusive basis for Civil, Military, and Emergency Services. As reported in the Independent Audit of Spectrum Holdings reported in 2005 by Prof. Martin Cave to the UK Government (referred to here as the Cave Audit), government holdings of spectrum approximate 50% of the spectrum below 15GHz. The UK government reviewed and assessed requirements for all government spectrum holdings and made recommendations leading to improving access to and efficiency of use in spectrum

Figure 1: Composition of public sector spectrum holdings below 15 GHz



◂ Figure I below, illustrates the relative share of spectrum between various government services in the United Kingdom.

To facilitate the process of shifting spectrum allocated to other non-government uses, the following steps could be taken:

- Issue a clear statement of government policy and direction, identifying and setting balanced targets, within sensible but aggressive timeframes for moving government spectrum allocations to commercial allocations;
- Conduct an independent audit of spectrum holdings to identify bands where immediate changes can take place; and
- Put mechanisms in place to begin transitioning allocations and assignments to new uses (commercial applications and assignments) and users. These will likely include:
  - Incentives – where all users pay for frequency assignments unless usage is unlicensed (spectrum commons and personal consumer products are two examples).
  - Compensation for affected users. There are various means to achieve compensation between parties. The overall process should be encouraged by government but the regulator should not become the payer of last resort between parties negotiating settlements for relinquishing licence rights or equipment under the administrative approach. More flexible licenses and spectrum trading accommodate results for these types of issues.

Reference Documents

- **United Kingdom - Independent Audit of Major Spectrum Holdings, 2005**

5.2.4.9 RE-ALLOCATING AND REFARMING SPECTRUM

One of the biggest challenges facing spectrum regulators is the reallocation of spectrum. When frequencies have been used for one purpose, perhaps for decades, it is often difficult to reallocate these frequencies for a different use. The need for reallocation – often known as re-farming - can arise in several ways. It may be that the international table of frequency allocations has changed and the national table of frequency allocations must be realigned to be consistent with it. Alternately, a radio service may not have developed as expected, while the spectrum available for another service operating in a nearby frequency band is insufficient to keep up with growing demand. Sometimes, new technologies become available which is more spectrum-efficient, allowing spectrum to be freed up either for the same use in that band or other uses. Whatever the reason, there will be times when spectrum users will have to make changes to their operations. The central issues that arise are then who decides, and who will pay for the costs incurred by these users in transitioning to new frequencies? One solution involves the regulator establishing a re-farming fund by setting aside a portion of spectrum revenues. A Fund for Refarming Spectrum has been established in France and is managed by the *Agence nationale des fréquences*.

Various approaches exist now for re-farming whereby regulators (administrative) address the issues and where users determine the timing and price (market-driven). Some simply require the user to absorb the cost. In other cases, the beneficiaries of the change are either invited or required to reimburse all or part of the transition costs of the incumbent user.

The essential difference between administrative and market-driven approaches is that under the administrative approach the regulator makes the decision while considering several criteria and possible competing objectives such as: logical market-structure, financial, socio-economic, and technical efficiency criteria. The regulator's analyses will include factors such as prices, costs, license conditions, withdrawal, and compensation. Under a market driven approach, the criteria used and analyses centre on financial and business factors with decisions resulting from an agreement between two or more parties.

Re-farming Definition

Generally speaking, refarming may be seen as process constituting any basic change in conditions of frequency usage in a given part of radio spectrum. Such basic changes might be:

- Change of technical conditions for frequency assignments;
- Change of application (particular radiocommunication system using the band);
- Change of allocation to a different radiocommunication service.

Practice Notes

- Examples of Re-farming: US and Japan
- Refarming of Spectrum Resources
- Refarming Tools

Reference Documents

- CEPT: Refarming and Secondary Trading in a Changing Radiocommunications World, 2002
- Hong Kong: Consultation on Spectrum Reform (refarming), 2006
- Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them and Examination of Exclusivity and Frequency Assignments Policies of the Private Land Mobile Services, Second Report and Order, FCC,

5.2.5 TECHNICAL STANDARDS

Regulators, users of radiocommunication services and radio equipment, operators and suppliers rely on technical standards as a basis for preventing interference and in many cases ensuring that radio systems perform as designed. Technical standards involve radio standard specification documents, the approval process, as well as testing and certification of radio equipment such as transmitters, receivers and antennas to determine compliance with radio or manufacturer specifications.

From a planning standpoint, the regulator uses technical standards to determine how certain radio equipment will interfere with other equipment in either shared or adjacent frequency assignments. That determination can then be used to develop spectrum use plans. The mutual interaction of radio and electrical products is known as "electromagnetic compatibility" (EMC). Balanced standards frameworks try to minimize business compliance costs while providing effective protection of the radio spectrum resource.

There are two categories of radio system interaction which concern the regulator.

Electromagnetic Interference (EMI) can be viewed as radiocommunications pollution and is sometimes referred to as "radio frequency interference" (RFI). Reducing the level of EMI produced by electrical and electronic products is particularly important where public safety and security services are involved such as aircraft and ship navigation, fire, ambulance and police communications. Under Article 15 of the International Radio Regulations, regulators are required to "take all practicable and necessary steps" to ensure EMI does not cause harmful interference to radiocommunication services.

Radio transmissions can also cause other non-radio electrical and electronic products to malfunction, a phenomenon sometimes known as "immunity" or "electromagnetic susceptibility" (EMS). EMS can also be a safety of life issue, for example, when the use of cell phones interfere with hospital equipment.

This section begins with a discussion of the desired objectives, types of standards and concludes with certification processes and various options available to regulators.

Practice Notes

- **Definitions: Electromagnetic Interference (EMI)**

Reference Documents

- **Electromagnetic Compatibility - the EMC Directive 89/336/EEC, 1992**

5.2.5.1 OBJECTIVES OF TECHNICAL STANDARDS

Technical standards for radiocommunication and radio equipment help to achieve electromagnetic compatibility (EMC) between radio equipment and services such as broadcasting services, navigational aids for aeronautical and marine traffic control, and radiocommunication services including cellular, land mobile, microwave and satellite services. As well, technical standards help by allowing planners and users to minimize interference between radio apparatus and other equipment. The uses of radio frequencies in industrial and commercial applications are important to the economy, so that interference-free use can be an important factor in economic development. Finally, consumers are better served when the quality and reliability of equipment distributed in the country can be improved over time.

Technical standards form the basis for certification and testing of radio equipment. Equipment is said to be certified when it complies with applicable standards of the country. The ITU also has equipment standard regulations for reference by its members. Technical standards and certification processes for specific types of equipment are the same for all manufacturers and importers, ensuring consistent quality for consumers.

Finally, the regulator can require, through technical standards, manufacturers to produce equipment which provides for greater efficiency in spectrum use.

5.2.5.2 SPECTRUM USE STANDARDS

The demand for spectrum is increasing and technology has developed so that radios can perform the same function at previously unused frequencies or require less spectrum capacity, or allow more frequency re-use for the same performance. In many countries and regions and especially in developing countries where growth in telecommunication services is primarily wireless, demand for spectrum continues to increase very rapidly. This increase is a result of expanded use of current services like cellular, radio and precision landing systems for improved aviation safety, and the development of new uses, such as Personal Communications Systems (PCS), digital audio broadcasting, advanced television, and satellite sound broadcasting. In the short term, technical advances needed to meet that demand may exceed the limits of practicality and increase the potential for spectrum congestion and interference. Increasing spectrum efficiency below 3 GHz is more and more difficult and affordable technology in higher bands for consumer wireless communications is not readily available. Spectrum use standards are thus important since they are used to minimize interference between users and systems sharing frequency bands. Spectrum use standards allow regulators to minimize interference regardless of the assignment or authorization method used – Service Based Licences, Spectrum Commons or Licence Exempt.

Spectrum use standards and radio system plans refer to planning documents issued by the spectrum management authority which state the minimal technical requirements for the efficient use of a specified frequency band or bands. They are used in the design, specification and evaluation of technical applications for new radio facilities or modification to existing radio systems operating within the specified band in accordance with a spectrum use policy. A spectrum use standard typically specifies appropriate equipment characteristics relating to efficient spectrum use and not the design of equipment. Spectrum use standards can be designed to match ITU-R Recommendations developed by the Radiocommunication Sector of the ITU in conjunction with the International Table of Frequency Allocations or be developed to reflect unique channelling arrangements formulated to meet national requirements.

Practice Notes

- Definitions: Spectrum Use Standards

Reference Documents

- Canada: Industry Canada, Radio Frequency Spectrum Standards, 2005
- Harmonized Standards Institute
- New Zealand: Radio Standards, Radio Spectrum Management
- Wireless Networks for the Developing World:

5.2.5.3 COPING WITH CONGESTION IN UNLICENSED SPECTRUM – NO STANDARDS?

In determining the most appropriate regulatory policy regarding unlicensed spectrum, it is necessary to determine:

- Whether there is spectrum which is currently uncongested or can be expected to remain uncongested and so could become unlicensed;
- Whether there is spectrum which is congested, but only because of inefficient usage and where changing the management policy of unlicensed usage would remove the congestion.

There are many factors that influence congestion. Some of these are caused by suboptimal allocation policies and can be expected to be gradually alleviated by the introduction of trading. Some are caused by allowing the use of equipment that is inefficient in its use of spectrum. Others are caused by the nature of the radio spectrum.

There is little that the regulator can do to affect the relative desirability of these bands. However, there are several things that the regulator can control. One of these, which has a significant effect on congestion, is the maximum transmit power.

For terrestrial uses of spectrum, the shorter the range of transmission, the lower the probability that there will be two users operating at the same frequency and in range of each other that might interfere. For example, the whole idea behind cellular telephony in major population centres is the use of low power cell sites so that the same frequencies can be re-used within a relatively short distance. Similarly in satellite communications, the use of spot beams as opposed to global or regional beams allows the re-use of frequencies. Obviously, while the regulator can control these factors to some extent, the radio system's service requirements and system economics are also important factors.

Therefore, if only short-range devices were allowed to use a particular piece of spectrum, the probability of congestion would be lower than for wider coverage applications. Broadly, this has been the regulatory policy to date, with unlicensed spectrum having a maximum transmit power that tended to limit the range to around 100m.

The other factor influencing congestion is the bandwidth and time of transmissions. These mostly depend on the usage. For example, a garage door opener only needs to transmit a short burst of narrowband data and only on a few occasions each day. A W-LAN base station might transmit broadband data almost continuously. The probability of congestion is proportional to this time-bandwidth product or information rate.

Historically, most short range devices have also had a low information rate, but more recently W-LANs and BlueTooth have changed this trend. If the unlicensed bands were restricted to products with a low information rate then congestion would be lower. However, it is quite difficult for the regulator to restrict the information rate in an unlicensed band.

The technical characteristics of receiving equipment (receivers and antennas) also play an important role in spectrum efficiency. If receiving equipment is allowed that cannot easily discriminate between wanted and unwanted signals, more spectrum will be consumed than is technically necessary. However, while some regulators do insist that receiving equipment meet certain standards, other regulators do not. Some others do not regulate receiving equipment explicitly but do so in a de facto manner i.e., specifying only transmitting characteristics and leaving it to users to decide how much interference they can tolerate.

Hence, the main tool at the disposal of the regulator in controlling the level of congestion and the suitability for unlicensed use, is the maximum transmit power, which equates to the range. By enforcing the lowest feasible maximum transmit power, the probability of interference is reduced. Further, the amount of usage will also likely be reduced as some applications will not be viable with short range transmissions. Regulators might have a number of different bands with different transmit power limits to offer users different levels of range and congestion. Alternatively, as an unlicensed band becomes more heavily used, the transmit power might be progressively reduced to new entrants in order to keep the congestion at an acceptable level.

In the past, the number of applications and users of radio spectrum has grown faster than the ability of technology to accommodate them. Hence, congestion has increased over time. However, it has been argued that if a "spectrum commons" approach were widely adopted, then this would reduce the overall levels of congestion. This section considers whether this is likely.

Without regulatory intervention, the problem of dealing with congestion would not be resolved. Equipment will only be made efficient or polite to the extent that it is necessary for that piece of equipment to operate reliably and not for the greater good of all the users of the band.

In summary, many observers conclude that spectrum should be unlicensed if it were unlikely to be congested. It has been noted that:

- Congestion was most likely in the core bands of around 100MHz to 5GHz;
- There is insufficient evidence that taking bands currently considered to be congested and making them unlicensed would alleviate congestion, hence this approach cannot currently be advocated:
- The probability of congestion could be dramatically reduced by restricting the range of devices through controlling the maximum transmitted power or by requiring specific behaviour such as politeness protocols.

Still, there is no definitive way to predict congestion. A judgment needs to be made on the basis of the frequency band, likely use and range. The range in turn depends on the use. Hence, a key stage in predicting the congestion likely in the band is determining the most likely use.

This suggests that the regulator should first come to a conclusion as to the most likely use or uses for the band. The regulator does not need to impose these uses. For example, if the band is subsequently auctioned there is no need to restrict its use to that deemed most likely. However, this decision will be used in the process of deciding whether spectrum should be unlicensed.

Having decided on the most likely use, spectrum should be subject to licensing where any of the following hold true:

- The band is likely to be congested. A way to approximate for this is to assume that congestion would occur if the use would entail a wide area service (i.e. one covering a contiguous area greater than ~1km^2) being offered. Examples of such services are cellular and broadcasting;
- A guaranteed quality of service (QoS) is needed. This is the case, for example, with most public safety communications;
- International treaty obligations provide restrictions that would be breached by operation on a licence-exempt basis either now or at some known point in the future;
- Finally, the regulator will need to make a judgement as to the most appropriate level of restriction.

Essentially, the greater the perceived risk of congestion developing, the more restrictions should be imposed. However, the restrictions should also take into account the likely additional cost imposed on the devices compared to the benefit that might accrue.

Depending on the level of information, it might be possible to perform an economic assessment of the value of the different approaches. For example, where imposing politeness protocols will have minimal impact on the device cost then they might be used without hesitation. Where such protocols would significantly increase the cost and where congestion is unlikely, or has little impact, then they should not be imposed.

Practice Notes

- **Coping with congestion in unlicensed spectrum.**

Reference Documents

- **Wireless Networks for the Developing World: The Regulation and Use of License-Exempt Radio Bands in Africa**

5.2.5.4 RADIOCOMMUNICATION EQUIPMENT STANDARDS

Radio equipment standards are technical standards specifying the minimal acceptable technical specifications and performance characteristics of radio equipment in general use. Radio equipment standards exist for both licensed radiocommunication equipment or stations and licence-exempt radiocommunication equipment which include low-power devices such as garage-door openers, radio frequency identification devices (RFIDs) or equipment utilizing ISM or unlicensed bands such as WiFi and WiMAX. Regardless of the licensing and frequency authorization process, radiocommunication equipment standards are established by the spectrum management authority and used by manufacturers to create minimally acceptable technical parameters for radiocommunication equipment. Technical standards documents provide general information describing the equipment and the application; indication of licensing and certification requirements, channelling arrangements, modulation techniques used by the equipment, transmitter power and transmission limits for unwanted emissions.

For a more detailed discussion of radiocommunication equipment licensing and authorization go to **Section 3: Authorization**. Certification of radiocommunication equipment is discussed in **Section 2.4.8**. Channelling arrangements involve spectrum use and are explained in **Section 2.3.2**. Modulation techniques and unwanted emissions are discussed in **Section 6: Monitoring**.

Reference Documents

- **Canada: Standard Radio Systems**
- **Radiocommunications (Radio Standards) Notice 2005 No. 2**
- **UK: Radio Equipment Standards**

5.2.5.5 RADIATION STANDARDS

Radiation standards refer to electromagnetic emissions which, at certain frequencies, may be harmful to life or some other concern to public safety. The spectrum manager is not typically responsible for conducting the research and determining the scientific basis for that concern. Other agencies of government such as the Ministry of Health and public and private research institutes conduct research to substantiate concerns. Once a decision by government on policy or regulation has been reached however, the spectrum management authority may need to take certain measures such as making modifications to radiocommunication equipment standards to ensure public safety.

The study of radiation effects on humans occurs at the national and international level. For instance, the World Health Organization studies radiation effects. The International Union of Radio Sciences in its Commission K addresses the effects of emissions on human health.

Reference Documents

- **FCC Spectrum policy task force Staff Working Group Paper Report of the Interference Protection Working Group, 2002.**
- **FR Radiation and Electromagnetic Field Safety, Hand Book of Radio Amateurs**
- **Maximum Exposure Levels to Radiofrequency Fields 3KHz - 300GHz**
- **Standards in Wireless Telephone Networks, Telecommunications Policy, Volume 27, Issues 5-6, June-July 2003, Pages 325-332**

5.2.5.6 OTHER STANDARDS

In connection with the deployment of radiocommunication system, other standards relating to the environment, construction and land use may apply. Although the spectrum manager may not be responsible for the development and enforcement of these types of standards, she or he will need to be aware of them and their implications in planning frequency use and licensing. This is particularly true where location with respect to essential facilities such as power transmission lines and airports is a factor.

Reference Documents

- **Canadian Municipalities and Regulation of Radio Antennae and their Support Structures, 1987**

5.2.5.7 STANDARDS DEVELOPMENT AND APPLICATION

The development of radiocommunication equipment standards and spectrum use standards occurs at the national, regional and international levels. In some cases, due to the importance and size of the national economy, national standards acquire international importance. Smaller nations routinely adopt, either formally or informally, radiocommunication equipment standards developed by other standards organizations, which is a cost-effective manner of designing a set of standards. Indeed, countries within almost all regions, including Europe, the Caribbean, Africa and Asia have opted to recognize both European (ETSI) and North American standards (FCC and ANSI). There are standards bodies in most regions of the world and particularly in regions where high technology and telecommunication and radiocommunication equipment are manufactured.

The regional and national standards bodies include: American National Standards Institute (ANSI); European Telecommunications Standards Institute (ETSI), the Australian Communications Forum (ACF), the Association of Radio Industries and Businesses (ARIB), the Telecommunications Technology Association (TTA), etc.. International standards bodies include: The Institute of Electrical and Electronic Engineering (IEEE) and the International Telecommunication Union (ITU).

RELATED INFORMATION

American National Standards Institute (ANSI);

Australian Involvement in International Standardization, Standardization Guide 2005,

European Telecommunications Standards Institute (ETSI);

The Australian Communications Industry Forum (ACIF)

The Association of Radio Industries and Businesses (ARIB)

The Telecommunications Technology Association (TTA)

The Institute of Electrical and Electronic Engineering (IEEE)

Reference Documents

- **European Union: Telecommunications equipment and Mutual Recognition Agreement**
- **IEEE: Broadband Wireless Access, Standards Development**

5.2.5.8 CERTIFICATION

Testing of radiocommunication equipment to establish compliance with national standards is performed by government-operated testing facilities or in private sector laboratories. In recognition of the dynamic nature of technological change and innovation and the high cost of test equipment, national governments are increasingly favoring private sector facilities. Due to the importance of testing and certification, the complexity involved and the reliance placed on results, policies and regulations have evolved around the harmonization of standards across regions and markets. Harmonization has also been promoted by the adoption of consistent approaches through the certification of Conformity Assessment Bodies (CAB’s). CAB’s are organizations recognized by the spectrum management authority to conduct testing and certification of radiocommunication equipment.

A CAB in one country can be recognized in another country by way of agreement. Mutual Recognition Agreements (MRA’s) facilitate trade among countries. They are established on a bilateral or a regional basis, and streamline the conformity assessment procedures for a wide range of telecommunication and telecommunication-related equipment. One such example is the Asia-Pacific Economic Cooperation Telecommunications MRA. These steps reduce the cost of supply of radiocommunication equipment and ensure both quality and conformity. An MRA provides for the mutual recognition by the importing parties of CAB’s and mutual acceptance of the results of testing and equipment certification procedures undertaken by those bodies in assessing conformity of equipment to the importing parties' own technical regulations.

Conformity to radiocommunication equipment standards and certification are necessary conditions for interoperability of radio communications services and terminals such as handsets. It is not a guarantee, however. Across a region or within a country, a common technology or standard such as GSM or CDMA may be used by service providers with similar networks but operating at different frequencies, making it difficult for users to migrate between networks. The absence of roaming agreements may also prevent interoperability even when frequencies and the technologies are the same.

Reference Documents

- **EU: Mutual Recognition Agreements**
- **Hong Kong: Equipment Evaluation and Certification Scheme**
- **Japan: Radio License Procedures and System for Conformity**

5.2.6 ALLOCATING SPECTRUM

In establishing what use can be made of the spectrum, allocating ranges of frequencies in what are referred to as bands is a central concept, and is explored through the rest of this section.

Reference Documents

- **Comments of 37 Concerned Economists (Federal Communication Commission 2001)**
- **IEEE: Radio Resource Management in Future Wireless Networks: Requirements and Limitations**
- **Much Ado About Bandwidth**
- **Technico-Economic Methods For Radio Spectrum Assignment, IEEE 1995**

5.2.6.1 RADIO SERVICES

Radiocommunication is a sub-set of telecommunication. Radiocommunication services are one of the main kinds of radio uses for which spectrum is allocated. Radiocommunication services have been the dominant focus of attention in attempting to match demand for spectrum with frequencies. It is important, however, for regulators to not overlook the other important uses and user of spectrum: navigation and public safety, for example.

In Article 1 of the ITU Radio Regulations, the term "radiocommunication service" is defined as "a service…involving the transmission, emission and/or reception of radio waves for specific telecommunication purposes".

An example of radiocommunication service and related allocation issues follows in the next few paragraphs.

Mobile satellite services (MSS) refers to networks of communications satellites intended for use with mobile and portable wireless devices. The mobile-satellite service (MSS) includes maritime mobile-satellite service (MMSS), the land mobile-satellite service (LMSS) and aeronautical mobile-satellite service (AMSS). There are many important applications in the MSS including:

- Aeronautical Mobile Communications – global satellite phone service, distress and emergency services;
- Land Mobile Communications - global satellite phone service, distress and emergency services;
- And Ship borne or Maritime Mobile Communications – Inmarsat safety and communications services for maritime operations.

Telephone connections using MSS are similar to a cellular telephone link, except the repeaters are in orbit around the earth, rather than on the surface. MSS repeaters can be placed on geostationary, medium earth orbit (MEO), or low earth orbit (LEO) satellites, provided there are enough satellites in the system, and provided they are properly spaced around the globe, an MSS can link any two wireless telephone sets at any time, no matter where in the world they are located. MSS systems are interconnected with land-based cellular networks.

Services have proliferated and periodically allocations have been reviewed in an effort to harmonize allocations on both an international and regional basis. As well, several bands have been re-allocated to support the growth in terrestrial mobile services – IMT-2000.

One of problems facing MSSs is the relative success of terrestrial mobile services like GSM and Advanced Wireless Servicer in comparison to MSSs. There have been several significant attempts to bring widely based MSSs to consumers which have not lived up to the expectations of the business or consumer – (for example: Globalstar went into service in 1998 at a cost in excess of USD 4 billion and filed for bankruptcy in 2002 and the assets were ultimately purchased for USD 43.million). With these failures in the background, it has become a hot debate to reallocate spectrum to other expanding services. MSSs do have a fundamental advantage over terrestrial systems in that they can reach users practically anywhere. It is the prospect for advanced services to remote regions which continues to attract proponents for maintaining MSS allocations.

Recently, The European Parliament has approved a proposal that demands mobile satellite services reach at least 60 per cent of every country in Europe, and 50 per cent of their populations, in order to get operating spectrum. The ruling relates to a couple of chunks of spectrum which have been handed to the EU by member countries, for allocation to mobile satellite services on a pan-European basis. The spectrum is around 2GHz, specifically 1980-2010MHz for the up link and 2170-2200MHz for the down link, with no applicant being allowed to have more than 15MHz for each direction: thus specifying a minimum of two operators. To qualify for the spectrum those operators will have to reach every country in Europe, with reception possible in 60 per cent of each country's landmass, and by half of their populations.

The future of AMS(R)S primary allocations is on the agenda for WRC-11. WRC-07 agreed on a future Conference Agenda Item for WRC-11 to consider the results of ITU-R studies to ensure long term spectrum availability and access to spectrum necessary to meet the requirements for aeronautical mobile-satellite service in accordance with Resolution 222. For a more detailed look at the proposed WRC-11 agenda, See **Section 7.2.2 Recent ITU World Radio (WRC) and Regional Radio Conferences (RRC).**

Practice Notes

- **Industry Canada: Principles Applied to Re-allocating MSS Spectrum**
- **Radiocommunication Services - ITU-R Allocations for Mobile-Satellite Services**
- **Radiocommunication Services ITU Regulation**

5.2.6.2 FREQUENCY ALLOCATION TABLES

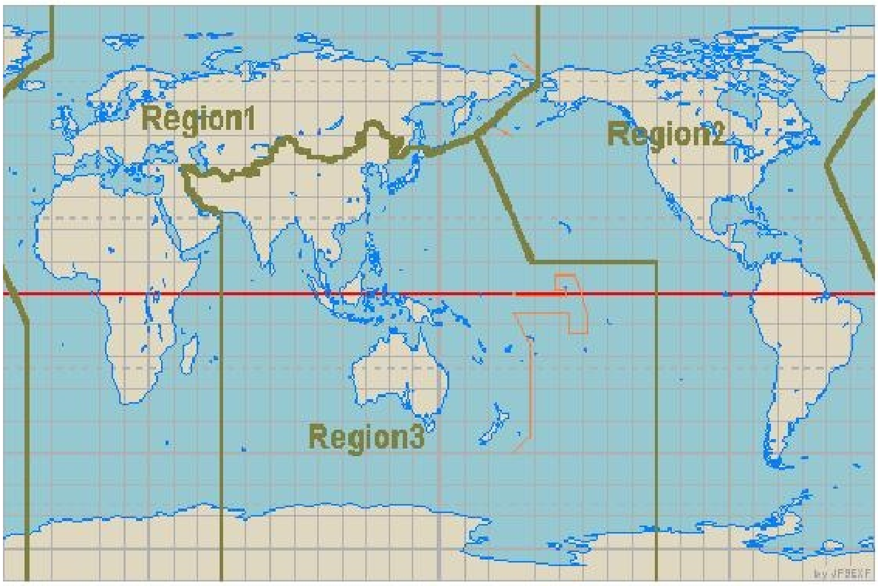
Before considering how the spectrum is allocated, it is perhaps best to clarify three terms: allocation, allotment and assignment.

An allocation is an entry in a table of frequency allocations which sets out the use of a given frequency band for use by one or more radiocommunication services. The term allocation is also applied to the frequency band concerned. An allocation then is a distribution of frequencies to radio services.

An allotment is an entry of a designated channel in a plan for use by one or more countries in those countries or within designated areas for a radiocommunication service under specified conditions. An allotment then is a distribution of frequencies to geographical areas or countries.

An assignment is an authorization given for a radio station to use a radio frequency or a radio frequency channel under specified conditions. An assignment then is a distribution of a frequency or frequencies to a given radio station.

For purposes of allocation, the world is divided into three Regions referred to as Regions 1, 2 and 3. A map indicating these Regions can be found below. A precise definition of the boundaries between Regions may be found in Article 5 of the ITU Radio Regulations.



◂ **Regions according to ITU Radio Regulations**
ITU-R

Allocations are made on a primary or on a secondary basis. Stations of a secondary service cannot cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date. Stations of a secondary service cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or to which frequencies may be assigned at a later date. Stations of a secondary service can, however, claim protection from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date. In a given band of the Table of Allocations, there are often footnotes which allocate the band in question (or a portion of a band) only in a specified geographic area. When a band (or portion of a band) is indicated in a footnote as allocated to a service on a secondary basis in an area smaller than a Region, or in a particular country, this is a secondary service. Where a band (or portion of a band) is indicated in a footnote as allocated to a service on a primary basis in an area smaller than a Region, or in a particular country, this is a primary service only in that area or country. The international Table of Frequency Allocations set out in the ITU Radio Regulations covers frequencies from 9 kHz to 275 GHz (or 1000 GHz, see footnote 5.565).

As mentioned in **Section 2.3.5** of this module, a National Frequency Allocation Table is an important document in planning the use of the spectrum within a given country. The National Table of Frequency Allocations must, in general, be consistent with the ITU Table of Frequency Allocations but usually contains a sub-set of the allocations found in the International Table. In addition, it usually is far more detailed and gives additional conditions for the use of spectrum usually through national footnotes in the National Table.

A recent example of modifications to Article 5 of the Radio Regulations involving significant changes to allocations across all regions are the IMT Advanced Allocations for Broadband Wireless Access (BWA) which have implications for most if not all members. These resolutions affecting the changes in allocation were made at the World Radio Conference (WRC) in Geneva in 2007. For a more detailed discussion of Recent World Radio Conferences see **Section 7.2.2**.

In this section, we discuss some of the step by step approaches involved in changing national frequency allocations to reflect and accommodate the changes in the International Table resulting from the WRC decisions concerning BWA.

Introducing New Services such as BWA – a general approach

Changes to the National Table of Allocations will ultimately lead to assignments for services. Allocations and assignments are linked and will ultimately reflect local market structures and conditions.

Allocating and assigning spectrum for various uses and users by regulators is a powerful tool with significant implications. Imposing or limiting restrictions on uses and users has a direct impact on spectrum access and efficiency. Knowing where and where not to impose restrictions requires information, building consensus and where consensus is lacking, the means to smooth out differences by way of an adjustment process such as compensation or arbitration. Consultation is important at all stages. Some of the general practical steps taken by regulators include:

- Acquiring the information needed to assess use, users and utilization. Spectrum audits can be performed to fill in the gaps in information;
- Consulting with current and prospective users;
- Creating channelling plans which compact spectrum assignments and increase the number of occupants through techniques such as re-use to ease congestion and interference;
- Reinforce the application of technical standards and compliance to ensure interference is managed and manageable;
- Clearing zones of spectrum through refarming incentives (user to user) or recapturing underutilized spectrum;
- Examining ways to license or unlicense underutilized spectrum to increase use and sharing;
- In bands where trading can take place and demand has been pooled, band managers can be tasked to manage use and users

Specific practical steps include the following:

- Identify the specific bands of interest and determine current use and utilization;
- Consult with existing and potential users and assess demand and value for existing and potential services;
- Conduct comparative analysis with relevant country experience and consider spectrum assignment, licensing and spectrum pricing issues and implications;
- Conclude on affected bands and consider allocation methodology. For example will 2 X 5 or 10 MHz chaired spectrum be allocated and in which bands;
- Consult and determine which allocation methodologies and authorization and assignment methodologies will be proposed or applied. The practice varies significantly across regions and methods include: administrative processes such as first-come first served, comparative review, auction methods. As well, concessions granted in the past may include unified service licenses (for more on authorisations see Module 3);

- Prepare resulting policies, plans and processes required to support conclusions on methodology, reallocation implementation steps, and expected assignment and licensing (unlicensed) outcomes.

Practice Notes

- Europe – Frequency Allocation Tables
- Germany (BNETZA) - BWA Allocations and Auction
- Mauritius – BWA Allocations
- Mexico – BWA Allocations

Reference Documents

- A Proposal for a Rapid Transition to Market Allocation of Spectrum
- Kenya: Table of Radio Frequency Allocations, 2002
- Table of Frequency Allocations

5.2.6.3 SPECTRUM USE DESIGNATIONS

In the international Table of Frequency Allocations as well as in national Tables, there are designations or identifications of spectrum use. These set out more specific types of frequency use than that foreseen in the allocation of a frequency or frequencies to a given radio service. For example, in the international Table, some bands allocated to the mobile service are designated for use by IMT-2000 systems. Such designations in the international Table do not preclude any use of the frequency band by the services to which it is allocated nor do they result in any priority for such use. At the national level, however, countries may choose to give such designations a priority or even use such indications to mandate an exclusive use within a given band. For example, a band allocated to the mobile or land mobile service may nationally be designated for a cellular mobile telephone service to the exclusion of all other mobile operations.

Practice Notes

- ITU Radio Regulations – Article 1, Definitions of Radio Services

5.3 AUTHORIZATION

Authorization is the process by which users gain access to the spectrum resource. This may involve assigning specific frequencies to users, allotting certain frequency bands or sub-bands to specific users who may or may not be able to transfer such spectrum rights to others or it may mean simply authorizing the use of specific equipment or categories of equipment. It is important to distinguish between methods for determining who will have access to spectrum versus determining the cost of such access (see also **Section 4** and **Section 5**).

5.3.1 INTRODUCTION TO AUTHORIZATION

With spectrum authorization, the spectrum manager approves the use of radiocommunication equipment and permits the use of radio frequencies to specific users or classes of users, in accordance with the national and international table of frequency allocations. Authorization processes contribute to the proper functioning of national spectrum-management operations and provide access to sufficient amounts of spectrum. Authorization activities include licensing, examination, certification of radio operators, authorization of equipment, type approval, type acceptance and international notification and registration. In terms of licences, there are various types, including individual licences, system licences, class licences, and general authorizations.

The spectrum manager can choose from a mix of authorization mechanisms: traditional administrative, market-based and unlicensed spectrum - as some uses of spectrum are not licensed - and also determine the appropriate spectrum revenue and spectrum pricing objectives, policies, regulations, mechanisms, and fee schedules. Unlicensed spectrum use does not mean unregulated use since the radio equipment and interference parameters will still need to comply with certain technical standards such as FCC Part 15 Rules for Ultra Wideband Devices. Spectrum authorizations promote awareness of users' operational obligations and user rights and that the spectrum manager has sufficient data to ensure effective and efficient operations.

The authorization of spectrum in connection with licensing of telecommunications service providers is important given the expansion of mobile telecom services and the liberalization of telecom markets in developing and emerging economies. It is important that the regulatory process facilitates granting, at virtually the same time, authorizations to operate a telecommunication service and to use the required radio spectrum. There should be no delays or risks of inconsistent regulatory requirements between the two types of authorizations. This is also the case for authorizing broadcasting undertakings and associated spectrum authorizations. If two separate authorizations are issued, they should be issued simultaneously.

There are a number of administrative methods that are used to manage processes by which access to spectrum may be granted. These include “a first come-first served basis”, a reserved basis for certain uses or users in a form of a-priori planning and so-called beauty contests, which may be held to decide who will be assigned certain frequencies or bands of frequencies. Economic methods such as lotteries or auctions may also be employed. There are clear advantages and disadvantages for each method and these are explored in more detail below and in: **Section 5.0 Spectrum Pricing**.

Improved technology used in analyzing spectrum use (**See Spectrum Monitoring Activities Section 6.2**) and information systems are playing more important roles when assigning and keeping track of spectrum use, as well as aiding in administrative functions such as collection of licence fees and preparing submissions of various information to other countries (or to the ITU where required). It is very important to tailor systems and the application of such technologies to the real requirements and to the available resources. Maintenance of any such information systems must be ensured which underlines the need for competency in such systems.

No matter what method is used for assigning frequencies, some level of spectrum engineering support is required to ensure, inter alia, that the use of frequencies authorized will not result in interference or to resolve any cases of intra-national or international interference that might arise. Such capability is also required to assess, for example, some of the newer technologies such as software defined radio equipment.

The next sections discuss: Assigning Frequencies and related sub-topics including Methods for Assigning Frequencies; Relation to Other Authorizations and the important subject of the Impact of Technological Innovation and the Impact on Authorization; as well as providing an overview of several technical topics, such as Certification of Radio Operators and Equipment Authorization.

RELATED INFORMATION

Authorization of Telecommunications Services Module – Section 6.6 Spectrum Authorization

The Radio Spectrum Decision lays the foundation for a general EU radio spectrum policy and is binding on all Member States. The objective of the Radio Spectrum Decision is to ensure coordination of radio spectrum policy approaches by facilitating harmonized conditions for the availability and efficient use of radio spectrum.

Member States shall facilitate the use of radio frequencies under general authorizations. Where necessary, Member States may grant individual rights of use in order to:

- avoid harmful interference,
- ensure technical quality of service,
- safeguard efficient use of spectrum, or
- fulfill other objectives of general interest as defined by Member States in conformity with Community law.

A number of key recommendations related to spectrum authorization are contained in the European Commission 2007 Review concerning spectrum management. These were as follows:

- **Increased Use of Market Mechanisms** - The current spectrum management and distribution system is generally based on administrative decisions that are insufficiently flexible to cope with technological and economic evolution, in particular with the rapid development of wireless technology and the increasing demand for bandwidth. The undue fragmentation amongst national policies results in increased costs and lost market opportunities for spectrum users, and slows down innovation, to the detriment of the internal market, consumers and the economy as a whole. Moreover, the conditions for access to, and use of, radio frequencies may vary according to the type of operator, while electronic services provided by these operators increasingly overlap, thereby creating tensions between rights holders, discrepancies in the cost of access to spectrum, and potential distortions in the functioning of the internal market;
- **Technology and Service Neutrality1** - Flexibility in spectrum management and access to spectrum should be increased through technology- and service-neutral authorisations to let spectrum users, choose the best technologies and services to apply in a frequency band (hereinafter referred to as the 'principles of technology and service neutrality'). The administrative determination of technologies and services should become the exception and should be clearly justified and subject to regular periodic review;
- **Freedom to Chose** - Spectrum users should also be able to freely choose the services they wish to offer over the spectrum subject to transitional measures to cope with previously acquired rights. It should be possible for exceptions to the principle of service neutrality which require the provision of a specific service to meet clearly defined general interest objectives such as safety of life, the need to promote social, regional and territorial cohesion, or the avoidance of inefficient use of spectrum to be permitted where necessary and proportionate. Those objectives should include the promotion of cultural and linguistic diversity and media pluralism as defined in national legislation in conformity with Community law. Except where necessary to protect safety of life, exceptions should not result in exclusive use for certain services, but rather grant priority so that other services or technologies may coexist in the same band insofar as possible. In order that the holder of the authorisation may choose freely the most efficient means to carry the content of services provided over radio frequencies, the content should not be regulated in the authorisation to use radio frequencies (there is no specific mention of must-carry obligations as typically imposed on cable broadcasters);
- **Spectrum User Rights** - In the interests of flexibility and efficiency, national regulatory authorities should, in bands which will be identified on a harmonised basis, also allow spectrum users to freely transfer or lease their usage rights to third parties, which would allow spectrum valuation by the market. In view of their power to ensure effective use of spectrum, national regulatory authorities should take action so as to ensure that trading does not lead to a distortion of competition where spectrum is left unused.

Decision No 676/2002/EC of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision).

◂ **Box 1 European Union General Authorizations**

Source: EU Decision No 676/2002/EC

The idea that a spectrum authorization can be issued which is technology neutral is being replaced by a concept of technology flexibility since interference cannot be entirely avoided.

Reference Documents

- **Bahrain- Invitation to Apply for Second Mobile Licence**

5.3.2 ASSIGNING FREQUENCIES

For spectrum managers, spectrum authorization involves the licencing of radiocommunication equipment and the making of frequency assignments. The administration of licensing contributes to the proper functioning of spectrum management operations. Licensing places controls on the operation of radio stations and the use of assigned frequencies.

Spectrum authorization activities include analyzing requirements for proposed frequencies in accordance with national plans and policies for frequency allocation. They include actions to protect radiocommunication systems from harmful and obstructing interference. Spectrum authorization strategies are used to ensure proper use, facilitate reuse, and achieve spectrum efficiency.

For users and potential users of spectrum, it is important for them to know their rights and obligations with sufficient precision to allow them to make plans and avoid interfering with one another's activities. Except in the case of unlicensed spectrum, this is done at the stage of assignment of frequencies which thus becomes a key aspect of spectrum regulation especially if licences are granted for a long duration.

For example, the Comprehensive Free Trade Agreement being negotiated in 2009, between the EU and ASEAN includes Article 31 which ensures that the requirements for the attribution of frequencies by licensees are adequately specified in the terms of the licence. In the case of spectrum authorizations, this is particularily important when licensees have transfer, leasing or trading rights and the licensee is required to either seek approval from the regulator for the change or simply provide notice of the change.

Precisely what the spectrum manager has to do in order to achieve an effective assignment depends on the method chosen, and also upon linkages with other authorisations such as the issuing of broadcasting licences. New technological developments may change the methods used to issue authorisations and may require 'refarming' of spectrum. The process will require engineering and administrative support and, in some cases, financial support. These issues are discussed in the following sections.

Reference Documents

- **CEPT: Refarming and Secondary Trading in a Changing Radio Communications World: Executive Summary**

5.3.2.1 METHODS FOR ASSIGNING FREQUENCIES

Spectrum Overview - **Section 1.5** above provides an in depth discussion of the three major methods of granting users access to spectrum: by administrative methods, using market-based methods and by permitting access to unlicensed spectrum. For the purposes of the present discussion on spectrum authorization, only the first two are relevant, because the third does not involve assignment to, or licensing of, individual users.

In the case of administrative methods, a spectrum manager specifies detailed rules and constraints affecting how, where, and when spectrum can be used and who has access to spectrum. Minimizing harmful interference lies at the heart of the traditional model which places an emphasis on the technical management of radio spectrum.

Market methods are used at the initial issuance of a spectrum licence, when auctions are used, by allowing spectrum rights to be bought and sold (traded) over the lifetime of a licence, and allowing a change of use and transfer between users of the relevant spectrum.

Administrative methods of assignment and the use of market-based methods such as auctions have many elements in common. In both cases, utmost clarity is required about what rights and responsibilities are entailed by the licence. These must be specified in respect of technology, geography and time.

The most complex is technology. Under administrative assignment of licences to a particular user providing a particular service (a specified form of radar, GSM, etc.), the technological restrictions in the licence are normally defined in terms of the location, power and geographic coverage of the specified apparatus. The specifications are chosen to avoid interference with other users. Any departure by the licensee from these conditions is a breach of the licence. If, however, spectrum licenses are flexible and can be employed for any purpose – following a trade of the licence, for example – apparatus licensing of the kind described above does not work, as each possible use will be associated with different equipment. In these circumstances, licensees will have to face restrictions in what emissions their activities are allowed to make at the boundaries of the licence area – i.e. what spill over they can make into adjoining geographic areas and frequencies. This is considerably more complex.

The geographical scope of a licence is more easily specified once the interference issue noted above has been resolved. It may be the whole territory governed by the spectrum regulator, or a small subset needed for a radar or a local radio station.

The duration of the licence must also be specified. **Section 4.2.4** on Market-based Methods – Licence Duration of this module discusses the pros and cons of shorter or longer licence durations.

Following the stage of definition of licensee rights and obligations, the administrative and market (auction) methods diverge. If an administrative method is employed, then the regulator must decide how to make the assignment. If there is no excess demand for spectrum licences, the method chosen might be 'first come, first served': the regulator would announce the available licences and invite applications. Applicants might have to be qualified in specified ways but qualified applicants would then be granted licences until they were exhausted.

If excess demand is anticipated, use of a competitive assignment process is normally preferred. For this to be done fairly and transparently, the regulator must set out the various criteria to be employed, relating for example to the technical and financial qualifications of applicants, their access to capital, the scope and geographical range of their services, and so on. Each criterion should have a pre-announced weight, and an objective method of measurement should be specified.

If an auction method is used to make an assignment, the procedures to be employed must be set out in fine detail to ensure that all competitors are on an equal footing. For example, if a sealed bid is employed, the date and place at which it must be lodged have to be clear. If an open auction process is utilised, in which bidders make offers for licences in successive rounds of bidding, a whole range of procedures relating to the frequency of rounds, increments in amounts bid, obligations to make new bids and so on must be specified. These points are discussed further in the Practice Note on auctions.

In all cases, it is vital that the regulatory body abide strictly by the conditions it has specified for the assignment. Any departure or evidence of partiality, prejudice or of conflict of interest will be damaging in several ways. First, legal challenges can delay the start of services of benefit to end users, possibly for many years. Secondly, doubts about the integrity of the process will deter companies from participating in competitive assignment processes. As a result, inferior candidates may be successful, leading to long term harm for consumers.

Reference Documents

- **Are spectrum auctions ruining our grandchildren's future? The Journal of Policy, Regulation and Strategy for Telecommunication Information and Media, Camford Publishing Ltd**
- **Breaking the Chains: Unlicensed Spectrum as a Last-Mile Broadband Solution, New America Foundation, Spectrum Policy Program, Spectrum Series working Paper No.7, June 2003**
- **Canada: Radio Station Licensing Procedure for Radiocommunication Service Providers, 2002**
- **Comments of 37 Concerned Economists**
- **Economic Case for Unlicensed Spectrum Below 3GHz**
- **Fixed Wireless Access (FWA) Spectrum engineering & Frequency Management Guidelines**
- **General Spectrum License for Radiocommunications Systems Related to the Integrated Licensing Regime**
- **India: Spectrum Auctions - Lessons from Experience, Telecommunications Policy (issue 25), 2005**
- **Lessons from the Spectrum Auctions and Beauty Contests , V.**
- **Regulation on Collective Frequencies for License-Exempt Radio Transmitters and on their Use**
- **Spectrum Issues for the 1990s: New Challenges for Spectrum Management**
- **Spectrum Trading in Germany, Austria and the UK: The influence of regulatory regimes and evaluation of criteria on competition in the European Mobile Telecommunications Sector, August 2003**
- **The Path towards Efficient Coexistence in Unlicensed Spectrum, Cargenie Mellon University, IEEE 802.16 Broadband Wireless Access Working Group, 30 April 2000**
- **The Question of Spectrum: Technology, Management and Regime Change, The Economics, Technology and Policy of Unlicensed Spectrum Research Conference (May 2005 Michigan)**

5.3.2.2 RELATION TO OTHER AUTHORIZATIONS

It should be noted that there are often other authorizations that are required in parallel with the spectrum authorization. In the case of telecommunication carriers, often telecom licensing is required (see the **Module 3. Authorization of Telecommunication/ICT Services**). The licensing of such telecom facilities can involve radio and non-radio based facilities, the former being subject to spectrum authorization as well as telecom licensing. In some countries, such licensing of telecom carriers is performed by the same regulatory body which regulates the use of spectrum whereas in other countries, telecom licensing is carried out by a separate regulatory authority. Similarly, in the case of broadcasting, often a broadcasting licence separate from a spectrum authorization is required. Again, in some countries it is the same regulatory body that issues broadcasting licences as issues spectrum authorizations whereas in other jurisdictions, it is a different regulatory body. In some countries, the regulation of spectrum, telecommunications and broadcasting is all carried out by a single regulatory body.

In addition to these authorizations, there are often additional authorizations required for a radiocommunication facility. For example, if an associated antenna structure is above a certain height and/or within a certain distance of an airport, painting and lighting requirements may enter into play. These requirements are usually set out by the government authority responsible for air navigation safety. Another type of authorization that may be required in some countries is what is often referred to as local planning permission. The siting of antennas may be subject to local land use policies and authorizations confirming conformity with such policies may be required.

RELATED INFORMATION

The following references give examples of regulators in selected jurisdictions who are responsible for multiple service authorizations (television, radio, telecommunications), singular authorizations, and regulations concerning deployment of infrastructure (antenna in municipalities).

Ofcom is the independent regulator and competition authority for the UK communications industries, with responsibilities across television, radio, telecommunications and wireless communications services.

http://www.ofcom.org.uk

The CRTC is an independent agency responsible for regulating Canada's broadcasting and telecommunications systems.

http://www.crtc.gc.ca

The Nepal Telecommunications Authority is responsible for The National Broadcasting Regulation, 2052 (1995) and the licensing of broadcast facilities.

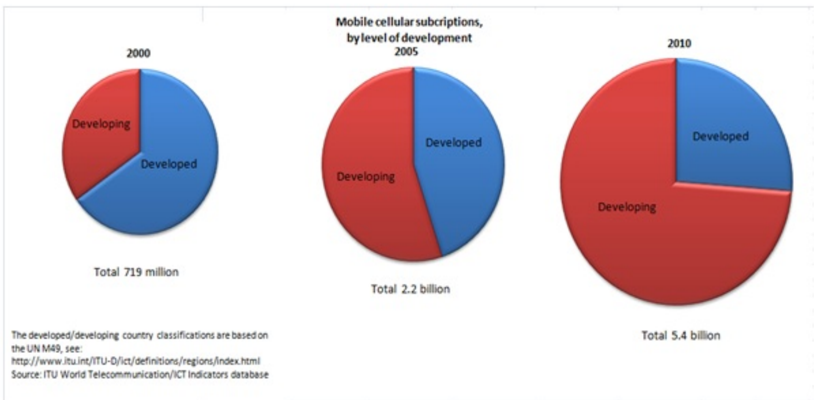
http://www.nta.gov.np/national_broadcasting_regulation_2052.html

Reference Documents

- **Botswana: The National Broadcast Board**

5.3.2.3 LIBERALIZATION AND THE IMPACT ON AUTHORIZATION

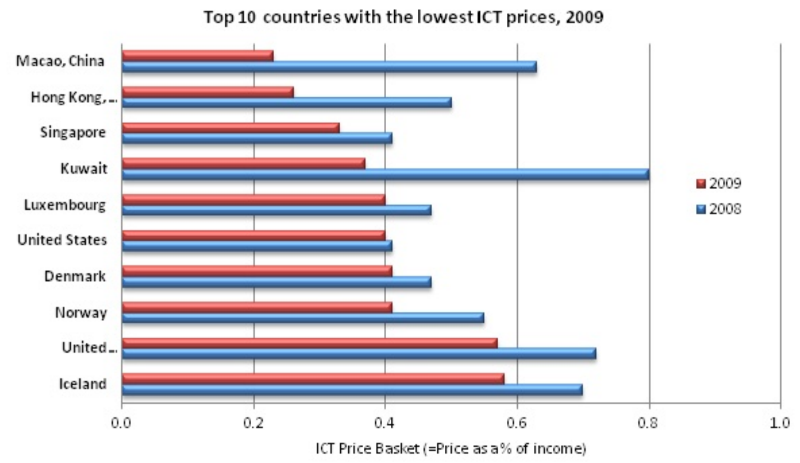
Liberalization, along with deregulation and privatization of telecommunication services, particularly within the mobile and ISP sectors, have been the dominant trends in the past ten years. As a result, competition has increased, demand has risen, ICT prices have fallen, and the quality of services has vastly improved. Mobile penetration in developing countries in Africa and Asia has reached approximately 45 and 62 per cent, respectively, with mobile penetration growing at a phenomenal compound annual growth rate over 22 per cent globally in 10 years. Indeed, amongst the least developed economies, mobile cellular subscribers outnumber fixed lines by more than nine to one. The balance has shifted between developed and developing countries with most of the growth in mobile subscriptions occurring in developing countries, as shown in Figure 3.2.3.1.



◂ Figure 3.2.3.1 Mobile subscribers worldwide by level of development 2000, 2005, 2010.

Photo: Source: ITU World Telecommunication Indicators Database.

The trend in ICT prices, as illustrated in Figure 3.2.3.2, is lower across developed and developing countries, even though new services (3G and mobile data) replace second generation mobile telephony. Correspondingly, new technologies and services (such as mobile data) have been developed alongside tapping into increased demand for services giving consumers and businesses more choice.



◀ **Figure 3.2.3.2 Top Ten Countries with lowest ICT Prices**

Photo: Source: ITU Measuring the Information Society 2010

There has been a shift away from the predominant traditional model, most notably in countries where demand for radio spectrum use is rising fast. Two features of more liberalized telecommunications regulation are:

- **Greater use of market-based mechanism**s - this covers competitive assignments (such as auctions) through to secondary trading. Within this environment, management is delegated as much as possible to participants within the spectrum arena. Spectrum management agencies in this setting perform the role of 'light-handed' regulation;
- **More flexibility in licensing and use** involves the relaxation of constraints on usage and technologies (either as a commons or in the form of managed shared use), as well as the possible expansion of licence-exempt frequencies. However, few countries have opened up large parts of the spectrum as a genuine commons. Most notably the United States has embarked on a path of considerable innovative activity. The use of WiFi, WiMAX and UWB in the US emerged many years before being deployed in most other countries, partly due the size of the market and as a result of regulatory actions designed to promote flexibility and unlicensed use.

Practice Notes

- **European Commission – Spectrum Authorization Reform**

Reference Documents

- **ITU:8th Annual Global Symposium for Regulators - A Discussion Paper on Spectrum Sharing by Adrian Foster, Pattaya, Thailand, 2008**

5.3.2.4 TECHNOLOGICAL INNOVATION AND THE IMPACT ON AUTHORIZATION

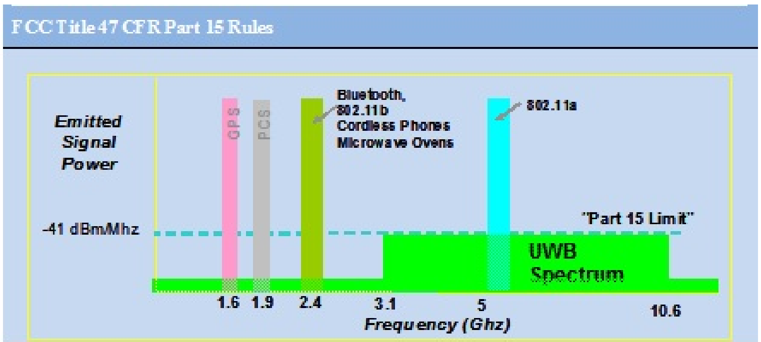
Technological innovation and wireless are synonymous. When this happens it can alter how radio frequencies should be used and assigned. This can become a problem and create a major challenge for the spectrum manager especially as the rate of change multiplies. Under an administrative procedure, when a licence expires a change of use can be a desirable approach with a new licence can be issued to provide the new service. Where a market regime involving secondary trading and change of use are in place, then spectrum user rights which are linked to the spectrum license permits the alteration to take place without regulatory intervention, if regulatory requirements concerning interference are in place. Indeed one of the arguments for the use of markets is that it takes the regulator out of the process of responding to technological change which is occurring at an increasing rate.

Technological innovation is a leading factor in improving the efficient use of spectrum. At the basic level the fullest possible use of all available spectrum is encouraged. Some measures of technical efficiency are needed to help regulators and users determine the degree of improvement in technical efficiency. Two measures of technical efficiency most commonly used are spectrum occupancy and utilization and data rate. Occupancy, for example, can be used as a measure of technical efficiency; in the sense of how constant or heavy the usage of spectrum is over time. Data rate means how much data and information can be transmitted for a given amount of spectrum capacity.

In the next several paragraphs several broad categories of innovative technologies are introduced which are altering the landscape. These are Spectrum Underlay and Overlay technologies,

Spectrum Underlay is a spectrum management technique by which signals with a very low spectral power density can coexist, as a secondary user, with the primary users of the frequency band(s). The primary users deploy systems with a much higher power density level. The underlay leads to a modest increase of the noise floor for these primary users. Examples of spectrum underlay technologies include; Ultra-wideband (UWB) and Spread Spectrum,

Ultra-wideband spectrum is an active underlay technology which transmits information spread over a large bandwidth (>500 MHz) while sharing spectrum with other users. The FCC defines UWB in its Part 15 Rules – see Figure 3.2.4.1 below. The ITU defines UWB in terms of a transmission from an antenna for which the emitted signal bandwidth exceeds the lesser of 500 MHz or 20% of the center frequency



◂ **Figure 3.2.4.1 FCC Title 47 CFR Part 15 Rules**

Photo: Source: FCC

Due to the extremely low emission levels currently allowed by regulatory agencies, UWB systems tend to be short-range and indoors applications. However, due to the short duration of the UWB pulses, it is easier to engineer extremely high data rates, and the data rate can be readily traded for range by simply aggregating pulse energy per data bit using either simple integration or by coding techniques.

Spread spectrum is a technique of spreading a signal out over a very wide bandwidth, often over 200 times the bandwidth of the original signal. A spread spectrum transmitter spreads the signals out over a wide frequency range using one of the following techniques:

Direct sequence spread spectrum - Spread spectrum broadcasts in bands where noise is prominent, but does not rise above the noise. Its radio signals are too weak to interfere with conventional radios and have fewer FCC (Federal Communications Commission) restrictions. Data is altered by a bit stream that represents every bit in the original data with multiple bits in the generated stream, thus spreading the signal across a wider frequency band.

Frequency hopping spread spectrum - using this technique, the original data signal is not spread out, but is instead transmitted over a wide range of frequencies that change at split-second intervals. Both the transmitter and the receiver jump frequencies in synchronization during the transmission. CDMA (Code Division Multiple Access) is a digital cellular standard that uses wideband spread spectrum techniques for signal transmission;

There are two types of overlay, passive or active (dynamic).

- The Amateur radio service has shared spectrum with various government users using passive overlay technologies which require the user to look for a CB radio channel that is free. A passive overlay technology is different from an active overlay technology.
- Active overlay technologies are beginning to emerge and be trialed. A major trial is currently taking place in Ireland involving several major manufacturers of equipment and devices. There are several possible approaches being studied.

In 2007, as part of Pakistan's consultation on infrastructure sharing for mobile companies concept of spectrum pooling which is a form of spectrum sharing achieved by overlay was considered. It was pointed out in the consultation report that no country has yet to permit this type. (See ITU GSR 2008 Discussion Paper on Spectrum Sharing, pps. 17-18.)

Dynamic Spectrum Access is in its early stages of development is an advanced approach to spectrum management that is closely related to other management techniques such as flexible spectrum management and spectrum trading. It involves unitising spectrum in terms of time slots and/or geographically. This allows users to access a particular piece of spectrum for a defined time period or in a defined area which they cannot exceed without re applying for the resource.

It permits communications to work by:

- Monitoring to detect unused frequencies;

- Agree with similar devices on which frequencies will be used;
- Monitoring frequency use by others;
- Change frequency bands and adjust power as needed.

Benefits of increased access to spectrum and better efficiency need to overcome several hurdles including:

- Potential for increased interference and affect on quality of service and compliance with regulations;
- Technical issues related to unseen devices competing for similar frequencies (the hidden node problem) and development of complex equipment.

Dynamic spectrum access is often associated with, although not exclusively dependent on, technologies and concepts such as Software Defined Radio (SDR) and Cognitive Radio which are described in the next paragraphs.

Refarming and Reuse As we have seen, the need for reallocation or re-farming, as it often term can often arise from technological change in several ways:

- it may be that the international table of frequency allocations has changed, as in the case of WRC-07, resulting in the realignment of national table of frequency allocations;
- demand for radio services may be changing and there may be more demand for mobile broadband and less demand for traditional terrestrial TV; and
- sometimes, new spectrum-efficient technologies allow spectrum to be freed up, as in the case of the Digital Dividend.

Reallocation and refarming of spectrum are activities in many spectrum management organizations that continue to pose challenging issues with respect to establishing policy and procedures for governments, regulators, and users alike. Key issues include deciding who pays and the amount that must be paid for reallocation and refarming of spectrum. These issues trigger all sorts of conflicts, some of which that escalate to legal challenges.

Various approaches exist for re-farming which may better suit certain circumstances. For example, in some cases featuring administrative approaches, regulators address the issues; in other cases featuring market-driven approaches, users determine the timing and price. Some approaches simply require the user to absorb the cost. In other cases, the beneficiaries of the change are either invited or required to reimburse all or part of the transition costs of the incumbent user.

There are several examples of tools used by that have proven to be effective including: Spectrum Refarming Funds (e.g., France, UK the US); dispute resolution techniques; and, in some cases, methods for spectrum valuation to determine:

- UK, a Spectrum Efficiency Scheme, administered by the regulator, exists to finance such costs;
- US legislation is in place which allows the auctioning of such spectrum, using as a ‘rescue policy’ the costs of relocation: in other words the process only goes ahead if the displaced party is compensated;

In reality, things can get quite messy. There may be uncertainty over what are the spectrum user's rights. This has been the case in the United Kingdom, for example, where licences have had a reasonable and legally enforceable expectation to receive a notice of an unspecified number of years before they are evicted. In a market regime where licences are of limited duration (e.g. twenty years), there may be a period of uncertainty, when a switch to a new use is desirable but no one is prepared to make the necessary investments to achieve it, because of uncertainty about future access to spectrum.

Another tool which can be used involves the use of auctions. For example, a licensee has a license with a fixed term remaining and the regulator chooses, in advance, to auction the licence for the succeeding period simultaneously making the current licence tradable. The prospective licensee can then bargain with the current licensee to achieve early release of the spectrum, if it is in the parties’ mutual commercial interest to agree such a transfer.

Successful re-assigning or 'refarming' of spectrum is a key element in achieving flexible use which responds to demands for new services.

RELATED INFORMATION

Legal and Institutional Aspects of Regulation Module: Section 4.3.2, Impact of Convergence on Licensing, Spectrum

Reference Documents

- **An Essay on Airwave Allocation Policy, 2004 (Need for Reform)**

- CEPT: Refarming and Secondary Trading in a Changing Radiocommunications World, 2002
- FCC, Amendment of Parts 2 and 90 of the Commission's Rules to Provide for Narrowband Private Land Radio Mobile Channels in the 150.05-150.8 MHz, 162-174 MHz, and 406.1-420 MHz Bands that are Allocated for Federal Government Use
- Hong Kong: OFTA, Frequency Bands for Broadband Wireless Applications, 2006
- ITU: Low Power Devices - Regulatory Issues, 2004
- Spectrum Efficiency – Drawing a Bead on a Moving Target, Radio Resource, Mission Critical Communications June 2005
- United Kingdom: Ofcom - Spectrum Efficiency Scheme

5.3.2.5 ENGINEERING SUPPORT

Software tools have been developed in house by spectrum management organizations and by the private sector. These tools are designed to support spectrum planning and frequency management in both head office and field applications. These tools assist frequency managers in establishing and maintaining the administrative and technical requirements of radio frequency management. The tools are very sophisticated and perform analyses which require the manipulation of large amounts of data in varying formats and structure. This poses several problems for regulators in both developed and developing countries. The capability to acquire and manage data and the development of innovative techniques have been developed for extracting and manipulating critical data elements and databases so as to transform data into useful frequency management information.

Engineering support is also required to determine which radio services and applications can share the same frequency band. Complex engineering calculations are often required in order to pack as many users and uses as possible into a given portion of the radio frequency spectrum. Analysis of cases of national or international harmful interference and coordination of frequencies with other countries requires engineering expertise. Engineering support is important when making proposals to change bilateral or multilateral treaties and agreements (e.g. at ITU World Radiocommunication Conferences) and when analyzing the proposals of others.

RELATED INFORMATION

SMS4DC Version 2.0 - Spectrum Management System for Developing Countries Edition 2008

ITU-D Regional Development Forum for the Arab Region: "Access to spectrum, including broadcasting services trends and technologies"

Reference Documents

- Europe: Fixed Wireless Access, Spectrum engineering & Frequency Management Qualitative Guidelines

5.3.2.6 ADMINISTRATIVE SUPPORT

Substantive spectrum management tasks such as authorization involving planning, engineering, and authorization tasks cannot be effectively performed without support from other staff units with expertise in legal, finance, and information management, as well as various clerical and administrative activities. The table below lists several administrative functions and responsibilities in addition to the mainstream spectrum management activities of planning, engineering, etc.

Some of the administrative functions will be associated with some of the routine tasks and methods associated with licensing of radiocommunications, approval of radio equipment type, and routine monitoring. These routine tasks should be supported by well-defined administrative processes, which can be dramatically improved and made more cost-effective through the use of efficient information management systems. Quality of service can be improved by placing service points of presence close to clients and users.

Other will be associated with some of the more technical areas involved in planning and authorization. Legal, finance and economic expertise will be required to support planning activities and implementation of new practices. For example, preparation of band plans, spectrum fees, licensing processes, spectrum occupancy analysis and surveillance and competitive bid processes create new business processes. The analysis of business processes will lead to an understanding of needs in information, data, and application. At this point, planning can shift to a consideration of technical architecture and technology platforms.

Spectrum Management Functions
Spectrum Management Policy and Planning: Allocation of Spectrum
Frequency Assignment and Licensing
Standards, Specifications, and Equipment Authorization
Spectrum Control (enforcement and monitoring)
International Coordination
Liaison and Consultation
Spectrum-Engineering Support
Computer Support
Administrative Legal Support

◂ **Table 1 Spectrum Management Functions**

Source: ITU Spectrum Management Handbook

Practice Notes

- **Canada: On-line licencing services web site - Industry Canada**

Reference Documents

- **How to Apply for Type Approval or Type Acceptance of Radio Equipment**
- **Resolution ITU-R 11-3 Development of an Upgraded Spectrum Management System**

5.3.3 CERTIFICATION OF RADIO OPERATORS

The ITU Radio Regulations set out the need for certain operators of radio equipment to possess a radio operator's certificate. Chapter 8 of the Radio Regulations deals with the requirements within the aeronautical environment while Chapter 9 deals with requirements in the maritime environment. In addition, Article 25 of the Radio Regulations and ITU-R Recommendation M.1544 which is incorporated by reference deals with the requirements for amateur radio operators. Ensuring conformity with these and with any additional national radio operator requirements involves examinations and the issuance of radio operator certificates of various types. In most countries, the conducting of these examinations is delegated to a public or private sector entity closely associated with the respective field i.e., aeronautical, maritime and amateur. Often such bodies will also conduct courses covering the material required for operator certification. In some cases, the delegated authority also issues the operator certificate on behalf of the government regulator.

Reference Documents

- **Canada: Restricted Operator's Certificate (Maritime)**
- **USA: FCC - First Class Radiotelegraph Operator's License Certificate Process Description**

5.3.4 EQUIPMENT AUTHORIZATION

Radiocommunication equipment (often referred to as radio apparatus) must be authorized for use even if the use of the specific equipment does not require a licence. Ensuring that equipment meets certain technical standards reduces the possibility of harmful interference.

Reference Documents

- **Regulation on Collective Frequencies for License-Exempt Radio Transmitters and on their Use**
- **Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and their Regulatory Issues, Federal Communications Commission, May 2003**

5.3.4.1 EQUIPMENT CERTIFICATION

Equipment certification and/or type approval provides assurance that, in terms of design, the licensed radio equipment will meet regulatory requirements and will enable radio equipment and radio stations to coexist within acceptable limits.

These limits are considered in conjunction with practical economic considerations of efficient spectrum use. Accessible records of approved equipment and licensed equipment facilitate the licensing and assignment processes.

The spectrum management authority or a designated agent maintains a listing of equipment categories which require either certification or type approval. Acceptance, sometimes referred to as voluntary certification, allows listed telecommunication equipment to be either marketed or used without having to obtain an equipment certification (type approval certification). Certification requires that equipment intended for sale or use be certified as approved prior to either its use or sale within the country of jurisdiction.

Reference Documents

- **Canada: Standards and Certification of Radio Apparatus and Electronic Equipment Used in Canada**
- **EU: Mutual Recognition Agreements**
- **Fees and Application Guidelines for Telecommunications/Radiocommunications Equipment Type Approval.**
- **Hong Kong: Equipment Evaluation and Certification Scheme**
- **Japan: Radio License Procedures and System for Conformity**
- **Mauritius: Type Approval Guidelines**

5.3.4.2 LABORATORY CERTIFICATION

Testing of radiocommunication equipment to establish compliance with national standards is performed by government operated testing facilities or in private sector laboratories. In recognition of the dynamic nature of technological change and innovation and the high cost of test equipment, national governments are increasingly favouring private sector facilities. Due to the importance of testing and certification, the complexity involved and the reliance placed on results, policies and regulations have evolved around the harmonization of standards across regions and markets. Harmonization has also been promoted by the adoption of consistent approaches through the certification of Conformity Assessment Bodies (CAB's). CAB's are organizations recognized by the spectrum management authority to conduct testing and certification of radiocommunication equipment.

A CAB in one country can be recognized in another country by way of agreement. Mutual Recognition Agreements (MRA's) facilitate trade among countries. They are established on a bilateral or a regional basis, and streamline the conformity assessment procedures for a wide range of telecommunication and telecommunication-related equipment. One such example is the Asia-Pacific Economic Cooperation Telecommunications MRA. These steps reduce the cost of supply of radiocommunication equipment and ensure both quality and conformity. An MRA provides for the mutual recognition by the importing parties of CAB's and mutual acceptance of the results of testing and equipment certification procedures undertaken by those bodies in assessing conformity of equipment to the relevant technical regulations.

Practice Notes

- **EU Directive: Definitions for Mutual Recognition Agreement and Conformity Assessment Bodies**

Reference Documents

- **EU: Mutual Recognition Agreements**
- **European Union: Telecommunications equipment and Mutual Recognition Agreement**
- **System of Certification under Conformity with Technical Standard**

5.4 SPECTRUM SHARING

This section is adapted from discussion paper on Spectrum Sharing prepared in 2008 for the 8th Annual Global Symposium for Regulators.

5.4.1 INTRODUCTION

This chapter reviews various trends in spectrum sharing methods used by spectrum managers who are responding to increasing demands for spectrum resulting from the unstoppable surge in new services and technologies. In the sections which follow, access to spectrum, international trends, and implementation issues are discussed.

Spectrum sharing is not a universal trend for all regulators nor are the approaches taken similar for all regulators:

- approaches by regulators for managing the unlicensed but regulated spectrum commons range from imposing license and permit constraints to few if any constraints at all beyond technical specifications. The allocation of ISM bands for unlicensed use by low power devices such as Wi-Fi has been encouraged by the ITU across all regions;
- Making changes to encourage spectrum sharing by different services such as fixed and mobile have shown many countries continue to reserve significant amounts of spectrum for exclusive (government use). The WRC-07 has made significant strides increasing the amount of spectrum available to broadband services.

Spectrum sharing encompasses several techniques – some administrative, technical and market-based. Sharing can be accomplished through licensing and/or commercial arrangements involving spectrum leases and spectrum trading. Spectrum can also be shared in several dimensions; time, space and geography. Limiting transmit power is also a factor which can be utilized to permit sharing. Low power devices in the spectrum commons operate on the basis of that principal characteristic: signal propagation which takes advantage of power and interference reduction techniques. Spectrum sharing can be achieved through technical means using evolving (not yet commercially available) advanced technologies such as cognitive radio. These technologies and related concepts are reviewed. Several prominent examples of spectrum trading experience are reviewed.

A common issue for both innovative technologies and market-based methods is arriving at the right balance. Resolving interference issues inherent in methods based on the principle of technological neutrality is an issue of great importance. Interference cannot be eliminated and so identifying interference management models which support spectrum sharing under either administrative, market-based or spectrum commons, remain as an ongoing requirement and challenge for spectrum managers. These issues are discussed and examples of possible solutions are given. The section ends with a review of some of the best practices used to encouraging spectrum sharing and implementation issues.

Related Materials

Module 2, Section 6.5, Mobile Network Sharing

5.4.2 ACCESS TO SPECTRUM

As the demand for spectrum increases and frequency bands become more congested, especially in densely populated urban centres, spectrum managers are following diverse approaches to sharing frequencies: using administrative methods including in band sharing, licensing such as leasing and spectrum trading, and the unlicensed spectrum commons combined with the use of low power radios or advanced radio technologies including ultra-wideband and multi-modal radios.

Spectrum sharing typically involves more than one user sharing the same piece of spectrum for different applications or using different technologies. When a band already licensed to an operator is shared with others it is known as overlay spectrum sharing. For example a spectrum band used for TV distribution in one geographical area could be used for an application such as broadband wireless access in another area without any risk of interference, despite being allocated on a national basis.

Spectrum sharing is required when sufficient demand exists for spectrum, causing congestion, and the technical means exist to permit different users to coincide; and other means for adjusting spectrum use and assignment have become burdensome and costly undermining the goals of economic and technical efficiency. The implications for spectrum managers are that spectrum management policies are evolving towards more flexible and market oriented models to increase opportunities for efficient spectrum use.

Reference Documents

- **Administrative Fees and Spectrum Charges: Report to the European Commission, Directorate General Information Society**

5.4.2.1 FORMS OF SPECTRUM SHARING

There are generally several ways to share spectrum and achieve the goal of improving access to spectrum by giving more users greater flexibility in its use by implementing:

- Liberalized methods for assigning spectrum rights such as leasing, trading (see section **1.5.2 Market methods**) and the spectrum commons (see section **1.5.3 Unlicensed spectrum**);
- A new paradigm for interference protection taking into account new technologies such as dynamic spectrum access where underlay technologies are used based on power limits, for example UWB, mesh networks,

software defined radio (SDR), smart antennae and cognitive radios (see section **4.2.5 Technically-enabled sharing**).

RELATED INFORMATION

The ITU conducted a New Initiatives workshop on the subject of "Radio Spectrum Management for a Converging World". The workshop was held at ITU Headquarters, Geneva from 16 to 18 February 2004. Presentations and papers from the workshop can be obtained by going to the ITU website. Go to **www.itu.int/osg/spu/ni/spectrum**.

5.4.2.2 WHICH BANDS CAN BE SHARED?

Some frequency bands are shared by some users by maintaining geographic separation and ensuring strict adherence to operational constraints preventing interference between services. One good example is spectrum shared by satellite and fixed links where the microwave links transmit horizontally and interaction between systems is limited. As well, fixed and mobile services share bands and do so by maintaining geographic separation and limits on power.

Potentially all bands can be shared and many bands remain under-utilized, i.e. although sharing does not yet occur in under-utilized bands, it is technically possible to share these bands using combinations of administrative means (assignment – time, geographic, and interference management constraints) and technical solutions (filters, smart antenna, smart transmitters such SDR, and cognitive radio, along with transmit power limitations combined with a relaxation of interference constraints). An important exception exists where there has been a spectrum policy decision to maintain exclusive band and assignments for public safety and security services.

Not all bands are equal, however, and so there can be increasing pressure to release new bands or share bands for certain services. For BWA, bands need not necessarily be contiguous, but must have sufficient bandwidth (i.e., 2.5 MHz) to support broadband applications such as video and should be located where good propagation characteristics exist (i.e., below 1 GHz) and where there is wide geographic coverage. Bands with low occupancy and utilization could also be of interest (i.e. above 15 GHz).

The question of sharing Public Use Spectrum bands also arises given the extensive amount of spectrum held by governments for their exclusive use. The arguments for special arrangements for spectrum for the public sector are as follows:

- it is indispensable to the provision of service such as defence radar;
- the service itself (such as an ambulance service) has a very high priority; and
- under past spectrum management practices, the only way to acquire spectrum was by administrative methods.

Even so, spectrum is much like any other input to government services obtained in structured markets. For a more detailed discussion of issues related to public use spectrum see **Section 2.3.7 – Public Use Spectrum**.

5.4.2.3 ADMINISTRATIVE SHARING

Administrative management of spectrum sharing generally involves the regulator's processes to establish where sharing should take place and what rules should apply. It also includes defining the sharing rules for radio system performance and applicable technical standards, equipment specifications and equipment type approval. There are several steps which can be taken by the regulator to improve spectrum sharing:

- Establish policies to make spectrum allocation and licensing assignments that are based on marketplace demands and adopt fair, efficient and transparent processes for awarding licences. This may mean beginning a process to evaluate existing allocations and determine how much spectrum can be allocated on a shared or non-exclusive basis.
- Conduct an independent audit of spectrum holdings to identify bands where immediate changes can take place.
- Conduct consultations with stakeholders to obtain necessary information to support decisions on sharing and technical standards.
- Encourage solutions based on negotiations between affected parties including the payment of compensation.
- Establish specifications which encourage the utilization of spectrum efficient technologies and put mechanisms in place such as through use of spectrum fee incentives to begin to transition allocations and assignments to commercial allocations, assignments and users.

- Consider the use of band managers to manage and to resolve issues on the part of licensees within the band. There are several models for the delegation by the regulator of spectrum management activity to a band manager, both on a non-exclusive and an exclusive basis.

RELATED INFORMATION

For more on Band Managers see **Section 1.6.2** of this Module: Management Rights Systems and Band Managers

Practice Notes

- **Types of band managers**

5.4.2.4 MARKET-BASED SHARING

As a starting point, economically efficient use of spectrum means the maximization of the value of outputs produced from available spectrum, including the valuation of public outputs provided by the government or other public authorities. From an economic efficiency viewpoint, spectrum should be divided in such a way that the benefits to the overall economy are the same from different uses of spectrum for an equivalent incremental amount of spectrum assigned to either use. Market-based approaches such as auctions and spectrum trading are viewed as superior ways of achieving economic efficiency over administered methods.

Market methods are being employed both at the primary issue of spectrum licences, when auctions are used, and, more significantly, by allowing spectrum rights to be bought and sold in the lifetime of a licence and allowing a change of use of the relevant spectrum.

In cases where spectrum is a scarce resource, and like all scarce resources in a competitive market, efficient allocation decisions are premised on prices. Well designed and properly managed auctions are appealing since they ensure that frequencies go to the firm which bids the most, and that may, in certain conditions, be the most efficient firm. Efficiency is further enhanced if the successful licensee chooses what services to provide and technologies to use.

Spectrum trading

Spectrum trading contributes to a more economically efficient use of frequencies. This is because a trade will only take place if the spectrum is worth more to the new user than it was to the old user, reflecting the greater economic benefit the new user expects to derive from its use. In the absence of misjudgements or irrational behaviour on the part of the buyer or seller, and if the trade does not cause external effects, then it can be assumed that spectrum trading contributes to greater economic efficiency.

As well as this direct effect, which at the same time boosts transparency by revealing the true opportunity cost of the spectrum, secondary trading also results in a series of indirect positive effects. Spectrum trading makes it possible for companies to expand more quickly than would otherwise be the case. It also makes it easier for prospective new market entrants to acquire spectrum in order to enter the market.

Greater flexibly in spectrum use also provides considerable incentives for incumbents to invest in new technology in order to ward off the threat of new entrants in the absence of other barriers to entry (i.e. the unavailability of spectrum). This in turn will boost market competition. These economic efficiency gains will not be realised, however, if transaction costs are too high or if external effects intervene (particularly, anti-competitive behaviour and interference).

It is important to ensure that the transaction or administrative costs for spectrum users are as low as possible. This implies, for example, that there should be few bureaucratic obstacles to the transfer of spectrum. At the same time, there should be a source of clear information that allows prospective spectrum users to find out which frequencies are available, what they can be used for, who is currently using them and what needs to be done in order to obtain a right of use.

In order for spectrum trading to be both transparent and efficient, it makes sense to give all interested parties direct access to information on current spectrum usage. To this end, it is advisable to set up a central database, which, for practical purposes, should be the direct responsibility of the spectrum regulator.

These criteria constitute the framework for a whole raft of institutional arrangements that determine the precise form of spectrum trading and set forth exactly how rights of use can be transferred. Institutional arrangements stipulate precisely who can make what decisions, when they can do so, and under what conditions. They also set forth the implications this will have for the parties involved. Ideally, such a system will include full details pertaining to all aspects of spectrum transfers and trading. At the same time, one of the aims of any spectrum trading regime should be to keep transaction costs down. Actually, the vast quantity of important details means that both primary legislation and secondary legal texts are limited in terms of how far they can specify actual arrangements.

To see more on Spectrum Trading go to **Section 1.6.4** Spectrum Trading Systems and also **Section 5 Spectrum Pricing**.

Licence duration

The introduction of spectrum trading diminishes the need to set a fixed expiry date for usage rights. Under a system of spectrum trading, rights are transferred to users who have identified an alternate use that promises greater economic returns. The choice of an expiry date, be it five, ten or twenty years hence, is always somewhat arbitrary. An argument in favour of granting spectrum usage rights in perpetuity is that users make complementary investments in stages and each investment has a different payback period. Indeed, one goal of spectrum regulation should be to encourage investment and innovation.

Economists who place their trust in unfettered market forces therefore advocate that spectrum usage rights be granted in perpetuity. This implies that, after the primary assignment of spectrum, the regulator would only have to intervene if users wished to return spectrum, or if their right of use were withdrawn owing to a breach of the conditions of use.

Nevertheless, since there are significant imperfections in the market, it may make sense to give the national regulatory authority the option of withdrawing spectrum usage rights. Alternatively, a certain period of time could be specified at the end of which the regulator decides whether or not the spectrum usage right shall be extended.

Competition issues associated with trading

Regulatory policy seeks to create a market in which prices are as close to costs as possible and where consumers can choose from a wide range of services. Sustainable competition is usually only possible where there are competing infrastructures, yet the scarcity of radio spectrum creates restrictions which often mean that an oligopoly is the only possible outcome. Frequencies should therefore be distributed in such a way as to create a market structure that ensures the maximum possible degree of competition for the available spectrum.

The *ex post* mechanisms of competition law plus regulatory oversight by the competition authority are, on their own, inadequate for policing markets, especially those that exhibit the above features. This means that *ex ante* regulation is required, particularly when it comes to distributing the scarce resource of spectrum. The design of the assignment mechanism, and of the associated licence conditions or conditions of use, is therefore crucial to the establishment of infrastructure-based competition. The assignment mechanism chosen by the regulatory authority shapes the market structure by dividing up the spectrum and limiting the maximum amount of spectrum any one user may acquire.

It is generally believed that the greater the number of spectrum users, the more competitive the market and the less need there is for regulating end users. Imagine for a moment that all the frequencies available for GSM mobile applications were auctioned in small parcels with no restriction on the maximum amount of spectrum that any one bidder may acquire. It is conceivable that one company might acquire all the parcels of spectrum, resulting in a monopoly of the mobile communications market. Without undertaking an exact analysis as to the likelihood of such an outcome occurring under different types of auctions, it is nevertheless true that, according to economic theory, an unregulated monopolist is in a position to make the highest profit and will therefore be willing to pay the most for the spectrum.

Efforts to establish a competitive market structure do not stop at spectrum assignment. Unrestricted spectrum trading could be exploited by users acting in concert to create a monopoly or at least a more concentrated oligopoly. Spectrum regulators should be alive to this possibility.

Anti-competitive behaviour, in the form of acquisition of “excessive” spectrum, can be prevented in different ways by the regulatory authority, which is in a position to set spectrum caps, to establish rules that specify how spectrum trading should take place, including prior approval of trades or transfers of spectrum.

The above remarks clearly show that, even under a more flexible regulatory regime, issues of market power will continue to be important. This, however, is not a reason to reject such a regime. In fact, a more flexible approach to spectrum regulation, which not only allows multiple transfers of spectrum but, moreover, is also accompanied by a far-reaching liberalisation of usage rights, would actually tend to diminish rather than amplify potential problems of market power.

Practice Notes

- **Spectrum Trading - GSR notes**
- **Windfall profits as a problem of transition to markets**

Reference Documents

- **A Proposal for a Rapid Transition to Market Allocation of Spectrum**

- **Designing property rights for the operation of spectrum markets, 2003**
- **Guatemala: The Guatemalan Experience, 2005**
- **Spectrum Management: Property Rights, Markets and the Commons**

5.4.2.5 TECHNICALLY ENABLED SHARING

Technically efficient use of spectrum, at a basic level, implies the fullest possible use of all available spectrum. Two measures of technical efficiency are occupancy and data rate. Time, for example, can be used as a measure of technical efficiency; in the sense of how constant or heavy the usage of spectrum is over time. Data rate means how much data and information can be transmitted for a given amount of spectrum capacity. Spectrum sharing technologies including spread spectrum, dynamic access, Ultra-wideband (UWB) are introduced and described in the next paragraphs.

Underlay Technologies – Ultra-wideband and Spread Spectrum

Spectrum underlay technique is a spectrum management principle by which signals with a very low spectral power density can coexist, as a secondary user, with the primary users of the frequency band(s). The primary users deploy systems with a much higher power density level. The underlay leads to a modest increase of the noise floor for these primary users.

Due to the extremely low emission levels currently allowed by regulatory agencies, UWB systems tend to be short-range and indoor applications. However, due to the short duration of the UWB pulses, it is easier to engineer extremely high data rates, and the data rate can be readily traded for range by simply aggregating pulse energy per data bit using either simple integration or by coding techniques.

Spread spectrum is a technique of spreading a signal out over a very wide bandwidth, often over 200 times the bandwidth of the original signal. CDMA (Code Division Multiple Access) is a digital cellular standard that uses wideband spread spectrum techniques for signal transmission.

Overlay Technologies and Dynamic Spectrum Access

Active overlay technologies are beginning to emerge and be trialed. A major trial is currently taking place in Ireland involving several major manufacturers of equipment and devices. There are several possible approaches being studied.

Dynamic Spectrum Access

Dynamic spectrum access, which is in its early stages of development, is an advanced approach to spectrum management that is closely related to other management techniques such as flexible spectrum management and spectrum trading. It involves unitising spectrum in terms of time slots and/or geographically. This allows users to access a particular piece of spectrum for a defined time period or in a defined area which they cannot exceed without re applying for the resource.

It permits communications to work by:

- Monitoring to detect unused frequencies;
- Agreeing with similar devices on which frequencies will be used;
- Monitoring frequency use by others;
- Changing frequency bands and adjusting power as needed.

Benefits of increased access to spectrum and better efficiency need to overcome several hurdles including:

- Potential for increased interference, effects on quality of service, and compliance with regulations;
- Technical issues related to unseen devices competing for similar frequencies (the hidden node problem) and development of complex equipment.

Dynamic spectrum access is often associated with, although not exclusively dependent on, technologies and concepts such as Software Defined Radio (SDR) and Cognitive Radio which are described in the next paragraphs.

Passive overlay

The other form of overlay is the passive overlay such as the Amateur radio service that has shared spectrum with various government users using passive overlay technologies that require the user to look for a CB radio channel that is free. A passive overlay technology is different from an active overlay technology.

Practice Notes

- FCC and ITU Regulations Concerning UWB
- Spread Spectrum Techniques

5.4.2.6 EMERGING TECHNOLOGY ENABLERS

In addition to the spectrum sharing techniques described in the previous paragraphs there are emerging technologies which are important in enabling these techniques, as well as fostering potential new methods for spectrum sharing. The most prominent enabling technologies are described in the next few paragraphs

Software-defined Radio (SDR) and Cognitive Radio (CR)

Software defined radio are radio systems implemented on general purpose hardware where specific operational characteristics are implemented in software – different radio systems and standards are essentially loaded as software programmes (e.g. a GSM program or a Wi-Fi program). A radio increases its flexibility as more of its functionality is software based.

SDR technologies are slowly making their way into commercial radio systems as technology developments make it economical for manufacturers to do so.

SDR enables more flexible spectrum allocation since these radio systems potentially use spectrum more intensively and are more tolerant of interference.

A cognitive radio is a radio that is to some degree aware of the environment by monitoring transmissions across a wide bandwidth, noting areas of unused spectrum and is able to modify its transmission using appropriate modulation and coding methods. From a user standpoint the certainty of finding unused spectrum in congested areas may fall low enough to impair its usefulness as a mainstay communications device.

See 'Dynamic Spectrum Access pp 12-13 and Reports ITU-R M.2063 and ITU-R M.2064. Issues on the agenda of WRC-12.

Smart Antennas and Other Technologies

Smart Antenna applications and technology have emerged in the past 10 years and are interesting because of their ability to significantly increase the performance of various wireless systems, such as 2.5 generation (GSM-EDGE), third generation (IMT 2000) mobile cellular networks and BWA. Smart Antenna technologies exploits multiple antennas in transmit and receive mode with associated coding, modulation and signal processing to enhance the performance of wireless systems in terms of capacity, coverage and throughput. Smart Antenna is not a new idea but a more cost effective one with the advent of digital signal processors and general purpose processors with application specific integrated circuits (ASICs).

Multi-modal radios are capable of operating across multiple bands and technologies. The tri-band and world mobile phone are examples of multi-modal radios. Frequencies continue to be divided in discrete elements although the need to harmonize frequency allotments and technical standards on a regional or global basis is not as critical.

Digital Terrestrial Television

Broadcast mobile TV is a very efficient multicast service that allows users with a mobile device to watch multiple TV channels in ways similar to DTT. Broadcast mobile TV services are available in several countries including Austria, Finland, Italy, the Netherlands and the USA. They use several technologies based on standards such as:

- Digital Video Broadcast – Terrestrial (DVB-T);
- Digital Video Broadcast – Handhelds (DVB-H);
- Digital Multimedia Broadcast (DMB);
- Advanced Television System Committee – Mobile/Handheld (ATSC M/H);
- Integrated Services Digital Broadcasting – Terrestrial 1 seg (ISDB-T 1seg); and
- China Mobile Multimedia Broadcast (CMMB).

The 470-862 MHz band is preferred by mobile operators for simultaneous use of broadcast mobile TV and GSM/3G services. Yet, other bands could be used for broadcast mobile TV such as the VHF television band.

Reference Documents

- Digital dividend: cognitive access

- Digital Dividend: Geolocation for Cognitive Access
- RSPG Report on cognitive technologies
- The Path to Market Success for Dynamic Spectrum Access Technology
- The Path towards Efficient Coexistence in Unlicensed Spectrum, Cargenie Mellon University, IEEE 802.16 Broadband Wireless Access Working Group, 30 April 2000

5.4.3 INTERNATIONAL TRENDS IN SPECTRUM SHARING

International trends in spectrum management are discussed under sections 4.3.1 to 4.3.4. These sections examine the recent trends in spectrum management policy and regulation, property rights in spectrum licences, interference, best practices on spectrum sharing techniques and country case studies implementing such practices.

5.4.3.1 TRENDS IN REFORM

In recent years, spectrum management policy and regulation have evolved greatly to better reflect the demand and supply requirements new services and uses. There has been a shift from relying predominantly on the traditional model, most notably in countries where demand for radio spectrum use is rising fast. The main principles underpinning the spectrum management reform agenda are:

- Liberalization and flexibility;
- Technology and service neutrality; and
- Licensing reform including spectrum transfers and the spectrum commons.

For a more detailed discussion of these concepts see **Section 3.2.3 Liberalization and the Impact on Authorization and Section 3.1 Introduction to Authorization.**

In this section, we review several of the most important trends in spectrum management including:

- Growing Importance of Spectrum Use and Spectrum Management
- Convergence and Reform of the Institutional Framework
- Spectrum Trading and Transfers
- Increased value and use of Unlicensed Spectrum
- Spectrum Planning - Spectrum Demand and Supply Studies

Growing Importance of Spectrum Use and Spectrum Management

In establishing the European Union's first policy on the Spectrum Management Programme in 2010, telecommunication professionals recognized that radio spectrum is a key resource for essential sectors and services, including mobile, wireless broadband and satellite communications, television and radio broadcasting, transport, radiolocation, and applications such as alarm, remote controls, hearing aids, microphones, and medical equipment. Spectrum also supports public services such as security and safety services, including civil protection, and scientific activities, such as meteorology, Earth observation, radio astronomy and space research. Regulatory measures on spectrum therefore have economic, safety, health, public interest, cultural, scientific, social, environmental and technical implications.

The total volume of services which depend on radio spectrum availability is estimated to be worth at least €200 billion annually in Europe.

http://ec.europa.eu/information_society/policy/ecomm/radio_spectrum/index.

Convergence and Reform of the Institutional Framework

Regulatory institutional reform leading to the combination of telecommunications, broadcasting and spectrum regulators can help facilitate spectrum sharing. There are several examples of where this has occurred or is being considered:

- In Australia the Spectrum Management Agency, Australian Communications Authority and the Australian Broadcasting Authority were merged in several steps beginning in 1997 to create the Australian Communications and Media Authority;
- The Canadian Telecommunications Policy Review Panel Report recommended to the government that Industry Canada transfer its spectrum regulatory functions to the CRTC;

- The UK has recently set up such a combined regulator (Ofcom) which regulates broadcasting, (wireline and wireless) telecommunications and spectrum;
- In Germany, regulation of spectrum is combined with regulation of telecommunications (and of other infrastructures), but separate from regulation of broadcasting.

Spectrum Trading and Transfers

Spectrum transfers are generally understood to mean some form of lease or sublease arrangement, including features such as frequency assignment transferability or divisibility:

- Transferability - licences maybe transferred (disaggregated);
- Divisibility or divided (partitioned), subject to either approval or notification to the appropriate authority subject to service and technical restrictions. Since spectrum can be assigned nationally or on a regional/local basis, a given assignment can be partitioned and shared by users in different locations.

Increased value and use of Unlicensed Spectrum

Spectrum commons

A spectrum commons is part of the spectrum that is free from centralized control where anyone can transmit without a license. For this reason it is sometimes referred to as license-exempt or unlicensed spectrum.

In practice what is referred to as a spectrum commons can have varying degrees of management. Licence-exempt bands (e.g. the ISM bands) are an example of a spectrum commons with some management in terms of power restrictions on individual users as applied in the US under the FCC Part 15 rules. In Europe there is a further degree of control in that devices used for communication in these bands must conform to certain technology standards (e.g. ETSI approval). So far this approach has only been used in limited bands for short range applications. However, significant innovation has emerged in these bands (e.g. Wi-Fi), which have led some to call for more spectrum to be managed similarly.

Spectrum white spaces

Most radio and TV broadcast channels are separated by small amounts of unused channels called white space, which are used to limit interference between active channels. Technology companies and consumer advocates believe the use of this underutilized and unassigned spectrum could be used for new services such as BWA. Not surprisingly, TV broadcasters oppose allowing any unlicensed device to use white-space spectrum because, they argue, these devices would interfere with television broadcasts, potentially harming the federally mandated transition from analogue to digital TV service.

A very active debate is taking place in the US between the broadcasters and Internet content companies such as Google, who argue the white spaces can be used to extend the reach of broadband services to rural communities. On October 15, 2008, the Chairman of the FCC indicated that he supports the idea based on extensive field tests conducted by the FCC to establish the veracity of either claim and on November 4th - the FCC approved the development of wireless devices that can use "white space".

Spectrum Planning - Spectrum Demand and Supply Studies

Spectrum Managers are increasingly conducting comprehensive reviews to quantify current the future demand and supply for spectrum. These studies typically include determining what is authorized and where, as well as identifying what is currently being used.

The timing and publication of the spectrum demand study varies by regulator with forecasts that can span from two to five (and even beyond) in years. The results of spectrum demand studies and comparisons with the spectrum database illustrate potential areas of surplus or deficit spectrum that should be investigated and made transparent to users..

The published report provides background information on the current state of the spectrum, what is driving spectrum demand (consumer, commercial, government demand, new technologies, new services) as well as future trends and projections that the regulator should consider when planning spectrum use.

Spectrum Demand and Supply Studies: UK, USA and Thailand.

United Kingdom

Ofcom and the UK Treasury Department obtain on a bi-annual basis from government departments independent studies of spectrum requirements - Supply and Demand Studies. The application of market prices using AIP has resulted in profound changes in the approach taken by departments, such as the Ministry of Defence (MOD), in the way spectrum is managed.

The MOD, as the single largest government user of spectrum in United Kingdom, has access to 30% of the spectrum between 100 MHz and 3.0 GHz. Its use is not exclusive – it administers civil applications and shares bands with other users

The most recent study was completed in early 2009 with the UK MOD conducting a forward view of spectrum demand covering 80% of its allocations (2010, 2015, 2027) in accordance with its agreement with Ofcom to perform such a review every 2 years. The study is both illustrative and instructive because:

- It shows the depth of analysis involved in assessing demand across a range of services and spectrum bands
- It demonstrates how spectrum prices based on AIP have resulted in two important changes which are noted in the report:
- Prior to AIP, the MOD did not factor in spectrum pricing as part of investment and operational decision making;
- Prices reveal surpluses in spectrum leading to another important change in which the MOD now sees itself managing spectrum needs and not existing allocations.

USA

The US Government published a National Broadband Plan and recommended that the FCC make available 500 megahertz (MHz) of new spectrum for wireless broadband, including 300 MHz for mobile flexible use within five years. In addition, the President directed in June 28, 2010, Executive Memorandum that 500 MHz of new spectrum for mobile and fixed broadband use. The drive to make available new spectrum for broadband is grounded in strong consumer demand for high-speed wireless Internet access. The FCC conducted a study of Broadband Spectrum requirements and published the results in the technical paper in 2010 - Mobile Broadband: The Benefits of Additional Spectrum, OBI Technical Paper Number 8.

Thailand

The National Broadcast and Telecommunication Commission (NBTC) of Thailand is the new legislated regulatory body combining the former National Broadcast and Telecommunication Commission into a multi-sector regulator. The NBTC is required to prepare a Master Plan for Telecommunications Services, a Master Plan for Spectrum Management and the National Table of Frequency Allocations. The Master Plan is to be published within one year from the outset of the new regulator being formed and will focus on spectrum demand and supply with particular attention given to cellular, broadband and broadcast requirements while addressing the issue of the Digital Divide

5.4.3.2 INTERFERENCE MANAGEMENT

Freedom from interference and restrictions of rights to interfere with others are two major related dimensions of property rights in spectrum licences. An exclusive use license defines the rights to occupy the spectrum volume for a user with the primary user has a presumptive right to exclude other users from occupying their electrospace while secondary users may have the right to occupy the electrospace if they can do so without causing interference to primary users, although they have no interference protection rights of their own. By setting conditions for all licences in this way, using an interference model which simulated the impact of apparatus on neighbouring reception equipment, interference can be controlled.

Spectrum managers are fundamentally concerned with managing interference and in establishing the methods, techniques, information and processes needed to protect users and uses from harmful interference. Harmful interference arises in radio systems when a transmitter's ability to communicate with its intended receiver(s) is limited because of the transmissions of other transmitters. The problem may be thought of as arising from the limitations of the receiver: better receivers are more able to extract the desired signal from a noisy environment of background radiation and other transmitters.

There are three categories of interference that are of principal concern:

- In-band interference from adjacent areas;
- In-band interference from adjacent frequencies;
- Out-of-band interference.

Under a secondary trading regime, licensees can bargain with one another to make adjustments to specified boundary emission levels. If such deals benefit both sides, it is likely, but not inevitable, that they will be made. The type of control exhibited in the administrative model may no longer be feasible, as the nature and location of the apparatus to be employed are no longer given, since they are now up to the licensee.

This requires a redesign of the interference model, from one where calculating the impact of specific apparatus is done, to one which sets limits to the emissions the licensee can deliver at the geographical and frequency boundaries of the spectrum it is licensed to use.

By properly defining the electrospace along with the size of the volumes, it is possible theoretically to specify transmitter (Tx) and receiver (Rx) occupancy rights so that a Tx/Rx must operate in different and distinct electrospace volumes to ensure non-interfering operation. For more on Interference, see **Section 6.1.2 Emissions, Interference and Spectrum Use**.

Various approaches to specifying these limits have been applied in Australia, the United Kingdom, the United States and elsewhere, as described in the Related Practice Notes and Related Reference Documents.

Interference cannot be eliminated and so identifying interference management models which support spectrum sharing under either administrative, market-based and spectrum commons remain as an ongoing requirement and challenge for spectrum managers. The goal is to develop an appropriate regime which protects user rights and finds the right balance for flexibility and innovation, and service neutrality. Finding the balance and structuring the appropriate response continue to be debated.

Reference Documents

- **FCC - Staff Working Group Paper Report of the Interference Protection Working Group**

5.4.3.3 LEADING PRACTICES

In most countries, the use of radio spectrum has been, and in many cases remains, very closely managed and supervised, in accordance with an agreed international framework established by the Member States of the International Telecommunication Union (ITU). Such management is predicated on a need to minimize harmful interference and has resulted in the application of what is sometimes referred to as the “command and control” model. In recent years, there has been a shift away from relying predominantly on the traditional model, most notably in countries where demand for radio spectrum use is rising fast.

In this section best practices are described in a system of reformed spectrum management that incorporates a greater reliance on spectrum sharing techniques which increase flexibility and are forward-looking.

Spectrum planning

Spectrum planning processes provide direction and cohesion in support of policy formulation and support future steps to achieve optimal spectrum use. Major trends and developments in technology and the needs of current and future users of the frequency spectrum should be closely monitored and mapped. The types of user requirements for systems utilized to conduct frequency management activities like monitoring systems, channel plan techniques, and tools should also be planned and developed.

Spectrum user rights

When existing licences become tradable and are subject to a change of use, rights should be established consistent with current uses; this will avoid conflicts of rights and permit parties to renegotiate rights when circumstances change. Discussion of spectrum user rights is a very detailed topic dealing with questions such as:

- whether to allow easements for new technologies?
- whether vacant spectrum should be placed in the market place (subject to international agreements)?
- fall back or insurance policies such as compulsory purchase of spectrum when there are hold-out owners of spectrum - should they be confined to national security needs?
- should users pay a perpetual annual charge for spectrum licensees or will these charges discourage efficient trading?

What about the license database?

The ability of potential sellers and buyers (and regulators) to keep track of current licences is an important component of tradable markets facilitated by a publicly available database. Knowledge of the location of existing Tx’s and Rx’s (where feasible) will allow potential purchasers of rights to accurately model the existing interference environment they are seeking to enter and to enable them to properly assess the rights they seek to acquire.

The information should enable regulators if called upon to adjudicate spectrum disputes and to enable them to track and assess the usage of spectrum in differing bands.

Finally, the database should include additional tools to analyze data on spectrum historical occupancy/usage and to interpret alternative propagation models.

In the US a spectrum auction and trading system is operated by Cantor-Fitzgerald, the Wall Street brokerage, providing an example of the sorts of capabilities that are needed at a minimum[i]. Cantor Spectrum & Tower Exchange provides an open or closed transparent forum for both primary (auction) and secondary (post-auction) market spectrum transactions in both public and private marketplaces.

- Sellers/Lessees can review FCC licensee information obtained by the exchange and see a snapshot in real-time.
- Qualified licence sellers/lessors or public sector entities offer radio frequency spectrum and digital sub-channel capacity in a multi-dimensional format showing coverage area, population, frequency range, radio service rules, terms and conditions, channel, time slot, etc.
- Buyers/lessees search for specific assets (or receive electronic notification), and can easily evaluate and bid on them.

This type of system helps facilitate the critical matching function that liquid markets depend on.

Dispute resolution

It is quite likely that with the arrival of the spectrum commons and increased sharing of spectrum through transfers and trades effective means other than regulatory adjudicative intervention to resolve issues between parties will be required.

There are two trends at work:

- rapid changes in telecommunications sector; and
- changes in the realm of dispute resolution procedures.

The expansion of the global telecommunications market, with its emphasis on innovative and fast-changing technology may need to be accompanied by dispute resolution procedures which are fast, flexible, and suited to the types of disputes that the global telecommunications industry will produce. In turn, the dispute resolution field is increasingly offering new models that may be useful to the telecommunications sector's new needs.

For a more detailed discussion on the topic of dispute resolution see **Section 2.3.10 – Dispute Resolution**

[i] See **www.cantor.com/brokerage_services/spectrum_and_tower** for further information about their system.

Practice Notes

- **Ofcom - Spectrum Usage Rights: A guide for describing SURs**
- **Ofcom Spectrum Usage Rights**

Reference Documents

- **Designing property rights for the operation of spectrum markets, 2003**

5.4.3.4 SPECTRUM SHARING IN PRACTICE

The following country examples reflect many of best practices described in the preceding section. Some of them feature practices for spectrum trading and spectrum commons management. Given the recent focus at the international level on identifying bands for Broadband Wireless Access, we look at the leading practices of several developing and developed countries where BWA is being implemented.

Brazil – Broadband Wireless Access

In January 2008, ANATEL in Brazil issued 4 licences per licensed area for 3G wireless deployment in the whole country. Coverage obligations for all licensed operators will lead to coverage over the whole Brazilian territory (probably 8 years after the licences have been issued). Operators are allowed to share network components such as towers as well as spectrum in order to provide services in municipalities with less than 30,000 inhabitants. ANATEL will likely issue new regulations on the conditions for spectrum sharing and sharing of active elements of the network. Spectrum sharing arrangements must be authorized by ANATEL. The rules governing the 3G auction in Brazil refer expressly to spectrum sharing as a means of providing coverage in rural and remote areas (i.e. the municipalities with less than 30,000 inhabitants).

ANATEL issued a number of licences for WiMax in the 2.6 GHz and five licensees in the 3.5 GHz band bands. A new auction for additional 3.5 MHz spectrum is planned for 2008. Some of the licences have already started authorized trials.

Europe - Flexible User Rights and Spectrum Trading

The European Union (EU) does not manage radio spectrum. Instead the Member States supervise its management at the national level and in international coordination. However, the management of radio spectrum in EU Member States is influenced significantly and increasingly by European legislation. Legislation is aimed at facilitating harmonization of regulation and promoting competition through the liberalization of markets. The key legislation is contained in a number of directives and decisions passed in 2002.

The Radio Spectrum Decision laid the foundation for a general EU radio spectrum policy and is binding on all Member States. The objective of the Radio Spectrum Decision is to ensure coordination of radio spectrum policy approaches by facilitating harmonized conditions for the availability and efficient use of radio spectrum.

The Radio Spectrum Decision encourages the European Commission to organize consultations to take account of the views of Member States and all other stakeholders. To facilitate more effective consultations, the Radio Spectrum Policy Group (RSPG) was established by separate decision.

The RSPG launched a consultation on secondary trading of spectrum in February 2004 following a request received from the EC in 2003 for an opinion on secondary trading. In November 2004, the RSPG published its Opinion on secondary trading.

RSPG has adopted a cautious stance with regard to spectrum trading considering it to be “beneficial in certain parts of the spectrum” and that “European administrations should introduce secondary trading with due care”.

The EU now proposes that one-third of the spectrum below 3GHz could have flexible usage rights and be tradable by 2010.

RSPG is elaborating on the concept of Wireless Access Policy for Electronic Communications Services (WAPECS) to move away from too narrowly specified allocations and applications, for which specific spectrum is designated.

Guatemala – Spectrum Trading

Guatemala and El Salvador are two small Central American countries (with populations of 12,728,111 and 6,948,073 respectively) which decided in 1996/97 to adopt a simple but effective spectrum market which, in the case of non-public sector spectrum, gave private parties exclusive control over use of bandwidth and confined the regulator to defining, issuing and protecting spectrum rights. This note focuses on Guatemala; the regime in El Salvador is similar but not as well documented.

The frequency use title (TUF) created could be leased, sold, subdivided or aggregated at will and lasts for 15 years (renewable on request); they are thus virtually private property. Regulation is restricted to setting aside bands for use by the state and adjudicating interference disputes which are not resolved by mediation.

A physical TUF is a paper certificate listing the frequency band, hours of operation, maximum transmitted power, maximum power emitted at the border, geographic territory and duration of right.

International Telecomunication Union

ITU Resolution 951 (Rev. WRC.07) Enhancing the international spectrum regulatory framework. This resolution establishes guidelines used in evaluating and developing concepts related to four identified options for enhancing the spectrum regulatory framework and for preparing solutions to be discussed at WRC.11. The four options include: keeping current practices, revising current service definitions, creating new service definitions, and introducing composite definitions.

Mauritius – Broadband Wireless Access

In early 2005 with spectrum pollution occurring in the 2.4 GHz band, the Information and Communication Technologies Authority (ICTA) conducted public consultations to receive input on proposed BWA frequency band allocations, technical characteristics and regulatory requirements and issued its decisions within three months. Those decisions opened the 2.5 GHz band for Mobile and Nomadic BWA (IMT-2000) applications by 2010, the 3.5 GHz band immediately for Fixed BWA and the 5.1-5.3 GHz band for low power in-building applications. In 2006, ICTA additionally opened the 5.4 GHz and 5.8 GHz bands for BWA. Band plans and technical rules were established limiting allowable power levels, separation and channelisation.

As of 2007, there are two mobile licensees providing IMT-2000 and WiMax services on a national basis.

New Zealand – Spectrum Trading and Spectrum Commons

The Radiocommunications Act 1989 was pioneering and radically changed the landscape of spectrum management. New Zealand was the first country to redefine spectrum in terms of property rights and to assign it in a tradable form. New Zealand also pioneered the application of competitive assignments based on auctions for radio spectrum, with the first auction held in 1989.

There are three licensing systems that apply to spectrum in New Zealand:

- The Management Rights Regime (MRR) (applicable to spectrum used primarily for commercial purposes);
- The Radio Licence Regime (RLR), earlier known as apparatus licensing, (an administrative assignment process which applies to spectrum used for applications in the public interest); and
- General User Licences for devices such as low-powered devices: garage door openers and Wi-Fi).

United Kingdom – Flexible User Rights and Spectrum Trading

OFCOM is currently shifting U.K. spectrum policy towards a flexible system of spectrum management through the liberalization of spectrum usage rights and spectrum trading. A gradual approach is being adopted, embracing progressively more bands and greater flexibility in use but relying on competitive assignment methods. This progression is exemplified by OFCOM's intention to apply service and technological neutrality in a forthcoming spectrum assignment involving frequencies currently used to support terrestrial analogue TV broadcasting, the proposed use of spectrum user rights in a forthcoming auction of the L Band, and in other auctions.

The United Kingdom has also adopted the policy of extending market methods of spectrum management to public sector spectrum, giving public sector users the right to trade or lease their spectrum and the obligation to go into the market place to acquire additional spectrum. OFCOM is also extending the application of administrative incentive pricing.

- Administrative Incentive Prices (AIP): are intended to encourage licensees of non-auctioned spectrum to use their spectrum rights efficiently; legislation enables annual licence fees to be set above administrative cost to reflect a range of spectrum management objectives (efficient management and use, economic and other benefits, innovation and competition), having regard in particular to availability of present and expected future demand for spectrum. OFCOM has been using AIP since 1998 and revised the approach in 2004. There AIP is used to value spectrum at its marginal value as a proxy for the opportunity cost to the representative spectrum user in those bands where AIP fees were charged.

United States – Flexible Spectrum Use and Broadband Wireless Access

The United States has been a leader in regard to spectrum liberalization. Liberalized spectrum management primarily relates to the non-government spectrum, whereas the usual framework for government spectrum continues to be traditional. Spectrum Policy Initiative – 2003 addressed several important components:

- Auctions: it was proposed that the FCC should be granted permanent authority to assign licences via auction (competitive bidding);
- Spectrum Licence User Fees - to ensure that licence holders pay the opportunity costs of their spectrum use.

The United States has also moved progressively in the direction of flexible use of spectrum, in conjunction with generally liberalized practices. The Communications Act specifically authorizes the FCC to permit flexible use where:

- such use is consistent with international agreements to which the United States is a party;
- the Commission finds, after notice and opportunity for public comment, that such an allocation would be in the public interest;
- such use would not deter investment in communications services and systems, or technology development; and
- such use would not result in harmful interference among users.

The FCC Spectrum Policy Task Force – 2002 advocated:

- increased reliance on both the exclusive use and commons models, and reduced use of traditional allocation mechanisms;

- maximum feasible flexibility for licensees, limited only by interference concerns;
- increased use of spectrum trading, including the ability to lease spectrum on a rapid or an overlay or underlay basis.

Practice Notes

- **Spectrum Trading in Practice - ECOWAS**

5.4.4 IMPLEMENTING SPECTRUM SHARING

Success in implementing spectrum sharing requires both vision and commitment for moving from current regulatory allocation and assignment practices based on a sound understanding of technology and systems operating under predictable circumstances.

Spectrum policies should address incentives for innovation, promote flexibility, establish spectrum users' rights, determine practical methods for compliance monitoring, compliance monitoring, and dispute resolution, whether spectrum is used in the spectrum commons or shared by some other means when implementation relies heavily on advanced radio technologies designed to facilitate spectrum sharing.

An additional step could be to follow the path being taken by the FCC and the NTIA in the United States to create Spectrum Sharing Innovative Test-Bed for studying spectrum sharing emerging radio systems such as software defined radio and methods and techniques such as dynamic spectrum access.

5.4.4.1 MARKET STRUCTURE

Analysis of current and future spectrum uses will be needed to help determine which bands should be included and how and when they should be released, for example by auction. Planning will involve consultation with various stakeholders and with industry fora. At a minimum, careful review and understanding of recent decisions at WRC and certain leading countries will be both helpful and necessary. A chief concern will be ensuring sufficient spectrum is available to satisfy demand and for proper market functioning. As we have seen earlier the extent to which spectrum is allocated for commercial or exclusive government use has an important bearing on improved access. Processes to review and understand government requirements and to shift spectrum away from exclusive use require both time and negotiation.

Demand and scarcity

Market-based methods work best when demand is sufficient and rules and rights are clear. For developing countries the real absence of scarcity and emerging demand for services might prove sufficient to cause delay in the introduction of spectrum sharing policies and assignment practices. The difficult question to answer is the impact of delay on the overall economy coming from investment and productivity. Favouring the creation of attractive markets for investors who can deploy or utilize advanced services and technologies should not to be ignored by spectrum policy makers.

Monopolization

Under administrative methods of licence assignments, the regulator plays a major role in determining the structure of the downstream services market. If two GSM licences are available, the GSM market place will have two suppliers, and so on. Indeed regulators have often deliberately chosen the number of licences to maximise competition or – less respectably – to limit competition in order to capture monopoly profits for themselves through an auction process for the licences.

Once secondary trading is allowed, industry structure can be affected by mergers of companies or the direct transfer of spectrum ownership. There is a risk of a structure emerging which contains a monopoly or, more generally, a dominant firm or firms, which can set excessive prices. If spectrum markets lead to the monopolization of the supply of downstream services (i.e., if a single firm could corner the entire spectrum capable of producing such a service), and there are no other competing or substitute technologies or services, then a spectrum market could easily produce worse results than an administrative system which led to competition among downstream suppliers of services.

Are these problems likely? It depends upon the degree of flexibility the regulator allows the market to exhibit. If there are no prior allocation restrictions (limiting certain services to certain bands) and if the arena in which the market operated is extensive, building a spectrum monopoly leading to dominance in downstream markets is not likely to succeed. For major services such as mobile voice or data, or mobile broadcasting, the required spectrum holdings would be very large. The danger does increase if either there are allocation restrictions or if the scope of the market is small (and other barriers to entry are high).

These problems can also be combated by ordinary competition law where the law exists; for example a dominant position might be broken up or a merger disallowed. But it may also be necessary for the regulator to have the power to scrutinize and, if appropriate, prohibit certain spectrum trades. For example, special procedures may be needed to limit the acquisition of spectrum licences or requiring prior approval of transfers or the application of merger-control procedures which vet a proposed concentration of spectrum for its impact on the relevant anti-trust market.

Finally, spectrum regulators can construct auction rules for the release of new spectrum in ways that promote competition. There are several examples:

- the 700 MHz auction rules in the USA include a requirement that some spectrum should be auctioned subject to an open access obligation;
- the AWS auctions in Canada completed in the summer of 2008 where the regulator included spectrum “set asides” to ensure access to spectrum for new entrants.

Market liquidity

Another key requirement for an effective market is that it have sufficient liquidity (i.e., volume of trades) to provide participants with a reliable method of transacting. Illiquid financial markets notoriously exhibit high spreads or differences between the buy and sell price, to compensate the intermediary for the cost of holding stock.

International experience in spectrum trading was highlighted in the sections above and the following similarities and differences were exhibited:

- there were few , if any, signs of intermediaries being active in the market;
- there were no signs of speculators entering the market;
- several countries exhibited significant levels of trade (Guatemala and El Salvador) or a number of significant ($ hundred million) trades (the United States);
- in Australia and New Zealand, levels of trade have been fairly low (roughly equal to the turnover of commercial property) reflecting an orderly turnover in spectrum through trades;
- in the United Kingdom, trades in the limited bands available have been infrequent, but the number of traded bands has been small and the spectrum regulator is in the middle of a large programme of spectrum awards which may provide an alternative source of spectrum to those who want it.

Liquidity of spectrum markets remains a real issue, and the design of liberalization measures should be in the foreground.

5.4.4.2 PRACTICAL STEPS

The regulator in exercising its primary responsibilities related to spectrum management goals and objectives should decide on what the appropriate balance and mix of administrative and market-based techniques is. It is a matter of reliance on methods that will ensure access and protection from interference. The current balance favours administrative approaches and it is the view of this author that a shift towards market-based methods should be acknowledged and encouraged by regulators. The practical steps involved in this shift in stance include:

- Spectrum legislation and regulation creating expanded authorities by the regulator to manage, assign, and license, while permitting spectrum use flexibility, technology neutrality, and sharing;
- Creating the necessary mechanisms, tools and processes to capture and include the needs and expertise of both current and future spectrum users.

These may seem like obvious steps to take. Making the decision to increase access and improve sharing requires a very strong commitment from the regulator for change and includes stakeholders and users as integral partners in the process of determining which approaches, methods and spectrum should be made more accessible. It is the commitment to change and inclusion which is often lacking and so the process sputters to a stalemate.

Advocating the use of innovative technologies is also a key role of regulators. Providing the means to test and trial new technologies by making spectrum available and using test licenses are two very practical steps that can be taken. ComReg in Ireland has indicated that it is keen to encourage innovative developments and more efficient ways to use spectrum. They wish to encourage development in these technologies through their test and trial licence scheme.

As discussed throughout the document, regulators have a powerful tool in allocating spectrum for various uses and users. Are there bands which by and large should always be allocated to BWA and so simplify the process for regulators?

The answer is most likely no. As we know, each region and country within a region differ and as we saw in the previous sections 4.3.4 and 4.4.1 approaches vary. We can say with confidence that by limiting the restrictions on uses and users, access is improved. Knowing how to go about limiting restrictions requires information, some consensus and where this lacking, the means to smooth an adjustment. What can be done?

The regulator should consider:

- acquiring the information needed to assess use, users, and utilization. Spectrum audits can be performed to fill in the gaps of information;
- consulting with current and prospective users;
- planning for and clearing zones of spectrum through incentives and adjustments like refarming;
- examining ways to license or unlicense underutilized spectrum to increase use and sharing;
- reinforcing the application of technical standards and compliance to ensure interference is managed and manageable;
- utilizing band managers to manage use and users in bands where demand has been pooled and where trading can now take place.

5.4.4.3 INFORMATION AND ADMINISTRATIVE PROCEDURES FOR SPECTRUM TRANSFER

If spectrum markets are to work properly, participants must have basic information about spectrum holdings adjacent to where they are considering buying licences. Otherwise buyers will not appreciate the constraints relating to interference to which they will be subject. This raises problems of confidentiality – both commercial confidentiality and the need for secrecy where spectrum is used for security or defence purposes. For a variety of reasons concerned with the policing of interferences as well as the policing of competition, the regulator will have to keep a register of spectrum use and licence holdings. Much of this can be published, and its existence will be of great help to potential licensees seeking to find out who their spectrum neighbours would be if they offered a particular service in a particular frequency in a particular area.

Practice Notes

- Online Spectrum Registers: Canada and New Zealand
- Sharing Mobile Network Infrastructure in India
- Spectrum Trading: Implementing Secondary Markets in the European Union

5.5 SPECTRUM PRICING

For any resource, including radio spectrum, the primary economic objective is to maximize the net benefits to society that can be generated from that resource such that there is an efficient distribution of resources resulting in maximum benefits to society. Prices are used as an important mechanism to ensure the spectrum resources are used efficiently by users.

The broad goals and objectives associated with spectrum pricing are:

- Covering the costs of spectrum management activity borne by the spectrum management authority or regulators;
- Ensuring the efficient use of the spectrum management resource by ensuring sufficient incentives are in place;
- Maximizing the economic benefits to the country obtained from use of the spectrum resource;
- Ensuring that users benefiting from the use of the spectrum resource pay for the cost of using spectrum;
- Providing revenue to the government or to the spectrum regulator.

Spectrum pricing refers to a range of spectrum management activities and tools including administrative fees, spectrum usage, and spectrum prices determined by way of market mechanisms. Developing spectrum pricing strategies invariably involves alignment with the government's and regulator's revenue goals and objectives, setting targets, and discussion with key stakeholders such as the Ministry of Finance and key sector groups – telecommunications service providers. Revenue targets and strategies relate directly back to the primary objectives; spectrum users pay for spectrum use, covering management costs, spectrum efficiency, and achieving economic and social development goals.

Practice Notes

- OFTA: Statement on Spectrum Fees

Reference Documents

- **Ofcom. Spectrum pricing. A statement on proposals for setting Wireless Telegraphy Act prices, 2005.**

5.5.1 INTRODUCTION TO SPECTRUM PRICING

In this section, we discuss various approaches used by spectrum managers to raise revenue and distribute the spectrum resource via spectrum pricing techniques and methods. Beginning with a discussion of important of the underlying value of and how that is important in determining spectrum prices, we then follow with a discussion of methods for determining spectrum values using an example from the Digital Dividend. Next, spectrum pricing objectives are outlined and described and market-based spectrum prices are contrasted with administratively determined spectrum prices.

Spectrum Valuation

Radio spectrum is an extremely valuable and often scarce resource which makes a major contribution to economic and social development, and is necessary to ensuring national and civil security. Maximizing and ensuring an efficient distribution of the net benefits generated by spectrum are important goals promoted by spectrum values and spectrum price mechanisms, which help to ensure that spectrum is used efficiently by users.

Spectrum values reflected in spectrum prices help to promote both economic and technical efficiency in the use of radio resources. Spectrum values can also be significant and help raise significant revenues for the government and recover the costs of managing spectrum.

Methods for Valuing Spectrum

Spectrum is either valued using prices in market transactions (auctions, spectrum trading or leasing) or by administrative means. Market based methods allow users to estimate the commercial value of spectrum based on their own and the market's expectations around what benefits that can be derived from its use. Administrative methods are also used in the assignment of spectrum and the determination its prices. In some cases, the method employed simply results in a recovery of spectrum management costs plus targeted revenue. In other cases, analytical and modeling techniques are used develop prices which reflect the underlying spectrum value.

Administrative fees and prices

The administrative assignment of spectrum is often supplemented by imposing charges for spectrum use. These charges usually take the form of simply setting fees sufficient to recover the costs of spectrum management. Prices can also be used to guide users in making decisions to use spectrum more efficiently. One example, applicable within the framework of administrative assignment of spectrum, is to set a charge for spectrum equal to an estimate of what the spectrum might be worth in a market context. This is sometimes called 'administered incentive pricing'.

Market-based prices

Alternatively, prices can emerge through an authentic market transaction such as an auction or secondary trading. The general theory of prices involves assumptions regarding the economic behaviour of consumers when using resources while being concerned with rational preferences for certain outcomes, utility (maximizing efficiency and profit) and information availability and access. From these assumptions, economists developed a structure to help understand how the allocation of scarce resources among alternative ends occurs in markets. We employ these basic principles to begin our understanding of how market prices for spectrum are set.

Administered incentive prices

We also describe a method where the spectrum regulator attempts to approximate the prices (often flat rate charges) that might emerge in a market context. This method is referred to as 'administered incentive pricing': 'administered' because prices are set by the regulator reflecting the opportunity cost of spectrum while incorporating potential 'incentive' properties: prices are thereby set at a level to encourage efficient use reflecting spectrum scarcity.

Cost Recovery and Spectrum Usage Fees

In the section Cost Recovery and Spectrum Usage Fees, we discuss the necessary recovery of spectrum regulatory agency operations costs. A discussion on spectrum usage fees follows.

Lotteries

Next, we discuss where spectrum is assigned by means of a lottery: a winning ticket chosen at random will carry with it a spectrum award. This is a 'non-pricing' method of assignment. However we note it here (and advise against it), as the lottery winner will often wish to turn the licence into cash (if he or she is allowed to do so) by trading it on markets.

Spectrum Auctions

We then consider, in some detail, how prices for spectrum licences can emerge through an auction process, reviewing different types of auction and their likely outcome. Auctions are a well-known means of using market-generated prices to assign spectrum at the time of its first issue by the spectrum regulator. In markets where subsequent or secondary trading of licences is allowed, procedures will emerge that set the prices for such trades, and these may also include auctions.

Adjusting Spectrum Prices

Finally, we give an account of how the spectrum regulator approximates spectrum prices that might emerge in a market context by setting spectrum charges, which reflect the opportunity cost of spectrum.

An important issue can arise when the regulator uses both administrative and market-based systems for different spectrum segments, which is the issue of price adjustment and alignment. For example, a regulator needs to consider how spectrum prices should be adjusted in adjacent bands when auctions take place indicating a rise in the opportunity cost of spectrum and equally should prices fall along the lines of mark-to-market valuation adjustments.

Practice Notes

- **Canada: Spectrum Fee Regulations and Guide**

Reference Documents

- **ITU Telecommunication Development Sector, ITU-D Study Groups 1 and 2: Draft guidelines for the establishment of a system of radio-frequency usage fees**
- **The Economics of Pricing Radio Spectrum**
- **What Price Spectrum?**

5.5.2 SPECTRUM VALUATION

The reasons for valuing spectrum are abundantly clear. Radio spectrum is an extremely valuable and often scarce natural resource (especially below 1 GHz) with a multitude of uses with major contributions to economic and social development, while helping to ensure national and civil security. To suggest that modern economies depend on fully developed and robust wireless communications capability is not an exaggeration.

In general, for any resource, including radio spectrum, the primary economic objective is to maximize the net benefits generated from the resource enabling an efficient distribution with maximum benefits to society. Spectrum values and spectrum prices are mechanisms used to ensure that spectrum resources are used efficiently by users.

- Appropriate spectrum values and price promote spectrum efficiency. Spectrum is a vital natural resource and spectrum prices should be sufficient enough to ensure it is valued and used wisely.
- Using the spectrum resource drives considerable economic benefit, which should be maximized.
- Spectrum management costs money and these costs can be recovered from those who benefit from these activities through spectrum prices.
- Finally, important social and cultural objectives can be advanced by using spectrum and spectrum pricing mechanisms should facilitate the achievement of government's social and cultural objectives.

Spectrum values are therefore reflected in spectrum prices and help to promote both economic and technical efficiency in the use of radio resources. Spectrum values can also be significant and help raise significant revenues for the government, which, in turn, recovers the costs of managing spectrum.

The Digital Dividend provides an example of significant spectrum values which are presented in Table 5.2.1.

Economic Value of the Digital Dividend - An EU Example

The European Commission refers to an estimate in the value of the Digital Dividend that exceeds EUR 150 billion, which is about 2.2 per cent of the annual European GDP for the total value of electronic communications services that depend on use of radio spectrum in the EU. Radio spectrum has an essential role as an enabler for growth, as was pointed out in the i2010 initiative. Significant estimates of the economic value of the Digital Dividend in the EU have been made and are provided below.

◂ **Table 5.2.1 EU Estimates in Value for the Digital Dividend**

Source: Exploiting the Digital Dividend – a European Approach, Analysis Mason, DotEcon, Hogan & Hartson, 2009.

Use	Assumptions	Valuation
Digital Terrestrial Television	Six DTT multiplexes in each Member State requiring 48 MHz when using National SFN's (8 MHz channels per SFN) and 384 MHz when using MFN's (64 MHz spectrum channels per multiplex).	Between EUR 130 Billion and EUR 370 Billion discounted over 15 yrs.
Mobile Television	One multiplex using either 8 MHz per SFN or approximately 48 MHz for an MFN.	Between EUR 2.5 Billion and EUR 25 Billion discounted over 15 yrs.
Wireless Broadband	Use of a 72 MHz sub-band within the 470-862 MHz band for wireless broadband services.	Between EUR 50 Billion and EUR 190 Billion discounted over 15 yrs.
Total		Between EUR 182.5 Billion and EUR 585 Billion discounted over 15 yrs.

The question of how to measure spectrum values is explored in more detail in Section 5.2.1.

5.5.2.1 MEASURING SPECTRUM VALUES

Spectrum is either valued using prices in market transactions (auctions, spectrum trading or leasing) or by administrative means. Market based methods allow users to estimate the commercial value of spectrum based on their own and the market's expectations around what benefits can be derived from its use. Not all radio spectrum is assigned or re-assigned using market based methods. Administrative methods are also used in the assignment of spectrum and determination of spectrum prices. In some cases, the method employed simply results in a recovery of spectrum management costs plus targeted revenue. In other cases, analytical and modeling techniques are used develop prices which reflect the underlying spectrum value. Administered Incentive Prices (AIP) is one such technique and is used in the UK by Ofcom and by ACMA in Australia - See Section 5.9.3 AIP in Practice.

The main problems with traditional administrative spectrum price determination are:

- At best they can only reflect the scarcity of the bands to which they apply;
- They emerge from a computational process by the regulator not from the interaction of firms in a market place;
- The computational process is inevitably inaccurate and subjective. It is however better than adopting a zero price, which we know is incorrect;
- A risk assessment process (consultation or a study such as this one) is required to establish the harm imposed by making them too high and too low.
- Applying economic and business valuation modelling techniques brings much needed rigor to the exercise of valuing spectrum.

Two forms of spectrum valuation which attempt to reflect market prices but which are not derived in the market and hence may be viewed as less reliable are Economic Modelling and Business Based Valuation. These methods do have an advantage in that values will be more consistent over time which overcomes the argument that prevailing extant prices may be distorted to due transitory factors.

Economic Modelling

The objective of economic modelling is to assess spectrum value from the perspective of its contribution to the national economy. This is important because we are interested in increasing economic contribution which translates into increasing value. It also allows us to take into account changes in the raising or lowering of economic activity such as economic downturns, changes in taxation, new trade relationships.

The basic model involves examining the economy at three levels of aggregation to get a picture of the stimulus to the overall economy on the assumption there are meaningful connections between individual, households, firms, industries and the macro-economy. Economic modelling gauges the increment in economic output and its effect in terms of employment and GDP per head. The essence of modelling consists of:

- Assessing demand using various take-up scenarios;
- Constructing a quantitative model using regression analysis and carefully selecting parameters;
- Applying historical data and projecting forward across the three levels of the economy.

How can the results be used? At best we can determine general trends and make some linkages between income growth, productivity growth and increasing use of spectrum in the overall economy. A value of potential impact on the overall economy can be determined after considerable effort.

A study involving 92 countries by Waverman et al (Waverman 2004) found that on average if a country has a teledensity greater than 10%, per capita GDP growth accelerates by 0.59 per cent per annum. It is safe to conclude the use of spectrum in cellular services makes an important contribution to growing the economy. It is more difficult to attach specific valuations to specific bands. One important issue to consider is to understand at which point does the contribution from spectrum begin to tail off and what adjustments if any are necessary. The amount to be charged to individual spectrum users cannot be easily determined even when the economic contribution to the economy can be determined. Is a 10% or 25% discount rate appropriate?

Business-based Valuation Model

A business-based valuation model assesses the value of spectrum from a commercial perspective. This is highly relevant to this particular study (and to users). The objectives of both regulator and operator converge at the point when the spectrum is optimally priced. Industry Canada is interested in economic and technical efficiency while the operator is interested in exploiting the profit potential of the assigned frequencies. The principles of the business-based valuation approach involve understanding how much profit the spectrum in question will generate.

A base model case is needed where aggregated current and future growth in demand and revenues for the sector are compared to the costs of providing and delivering service (CAPEX and OPEX). The resulting discounted cash flows do not, at this point, reflect the value of spectrum to a business since there are multiple factors affecting profitability, not just the contribution of spectrum. Measuring the value of spectrum from the operator's perspective also involves estimating the constraints on profit such as competition and regulation. The number of licensees entering the market affects the demand model and the impact of new services and technologies needs to be factored into the measurement of spectrum value.

Estimating the value of spectrum will involve analysis of the impact on profits of changes in spectrum fees over the model period. Modelling what happens to estimates of profits across the sector in the case where there are no spectrum fees is revealing and can be analyzed in comparison to current fee levels.

Some of the important issues which will affect spectrum valuation utilizing a business-based model include the following:

The level and growth in demand (subscribers and ARPU) given that certain regional markets may be considered as mature or maturing;

- The level of competition and market shares on a regional basis and the impact on spectrum valuations on a regional basis;
- Attractiveness of substitute or alternative bands such as 800 MHz and 1900 MHz band for the introduction of new services and technology;
- Strength of competition from other services including fixed line and new services such as VoIP and BWA;
- Assumptions about current and future costs of equipment and assumptions about operating costs of all operators and the timing of investments.

Determining spectrum values which relate directly to the commercial perspectives of the primary users of the spectrum in the provision of services is highly relevant to the goals of promoting efficiency and fair competition in the sector.

5.5.3 SPECTRUM PRICING OBJECTIVES

Policies are needed to govern spectrum revenues and spectrum prices which serve to ensure the efficient use of spectrum and to enable financial sustainability of the spectrum regulator. Revenue objectives and strategies relate directly back to the primary objectives; spectrum users pay for spectrum use, covering management costs, spectrum efficiency, and achieving economic and social development goals.

The total amount of revenue to be raised from some or all spectrum uses falls into three categories:

- "Partial" cost recovery – not all of the costs of regulation are obtained;
- “Full” cost recovery – all costs are covered;
- Greater than “full” cost recovery – a surplus is generated which may be related to several other objectives.

Given that the amount of revenue generated is determined and from whom, the next question to be resolved is –how should the revenue be applied:

- Cost recovery – if the amount of revenue obtained is less than or equal to the cost of spectrum management, the decision on application has already been determined. Where surplus revenues exist and are approaching revenue maximization they may be related to spectrum usage or to other benefits.
- Spectrum Usage – revenues associated with mechanisms to promote efficient
- Economic benefits for the public – revenues associated with other regulatory or government objectives: employment, technology innovation and diffusion.

Spectrum pricing refers to a range of spectrum management activities and mechanisms including administrative fees, spectrum usage, and spectrum prices determined by way of market mechanisms. Developing spectrum-pricing strategies invariably involves alignment with the government’s and regulator’s revenue goals and objectives, setting targets, and discussion with key stakeholders, such as the Ministry of Finance and key sector groups – i.e. telecommunications service providers

In general, for any resource, including radio spectrum, the primary economic objective is to maximize the net benefits generated from the resource initiating efficient distribution that will maximize benefits to society. Spectrum prices are used as an important mechanism to ensure that spectrum resources are used efficiently by users.

- The pre-eminent policy objective for spectrum pricing is that it should be done to promote spectrum efficiency. Spectrum is a vital natural resource and the price of spectrum is sufficient enough to ensure it is valued and used wisely.
- Use of the spectrum provides considerable benefit to the economy and the benefit derived from spectrum should be maximized.
- Managing radio frequency spectrum costs money and these costs should be recovered from those who benefit from spectrum management activities.
- In general, a user pay principle should apply which extends to all users of spectrum: public and private.

Finally, important social and cultural objectives can be realized by use of the spectrum and spectrum pricing should facilitate the achievement of government social and cultural objectives.

A sound legal and policy framework are the foundations upon which sound spectrum management practices are built. The authority to establish the appropriate method and means to set spectrum prices, levy and collect spectrum application fees and spectrum charges such as spectrum usage charges, assign, and licence spectrum should be established in primary legislation (the Act) and secondary (the Regulations) legislation. Establishing the authority rests with the legislature. The Government should set general spectrum policy and policy governing spectrum revenue, prices and fees.

Best practice includes such measures as communication and publication of schedules for spectrum application fees and spectrum charges. Also, legislation often provides for stakeholder input in the form of stakeholder consultation and where difficulties or infringements of rights are perceived mechanisms for raising objections, seeking redress and dispute resolution.

The approach taken by the spectrum authority should be:

- Spectrum pricing policies are efficient by being fair to all sides;
- Methods should be objective and measurable;
- Transparent decision-making and access to information;
- Practices and procedures should be simple to manage and administer.

Because one of the goals is to recover spectrum management costs there is a need to determine what costs should be included and at what (reasonable) level. In doing so there are several considerations:

- Organization strategy, structure and function and key activities;
- Initial minimal capabilities needed within the regulator;
- Strategies and costs to fill resource and capacity gaps.

◂ Box 1 Best Practice Spectrum Pricing and Fees Guidelines

5.5.4 SPECTRUM MANAGEMENT COST RECOVERY

It takes money to run a spectrum regulatory agency. The resources the spectrum management agency requires include: skilled labour, IT resources, investment in technical monitoring equipment, and expenditures to pay for participation in ITU and other international meetings. As well, the normal inputs such as office space and utility services needed to be funded. Governments can remunerate such costs directly from general revenue and in certain circumstances they should do so (for example if full cost recovering would deter spectrum use). It is usually efficient, however, for licensees or groups of licensees to be liable for the direct regulatory costs which they impose, on the ground that such costs are 'caused' by each licensee. Each user should then expect a direct cost based licence charge when it seeks access to spectrum, just as it takes account of other costs which it incurs or imposes.

5.5.4.1 THE STRUCTURE OF COSTS IN A SPECTRUM MANAGEMENT AGENCY

The activities of each licensee impose direct costs on the regulator. These include the costs of issuing, maintaining data, spectrum monitoring and enforcing its individual licenses. Some costs will be common to a band or to a radio service (such as band planning); whereas others will be common to a group of bands and some, such as management overheads, will straddle all licensees. The Australian study referenced in the following practice note suggests that indirect costs predominate.

Practice Notes

- Cost Recovery in Australia and Cost Analysis in Canada

5.5.4.2 SETTING FEES AND PRICES TO RECOVER COSTS IN PRACTICE

Fees are usually imposed by the regulator when administratively assigning spectrum and processing applications. The types of fees include:

- Application fees
- Type approval fees
- Radio operator examination fees
- Fees for radio operator certificates

- Interference complaint investigation fees

Setting fees schedules and prices to recover costs has been tackled by regulators in several ways. Some have used detailed costing models to establish which licenses have imposed which costs; others rules of thumb. Rules of thumb, such as setting charges on the basis of a percentage licensee's turnover, are likely to be subject to increasing criticism by those who think they are overcharged. In these circumstances, a simple model of direct costs can be developed. The model needs to be based on defined structure and business processes and associated management accounting data within the regulator – for example the amount of time spent issuing and enforcing particular licences. As well, a method of allocating indirect or common costs will be needed – for example, based on licensees in proportion to the direct costs which they impose. Or they can be allocated in accordance with the amount of spectrum (e.g., in MHz) with which a licence is associated.

The choice between these and other approaches has to be made by the regulator in the light of considerations of fairness, and the likely effect of the charges on spectrum use. If a high allocation of indirect costs makes a licence uneconomic, the matter may require reconsideration. We give two examples of alternative approaches in the following practice note and reference document.

RELATED INFORMATION

ITU-D: Study Groups: Spectrum Fees Database - Spectrum Management

Reference Documents

- **Canada: A Guide to calculating Radio Licence Fees**
- **Organization Plan Report, Telecommunication Authority Suriname**
- **Tanzania: Guideline for Fees and Application Costs for Telecommunications Equipment**

5.5.5 SPECTRUM USAGE FEES

Spectrum usage fees are charged to recover a spectrum resource rent for the government and to ensure that users of spectrum utilize the resource on an efficient basis. Under a spectrum usage pricing framework users should move to a state where only assigned and utilized spectrum is paid for. Unutilized spectrum is returned for reuse.

Specific targets for spectrum use do vary considerably across regions. There is an argument for making spectrum usage charges consistent across a region to avoid investment disincentives. However, in looking at regional best practice several important factors including scarcity, quality, congestions and value in use need to be taken into account.

It should be noted that spectrum usages charges should also apply to other main users of spectrum including microwave and satellite.

5.5.5.1 SPECTRUM USAGE FEES IN PRACTICE

There are two methods for pricing described in the articles which are commonly adopted for concession and network pricing and for spectrum usage. These two systems are briefly described below

- Spectrum Use Management Value (Nurmatov); and
- System Performance Pricing (Nozdrin)

Spectrum Use Management Value

Fees can be calculated on the base of costs on spectrum management possibly to present in the total functional form:

$F = D_i$

$F = f(D_i, L_i \times I)$

where:

F = fee, imposed on the spectrum authorisation licensee

D_i = direct administrative costs on processing license applications;

L_i = share of in additional administrative costs;

I = total additional costs.

System Performance Pricing

A universal approach to spectrum price determination based on system performance has been developed where the price can be built up from a number of separate elements based on any or all of various criteria such as the amount of spectrum used, number of channels or links used, degree of congestion, efficiency of radio equipment, transmitter power/coverage area, geographical location and so forth. The basic principle of this approach is to identify various technical parameters in order to measure the spectrum volume used or define the "pollution area" of a radio system as a common basis for establishing spectrum fees.

For example, the following universal formula may be considered by the box below:

◂ Box Universal Formula for System Performance Pricing

XXXXXXXX

where,

P = spectrum price;

V = volume of space or geometric area occupied;

M = useful results obtained from the radio equipment considered, for example the number of channels to be provided or users to be served;

Kf = coefficient reflecting specific characteristics of range used;

Ks = coefficient taking into account the region of the radio station installation;

Km = coefficient reflecting social benefit of radio system;

Cs = annual spectrum management costs;

Kp = coefficient reflecting the level of spectrum access demand in the band in question.

On one hand, the application of this method can stimulate more efficient spectrum utilization; on the other hand various problems with the practical use of such formulas remain to be resolved. One disadvantage of the above technique is the choice of coefficients designed to take into account specific features of service, spectrum demand, etc.

Practice Notes

- Thailand – Calculation of Spectrum Usage Fees: Generalized Formula
- Trinidad and Tobago – a simplified system performance model including license fee, spectrum usage and application fees.

Reference Documents

- Spectrum Pricing - Paper delivered at the Lusaka Spectrum Management Conference 2003
- Spectrum Pricing Methods

5.5.6 SPECTRUM ROYALTIES AND LOTTERIES

Spectrum royalties and lotteries are administrative methods for raising revenue which may bear no resemblance to either the economic value of spectrum or the cost of spectrum management. Historically, royalties and lotteries preceded what are now viewed in practice as more reliable market-based methods for setting prices – such as auctions.

Spectrum Royalties

Spectrum or licence charges can be assessed as a percentage of (or royalty on) revenues or profits, which has to be handed to the spectrum regulator under the terms of the licence received or profits earned by an operator. This can be a way to cover regulatory costs, or it can be designed to raise revenue for the government.

The amounts that royalties paid go up and down depends on the the prosperity of the firm and sector (e.g., mobile communications). This makes the regulator a kind of 'partner' of the operator, sharing a common interest in maximising revenue or profit. Because royalty payments depend upon operator's performance the income they generate is unpredictable, which may be a disadvantage. There also needs to be legislative clarity to ensure that what might be viewed as taxation is indeed legal.

Finally, the basis for calculating payments must be spelt out, to prevent an operator from using accounting devices to hide income or profit and thus reduce payment.

Lotteries

Revenues are raised by applicants paying entrance fees to gain spectrum rights. Although this procedure may seem attractive and equitable, it has many drawbacks and has fallen out of favour.

- First, if there are many applicants, the cost of administration may be large, especially if applications are reviewed and vetted for suitability.
- Second, tif applicants are not vetted the lucky winner may not have the necessary qualifications to operate the service efficiently. If they are not allowed to sell the licence, this may be a recipe for disaster.
- And if, thirdly, they are allowed to sell them to efficient operators, the winners will be appropriating auction proceeds which would otherwise go to the government.

5.5.7 SPECTRUM AUCTIONS

In recent years regulators have relied heavily upon assigning some licences via a competitive process involving (normally) a monetary payment (which we call an auction) rather than relying on alternative procedures such as comparative hearings. In which applications are judged on a range of criteria. A more complete discussion of the methods for selecting licensees can be found in **Section 3 of this Spectrum Management Module** . This present Section focuses on the pricing aspects of the selection process.

In an auction, contestants for a licence make competitive bids and the licence goes to the highest bidder. It is normal for the bids to be made in monetary term, the competitor offering the largest monetary sum getting the licence. But the competition can be in some other variable. For example, competitors can bid against are another over which of them will offer service over the largest geographical area. Or the competition can be in term of which operator will charge the lowest amount for service. Once the rules are established, however, the winner is determined by the operation of the competitive process, not by an administrative decision.

Switching from comparative hearings, followed by an administrative decision, to an auction does not in itself fundamentally change the spectrum regulatory regime. If licences specify in great detail the technological apparatus to be employed and services to be provided, the winner of an auction is as effectively tied down as a firm granted a licence by any other means. The key differences are that:

- an auction assigns the licence to the firm which bids the most, and that may in certain conditions be the most efficient firm;
- a competitive auction will, if it operates properly, cause any expected excess profits from providing the service to go to the Government, rather than the operator as would be the case if the operator were chosen via a competitive hearings.

The licence being auctioned is not always so prescriptive as assumed above, but may allow the successful licensee to choose what services to provide. We consider some of the resulting issues associated with change of use under the heading of 'secondary trading in practice'.

Although auctions have been used in many countries over the last 10-15 years, it still remains the case that most of the spectrum in use in all countries has been allocated by administrative methods. Auctions tend in practice to be confined to cases where:

- the spectrum available is in scarce supply;
- many firms want to acquire licence;
- the service to be provided with the spectrum can be precisely defined
- the monetary value of the licence is relatively high, justifying what can be a complex assignment procedure.

It is clear, however, that auctions can be used in a wider class of cases than these. A successful auction process relies upon clarity about the rights and obligations being auctioned, and also from clear rules for the conduct of the auction. If either of these is absent, firms will face uncertainty which will make them reluctant to participate or to submit high bids.

A more extensive discussion of the methods for selecting licensees can be found in **Section 3 of this module**.

Reference Documents

- **Are Spectrum Auctions ruining our grandchildren's Future?**
- **Framework for Spectrum Auctions in Canada**
- **Using and Abusing Auction Theory**
- **What Really Matters in Auction Design**

5.5.7.1 TYPES OF SPECTRUM AUCTIONS

There are several circumstances where an auction can be considered as a means of assigning licences:

- The simplest case is one in which a single license is offered for auction in a self-standing process.
- When two or more identical or complementary licences are offered, they can be offered sequentially or simultaneously. Where each licence is local, a simultaneous auction can allow firms to piece together local licences to provide broader coverage.
- The licence(s) can be assigned on the basis of a so-called 'open bidding' or public process, with bids visible to other parties, or on a 'sealed tender' system, under which each party marks a single private offer; there are numerous alternative variants of open auctioning, one of which is the so-called clock auction.
- The auction can have a minimum acceptable bid or 'reserve price.

Some examples are given below:

- A spectrum regulator proposes to assign a single licence for the provision of a national second generation mobile telephone service. The successful applicant must commit itself to providing coverage to 50% of the land area and 80% the population. Sealed bids must be submitted by a specified date, by firms which have pre-qualified (i.e. have shown their competence to become a licensee). The winner is the firm which bids the most.
- Two or more licences to provide national 3G mobile services are auctioned.Pre-qualified applicants bid against each other in an open bidding auction. They have the opportunity to submit new bids for the licences at pre-specified intervals. The auction ends when the winning bids for each licence are the same, in terms of bidder and sum bid, as they were in the previous round. To ensure completion of such an auction, firms must be made to bid at a specified frequency.
- This example is similar to the 3G example above, except that there is restriction as to the use to which the winning competitor can put the spectrum (provided that interference conditions are met). Such auctions are said to exhibit technology- and service-neutrality. A country's territory is divided into, for instance, twenty areas, and three (identical or similar) licences are auctioned in each area (sixty in all). The procedure is an open bidding one. At each round, a firm can bid for one licence in each region. This procedure makes it possible for firms to put together a national service by bidding in all areas simultaneously. At the opposite extreme a firm can bid to provide a local service in one area only.
- An ascending clock auction is a procedure for selling multiple identical licences which requires the auctioneer to announce prices to bidders that increase over time (ascend with the clock) and bidders choose whether to accept or reject the announced prices. The auction is over when the number of bids equals the number of licences. The winning bidders all pay the required bid amount and each of them is assigned an identical licence. Variants of the clock auction can accommodate differences among licences, via a separate sequence of prices for each one. Clock auctions can also be combined with a subsequent phases to deal with bids for packages of complementary licences.

The choice of auction mode will vary with the nature of licences made available, the number and nature of firms with an interest in theirs and the regulator's or government's objectives. There are a number of trade-offs between, for example, the advantages which an open auctioning system has in spreading knowledge among firms about other firms' valuations, hence encouraging higher bidding, and the opportunities for collusion among bidders which the communication present in open auctioning may facilitate. As a result, each set of circumstances tends to require an individual solution.

Reference Documents

- **USE OF AUCTION-BASED METHODS FOR THE ASSIGNMENT**

5.5.7.2 SPECIFYING RIGHTS AND OBLIGATIONS

A successful auction requires a clear understanding by participants of what rights and obligations are available to the winner or will be imposed upon them. If there is uncertainty about this, it will discourage competitive bidding. Auctions differ in two main ways: in the number of lots (or licences) made available and the way the auction is conducted. There has been a significant number of mobile licenses grant by auction around the world and they form a good basis for analysis and understanding. In relation to these wireless communication licences, some the the key variables in designing the auction are:

- The number of licences to be offered to the service and in which band: this decision is of fundamental importance, since it determines the structure of the services market. The objective of maximizing consumer welfare suggests the harnessing of competitive forces to the maximum – i.e., issuing, subject to spectrum availability, as many licences as the market will be able to support (plus one or two extras to permit freedom of entry into the market);
- Any commitments made at the time of the auction relating to restrictions on the award of subsequent licences;
- Whether national or local regional licences are issued; here the regulator may find it helpful to anticipate the kind of business plans (national or regional) firms are likely to have and make licences available, accordingly there is nothing to preclude a mixture of national and regional licences;
- How long the licences will last: too short a period may discourage investment in the services, while too long a period may allow the spectrum in question to stagnate if it cannot be sold on for another purpose;
- Any obligations a licensee may have to make periodic payments in the course of the licence;
- Any network roll-out obligations or 'use it or lose it' clause;
- Any foreign ownership restrictions.

All these aspects influence the expected revenues from the auction, and their expected impact on consumer welfare.

Reference Documents

- **1.8 GHz and 800 MHz Band Spectrum Licence Allocation - Area Maps and Boundary Coordinates**
- **Auction for Fixed Wireless Access Individual Licenses - Summary of Invitation to Tender**
- **AUCTION OF WIRELESS BROADBAND SPECTRUM RIGHTS**
- **How (Not) to Run Auctions: the European 3G Telecom Auctions, European Econ. Rev., November 2001**
- **Procedural Manual for Bidders, Phase 1**
- **Procedural Manual for Bidders, Phase 3**
- **Third Generation Mobile Services Licensing - Information Memorandum, OFTA, July 2001**

5.5.7.3 RULES AND PROCEDURES FOR SPECTRUM AUCTIONS

Auctions only work properly when there are clear rules attached to them which all participants understand. These should be designed both to prevent collusion and to bring the proceedings to an efficient close. Regulators have to stipulate the rules in some detail in bidding documents.

The nature of the rules required varies from the very basic to the more sophisticated, depending on the form of auction chosen.

In the former category, basic housekeeping rules have to be established to ensure that scaled bid remain confidential until the 'official' opening date, and that competing bids in an 'open bidding' system are delivered simultaneously by all competitors.

To bring complex multiple round auctions to a close, it is necessary to force all participants to bid at regular intervals (according to so-called 'activity rules '), rather than make unexpected bids as the end of the process approaches, and to ensure that there is a minimum bid increment, to prevent bids rising endlessly by small amounts. Both the Canadian Advanced Wireless Services (AWS) and other spectrum in the 2GHz range auction and the Finnish 2500-2690 MHz spectrum auction featured activity rules, for example.

In one US PCS auction, it was discovered that participants were using the amounts they bid to signal to competitors – more precisely to 'warn them off' bidding for certain lots. As a result, a rule was introduced which required bids to be in round numbers, which could not send signals of this type.

Related Materials

Module 3, "Authorization of Telecommunication/ICT Services", Section 4.1.1, "Features of a Multiple Round Auction: The Canadian Example"

Practice Notes

- Selection Mechanisms in Comparative Perspective

Reference Documents

- Auction for Fixed Wireless Access Individual Licenses - Summary of Invitation to Tender
- Auctioning of Spectrum for Third Generation Mobile Services (3G) -
- Bidders Manual
- Briefing to Industry and Analysts on the Hong Kong 3G Auction
- Canada -- Licensing Framework for the Auction for Spectrum for Advanced Wireless Services and other Spectrum in the 2GHz Range
- Finland -- Explanatory Memorandum regarding the Regulation on 2500 - 2690 MHz Spectrum Auction
- Finland -- Regulation: 2500-2690 MHZ SPECTRUM AUCTION
- India -- Auction of 3G and BWA Spectrum
- Nextwave Supreme Court Victory Ends Five-Year Struggle Over U.S. Wireless Spectrum Auction Rules, Telecomfinance (issue 99), March 2003
- Radiocommunications (Spectrum Licence Allocation) Determination 1998 - Setting of Entry Fee and Eligibility Payment

5.5.7.4 SPECTRUM AUCTIONS IN PRACTICE

Literally hundreds of spectrum auctions have been conducted in the past ten years. Some have attracted great attention by generating billions of euros or dollars from bidders. Most have been on a much smaller scale. A range of methods have been employed and some have been judged successful, others found to have failed. Regulators can learn from this experience to choose a procedure which meets their circumstances.

Here we offer an account of a selection of spectrum auctions; it is not intended to be complete but to identify useful precedents.

Great experience has been accumulated in the USA, where the Federal Communication Commission (FCC) has run a series of auctions starting in July 1994, and continuing in 2007.

One commentator has drawn the following lessons from these auctions, which typically have involved the auctioning of multiple local licences which can be aggregated to provide regional or national services:

- Open bidding is better than a single sealed bid;
- Simultaneous open bidding is better than a sequential auction, in which licences are auctioned one after another;
- Allowing bidders to bid for packages (e.g. a group of local licences capable of providing wider area services) is desirable in principle but found (in 2001) to be too difficult in practice;
- Collusion in a major problem, which can be countered by concealing bidders' identities (i.e. publishing the bid, but not who made them), and setting high resume prices, amongst other ways.

The most conspicuous recent auctions have probably been those for 3G (UMTS) licences in Europe. In 2000-2001 a sequence of auctions took place, beginning with the UK, where operators bid very large amounts (USD 35 billion for five 3G licences). Although revenues from the German auction several months later were also high, thereafter they declined on a per capita basis. Many analysts of these processes have now been published – among the best that by Paul Klemperer, to be found in the references below.

Where a small number of national licences are being auctioned, for example in a developing country, a simpler approach is possible. A good example of this is provided by the auction of three identical GSM licences in Nigeria in 2002. This was done with a carefully thought-out process which involved invitation and pre-qualification stages, as well as the auction itself. Recognising the problem of collusion, the designers made alternative plans which depended on the number of qualified bidders for the three licences. If they were five or more - i.e., if bidders exceeded the number of licences by more than one, an ascending clock auction would be held. If these were only four, a sealed bid process would be implemented.

Related Materials

Module 3, "Authorization of Telecommunication/ICT Services", Section 4.1.1, "Features of a Multiple Round Auction: The Canadian Example"

Practice Notes

- Best Practice Guidelines for Spectrum Auctions

Reference Documents

- Auction for Fixed Wireless Access Individual Licenses - Summary of Invitation to Tender
- Australia_Data on Spectrum Auction Results
- Comments on Auctioning of Spectrum for 3G Mobile services - Proposed Rules on Connected Bidders
- Framework for Spectrum Auctions in Canada
- High Bids and Broke winners
- Licence Award Process for the Provision of 3G (UMTS) and 2G (GSM/DCS) Mobile Services - Information Memorandum
- Solving Spectrum Gridlock: Reforms to Liberalize Radio Spectrum Management
- Spectrum Auctions do not Raise the Price of Wireless Services: Theory and Evidence, Federal Communications Commission
- Spectrum Auctions in India, Indian Institute of Management, February 2001
- Spectrum Auctions: Yesterday's Heresy, Today's Orthodoxy, Tomorrow's Anachronism: Taking the Next Step to Open Spectrum Access

5.5.8 SECONDARY MARKETS

When licences for spectrum are being initially offered, auctions can create competition for spectrum however it is often the case that the successful licensee is precluded from trading the licence at anytime afterward. Continuous reselling of spectrum becomes possible when a secondary market operated in respect of either spectrum that has been auctioned or of spectrum allocated initially by administrative methods but which is now been cleared for trading. When a secondary market is combined with flexibility in spectrum use, licences can be deployed by the original licensee or, after a trade, by another firm in a new innovative use. Auctions alone merely introduce an initial market-based selection by organizations that will exercise highly specified spectrum usage rights, whereas secondary trading seeks to develop a primarily market-based solution both for spectrum assignment and for spectrum allocation, on the condition that flexibility in use is permitted.

For more details on market-based sharing see sections 4.2.4 Market-based sharing and 4.3.4 Spectrum sharing in practice of this module.

Practice Notes

- Spectrum Trading: Implementing Secondary Markets in the European Union
- What is Spectrum Trading?

Reference Documents

- An Essay on Airwave Allocation Policy, 2004 (Need for Reform)
- De-regulating the spectrum - Implications for Technology, 1999

- Final report for the European Commission, Study on conditions and options in introducing secondary trading of radio spectrum in the European Community, Summary of the Report, May 2004
- Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment
- Spectrum Trading: Band Managers - The Policies and Incentives Needed to Make them Succeed, 2003
- Study on the conditions and options in introducing secondary trading of radio spectrum in the European Community

5.5.8.1 DEFINING PROPERTY RIGHTS FOR SPECTRUM TRADING

Where trading occurs, it is desirable or even necessary that buyer and seller – as well as the regulator and the courts where appropriate – share the same understanding of this bundle of rights and obligations which is changing hands. This is true of land, for example, and also of a spectrum licence. Clearly defined property rights are thus a precondition for efficient spectrum markets.

The dimensions of rights and obligations in a spectrum licence include:

- The band which is available for use;
- The geographical area in which it can be used;
- The period for which the licence is entitled;
- The uses to which it can be put;
- The licensee's degree of protection from other users;
- The licensee's obligation not to interfere with other spectrum user's rights.

Practice Notes

- Designing property rights for the operation of spectrum markets

Reference Documents

- Sharing Spectrum
- USA: Assigning Property Rights to Radio Spectrum Users, 1998

5.5.9 ADMINISTERED INCENTIVE PRICES (AIP)

Administered Incentive Prices (AIP) are used by some regulators (principally by ACMA in Australia, the Ministry of Economic Development of New Zealand, and Ofcom in the UK) as an additional tool to promote efficiency in spectrum use within a framework of administrative spectrum management.

It is called 'administered incentive pricing or AIP' since prices continue to be 'administered' or set by the regulator and include potential 'incentive' properties to promote efficient use. There is strong evidence that AIP's which are intended to be set at a level reflecting spectrum scarcity in particular bands encourage efficiency and economy in spectrum use.

In this section, AIP's are described in more detail beginning with Section 5.9.1 – Introduction to AIP followed by an outline and explanation of the opportunity cost approach commonly used to develop AIP's in Section 5.9.2 -The Opportunity Cost of Spectrum. In Sections 5.9.3 and 5.9.4 AIP in Practice and Methods to Adjust AIP are described.

Practice Notes

- Spectrum Pricing: Administrative Incentive Prices

5.5.9.1 INTRODUCTION TO ADMINISTERED INCENTIVE PRICES

Objectives

Spectrum prices should be set with a clear view of objectives and intended results. Administratively assigned licences usually carry with them an obligation by the licensee to make a payment to the regulator or government that is designed to promote efficient spectrum use – not simply to recover spectrum management costs. The idea is that if spectrum is priced reflective of its value in a market place (for example prices set by spectrum auction) a user with unused or underutilized spectrum will choose to return it or trade spectrum rather than pay the charge. As well, if a user can pay a lower fee by using less spectrum that is by being more efficiently, that user will rationally adopt more spectrum-efficient operations.

Comparing Spectrum Pricing Approaches

Promoting efficiency is generally achieved by relating spectrum prices to key factors such as frequency band (coverage and data carrying capacity), bandwidth, extent to which the band is sterilized (exclusive licenses and guard bands), type of service, population density, location of use. In most cases, the parameters used in developing formulae bear no relationship to the spectrum demand or opportunity costs associated with the use of spectrum in an alternate higher value use. Instead of using market-based prices, values for spectrum prices and parameters are set by the spectrum manager using judgements which are heavily influenced by historical precedents and often political sensitivity and reluctance to make major changes in fees. The cost recovery price of spectrum can also cause a user to return excess spectrum or to use spectrum more efficiently, but often they are too low to impose an appropriate level of discipline on licensees.

Benchmarks using observed prices in market transactions in the same or related frequencies are often are included in the analysis of spectrum values because benchmark prices provide some reference and basis for having arrived at similar conclusions concerning price levels even though true comparisons are difficult since like for like situations are uncommon. These transaction prices will embody not only 'opportunity costs' – the cost-saving potential of the spectrum licence, but also any excess profits which the licence holder can derive through exclusivity or market power. As a result, benchmarks should be used with caution. For example, the comparison involves two mobile licences that were auctioned in another jurisdiction. Bids may well have been based on business plans which anticipated high mobile telephone charges, based on limited competition. If a new entrant in your own market is faced with administered price equal to the benchmark auction bids, it might find it uneconomic to enter the mobile market, as the profits achievable in a more competitive market might not be enough to cover so high a charge. This shows how an excessive administered price can leave spectrum underutilised.

Administrative Incentive Prices

Regulators are increasingly considering the use of market based mechanisms to determined spectrum allocations mechanisms - auctions and trading – to optimise the use of spectrum. AIP is a useful complementary tool for establishing spectrum prices using opportunity costs to promote and encourage the efficient use of the spectrum resource Ofcom, the UK regulator, has pointed out in its Administrative Incentive Price (AIP) Policy Evaluation Report (2009), that (AIP) are effective used alongside the increased use of market-based allocations. As well, AIP has improved information for all users and potential users on the value of scarce spectrum during the early transition to a market-based approach to spectrum allocation.

AIP is expected to provide long term signals of spectrum value to spectrum users. These long-term value signals are intended to help spectrum users (and their suppliers) make more efficient decisions concerning investment and the combination of inputs such as land and equipment along with how much spectrum should be and investment in radio technology. Given the significant investments made by many users which are tied up in radio equipment, land, etc., and since these, in most cases, cannot be easily and quickly reconfigured to use other frequencies and have a lifetime of many years, it should not be expected that AIP will lead to significant changes to spectrum use in the short term. Ofcom has stated in its policy it does not expect AIP to achieve any specific short term spectrum reallocation goals

AIP's are used as a surrogate for market prices reflecting opportunity cost and emphasizing productive efficiency where the demand and supply of radio spectrum is brought into equilibrium by the working of the price mechanism reflecting opportunity costs. AIP's target productive efficiency; one of three dimensions of economic efficiency:

- Productive efficiency – production of goods and services takes place at the lowest possible cost. In the case of radio spectrum users select combinations of inputs such as spectrum, equipment, land and labour to produce services at their lowest cost;
- Allocative efficiency – an optimal mix of goods and services is produced which maximizes consumer welfare – no on benefits from the use of spectrum at some else's expense;
- Dynamic efficiency –radio spectrum should be used in a way to encourage an appropriate level of research and innovation.

Ultimately, spectrum values are determined by users using not only opportunity costs and an assessment of alternatives but also the users' view of the revenue potential associated with several possible uses and deployments. Spectrum values can be expected to be determined by users based on expected net present values of future returns where returns are determined based on calculations of all inputs (spectrum, land, equipment, maintenance) using their market prices plus a value attributable to the flexibility of options available to the user in how the frequencies can be used (positive externalities). Technology flexibility and service neutrality contribute to spectrum values. For more on opportunity costs see Section 5.9.2 – Opportunity Cost. For more on spectrum valuation See Section 5.2 – Spectrum Valuation and Section 5.2.1 – Measuring Spectrum Values.

5.5.9.2 THE OPPORTUNITY COST OF SPECTRUM

In the absence of a primary or secondary market for spectrum (or even in their presence), it may be desirable to give licensees an incentive to economise on spectrum use, in order to discourage extravagant use or hoarding. This applies both to private sector (or commercial) users and to public sector users.

There are various ways of doing this, including regular audits. By setting a charge for spectrum steady pressure is imposed on users to economise, just as appropriate electricity prices discourage waste of electricity.

To apply the right level of price pressure without forcing excessive economies which leave valuable spectrum unused, spectrum should be priced in any use at its opportunity cost. This can be found by estimating the other resources which would be saved if the same spectrum were redeployed to produce another service, or the extra costs which would be incurred if it were not available to provide the service for which it is currently employed, so service had to be produced with less spectrum.

As an example, spectrum used from mobile communications can have its opportunity cost computed in either of the above two ways. Either we can ask: "how much extra would it cost to provide mobile communications with less spectrum – i.e., with better spectrum re-use, hence lower power and use of more base stations?" Or we can ask: "if the spectrum were reallocated to another use, what costs would the new spectrum licensee save in the production of that service?" Both of these are possible measures of opportunity costs, but we should also take the higher of the two (or more) estimates provided because that measures the cost to society of keeping the spectrum in its current use.

Note that this approach only measures the potential of spectrum to reduce costs of services, not its role in generating excess profits from monopolisation of services. Hence the opportunity cost is not an estimate of the market price of leasing or buying spectrum, as this would include any 'monopoly profits'. If the regulatory body wants estimates of the market price of any spectrum, it might examine price levels in comparable commercial transactions, such as auction proceeds or secondary trading.

If AIP's are based on opportunity cost, then it follows that they should be zero (and replaced, probably, by cost recovery prices based on direct cost only) if the spectrum has no alternative use. This might arise because:

- there is no shortage of spectrum in the relevant frequency, so that all users can be accommodated;
- there is a legal impediment to using the spectrum in question for other purposes; this might apply for instance, to spectrum used for the purposes of aeronautical communication under the auspices of the International Civil Aviation Organisation (ICAO).

A criticism of AIP, is that in the real world, decisions to bid and acquire spectrum are not only based on costs, but also on the projection of future revenues, after analyzing the efficiency and capability of the technology and the marketability of the resulting applications that the spectrum will support. Some argue, the best way to capture the estimate for spectrum value is to use the *net present value* (NPV) concept, which balances the net costs against the net cash inflows over time. From the point of view of a potential operator choosing whether or not to invest in a particular Broadband Wireless Access market (for example) using NPV translates into a calculation of the total net value of a project, assessing whether positive outputs (i.e., revenues) exceed input costs including spectrum as a factor in determining net project value for the proposed project – and whether the cost for the spectrum input is justified.

Measurements of potential revenues can also be forecast with some reliability, through benchmarking similar services, or benchmarking identical services in other markets. As well, more focused research can be done through marketing studies and demand surveys of discrete markets.

The model for spectrum pricing known as *administered incentive pricing* (AIP), is based on the economic rationale that market-based signals will generate economic responses that will lead to more efficient and productive use of spectrum resources.

In practice, *opportunity cost* calculations and spectrum management policies are used to derive market-oriented fees, even for spectrum bands that have never been auctioned. The fees may represent discounts from true market-oriented amounts, based on policy goals or to avoid "fee shock" for users in lucrative bands below 3 GHz. The fees are then imposed as economic costs upon the users of the spectrum input. If the users find that the fee costs cannot be justified economically, they can release the spectrum. The intended result is more productivity gained from the finite spectrum resource.

In its broadest sense, administered pricing has been employed in numerous countries, wherever governments have opted not to conduct auctions but rather to set up-front or recurring fees based on calculations – or often simply estimates – of what the operators would consent to pay. Contemporary AIP, however, seeks to marry auction avoidance with market-oriented fees that are based on sound economic principles. Not all governments, however, have been willing to impose AIP on all services – particularly the command-and-control public service operations that they themselves operate.

◂ **Box AIP: A Proxy for Market-Based Prices**

Source: Exploring the Value and Economic Valuation of Spectrum, GSR 2010 Discussion Paper, ITU, John Alden.

Reference Documents

- **AN ECONOMIC STUDY TO REVIEW SPECTRUM PRICING**
- **Group on Telecommunications Report - Opportunity Costs Affecting Spectrum Utilization, Group on Telecommunications – India**

5.5.9.3 ADMINISTERED INCENTIVE PRICES IN PRACTICE

Administrative Incentive Prices (AIP) based on opportunity costs are used by Ofcom in the UK and ACMA in Australia as an additional tool to promote efficiency in spectrum use within a framework of administrative spectrum management. Licences are issued administratively but carry with them an obligation to make a payment to the regulator or government which is designed to promote efficient spectrum use and not simply recover the costs of managing spectrum. Basically, if a user has unused spectrum, the user will choose to return unused spectrum rather than pay the charge. Also, if a user can pay a lower fee by using spectrum more efficiently, that user may adopt more spectrum-efficient operations.

In this section, the approaches to AIP taken by Ofcom in the UK and ACMA in Australia are briefly described. The summary conclusions drawn from Ofcom's AIP Policy Evaluation concerning the effectiveness of its AIP policy for spectrum prices are also given.

◂ Box United Kingdom - OFCOM

Smith-NERA was commissioned by Ofcom's predecessor the Radiocommunication Authority in 1996 to report on how AIP might be applied to range of licence classes given that the 1998 Wireless Telegraphy Act (the "WT Act 1998"as primary legislation, was an important cornerstone in the development of AIP. The WT Act 1998 permits the UK NRA to reflect considerations other than cost recovery when charging fees for spectrum use. Up until that point, the existing regulatory framework had not provided any means by which users could be incentivised to make efficient decisions about their spectrum requirements, based on the value of the spectrum to society at large, as the legislation in place would not permit it.). The WT Act 1998, however, did not address government users of spectrum, who could continue to use spectrum without a WT Act licence because of "Crown immunity". In the late 1990's, no spectrum auctions had been undertaken, although the principles were being discussed by the UK NRA. The results of the Smith-NERA work and initially led to proposals to phase in AIP over 3 years commencing on 1997 for Fixed Services (point-to-point links); Private Business Radio (including CBS use), and Public Mobile Communications (Cellular).

An AIP policy was subsequently continued by Ofcom given its duties and powers under the new Communications Act. Ofcom's AIP methodology uses the marginal value of spectrum to the user taking into consideration the amount of congestion in a given band and attempts to set fees at "market-clearing" rates that balance spectrum supply and demand. Ofcom has said that one way to evaluate the marginal value to the user is on the basis of the "additional costs of the least-cost practicable alternative" – another way of stating opportunity cost. For example, for a user of a point-to-point fixed service band, the most cost-effective alternative to using the band would be either deploying more spectrally efficient systems or relocating to higher frequencies. The relative costs of these alternatives reflect the marginal value.

Therefore, most valuation models involve a calculation of marginal costs associated with network infrastructure, including equipment and construction costs, as well as cost of capital or labour. Some of these costs can be known or at least well estimated, through benchmarking and survey of existing equipment markets. This is particularly helpful if the spectrum being valued is harmonized across multiple markets (or even worldwide), leading to predictable economies of scale and scope in manufacturing. It is also clear that such cost calculations are made on a forward-looking, incremental basis, because the analysis must capture ongoing costs, not a theoretical start from a baseline of zero.

Ofcom agreed with Smith-Nera that the key criteria when setting a more incentive based pricing regime should be that:

- Prices should be based on the estimated marginal value of spectrum; \
- marginal spectrum values should be calculated by costing the alternatives faced by potential users denied access to the spectrum and then taking the difference between the costs of providing the service at current levels and the minimum cost of those alternatives initially prices less than marginal values should be set, because the current allocation and assignment of spectrum was not an equilibrium position;
- initial prices should be set at a fraction of the estimated marginal values, but probably at several times the then current fee levels;
- prices should then be increased over, say, a five year timescale, depending on users' reactions.

Ofcom continued to develop AIP fees across a number of sectors beyond the initial three from a base set by a general of 50% reduction over 10 years ago. This generally reflects the assessment that the risks to optimal use posed by setting fees too high are more significant than those associated with setting them too low as setting them too high could result in the loss of existing services that are efficient in their use of spectrum, or the lack of new services that might otherwise have evolved if the spectrum was priced appropriately.

Ofcom – AIP Policy Evaluation, 2011

In 2011, Ofcom completed a review and evaluation of its AIP spectrum price policy. It concluded that:

- In the main, AIP continues to meet its primary objective in helping to incentivise spectrum users to ensure that the spectrum they have access to, is used optimally;
- Alternative use of a non-incentive pricing mechanism such as Cost Recovery would have been quite likely to allow inefficiencies to continue;
- AIP fees were set conservatively below expected opportunity costs, it is unlikely that the application of AIP-based fees, by themselves, made otherwise economic uses of spectrum uneconomic.

The case for AIP is relatively simple. Due to increasing demand for applications and the introduction of new services, spectrum is scarce or in excess demand1 in many frequencies and geographical areas – not all potential users and uses can be accommodated in their preferred frequencies and locations, and there is a need to ration demand by means of a price.

In the absence of price signals, users will lack incentives to economise in their use of scarce spectrum, and will tend to hoard it or use it in greater quantities than if it was realistically priced. Putting a price on scarce spectrum provides the necessary incentives and allows those who value it most to gain access to it thereby providing services of a greater economic value to the benefit of citizens and consumers.

ACMA's approach to AIP is highlighted next.

◂ **Box Australia - ACMA**

ACMA which determines spectrum fees in Australia has operated a system of spectrum pricing which in part utilizes opportunity costs. ACMA employs the following principles in developing spectrum fees to encourage the efficient use of spectrum based on an equitable and consistent spectrum fee regime:

- Spectrum fees, however based, should cover the costs of authorizing spectrum;
- Taxes from spectrum licensees should recover the indirect costs of managing spectrum;
- Taxes should be based on the amount of spectrum denied to others;
- Spectrum fees should be based on their opportunity cost that is the best alternative use;
- If the opportunity cost is less than costs of managing spectrum, taxes should then make up the difference but not exceed these costs.
- Adjustment factors will be used by ACMA to take special situations into account.

ACMA's treatment of AIP differs from Ofcom's in that AIP's should not exceed the costs to manage spectrum somewhat restricting the incentive aspect of AIP.

The Federal Communications Commission, as directed by Congress, in 2010 developed a National Broadband Plan which includes a detailed strategy for achieving affordability and maximizing use of broadband to advance public policy goals including:

- consumer welfare;
- public safety and homeland security;
- health care delivery;
- energy independence and efficiency;
- education;
- job creation and economic growth;
- and other national purposes;

The goals identified in *Promoting Mobile Broadband Infrastructure* supports the Government's goal of making an additional 500 megahertz (MHz) of spectrum available for mobile broadband by 2020 by expanding the use of incentives mechanisms to reallocate or repurpose spectrum to higher-valued uses.

The FCC stated that it should also consider a more systematic set of incentives, (such as AIP among others) to ensure productive use of spectrum to address broadband gaps in underserved areas.

Practice Notes

- Calculating AIP in Practice: An example for mobile spectrum
- Spectrum Pricing: Administrative Incentive Prices

Reference Documents

- Ofcom. Spectrum pricing. A statement on proposals for setting Wireless Telegraphy Act prices, 2005.
- Response to OFTA's Consultation Paper on 3G, Centre of Asian Studies, University of Hong Kong, 2000
- UK: Application of AIP in the UK_2004

5.5.9.4 ADJUSTING AIP SPECTRUM PRICES

An important feature of the price for most objects is that it can change over time in response to scarcity, substitutes and changes in consumer tastes. To the extent prices change in well ordered markets, the prices of spectrum will change when prices are determined by market methods.

What of administered prices and AIP? Again, prices can change as allocations and availability are altered through international or national processes. If administrative scarcity is the dominant characteristic in certain bands improving availability and access should have downward pressure on spectrum prices. As regulators become more efficient in the management of radio spectrum, there is justification for a reduction in that portion of spectrum fees that are related to cost recovery.

As we have seen AIP's for a particular band or service are determined by estimating the opportunity cost of the existing service with the best alternative use. As opportunity costs change reflecting both technological improvements and changes in the service offering then we can expect AIP's to be adjusted lower. This is the case with the prices determined by Ofcom. Ofcom periodically re-calculates AIP for various services and adjusts some prices upwards and others downwards.

Should the price of spectrum in bands adjacent to bands reflecting either an opportunity cost or market-prices go up in price in some synchronous manner? The answer to this question depends on whether the bands in question are used for similar services. Market-based methods will resolve the price question quite readily whereas the spectrum manager will need to adjust the price through an administrative process and possibly run the potential for both delay and inaccuracy.

5.6 SPECTRUM MONITORING AND COMPLIANCE

Spectrum monitoring is one of four key spectrum management functions which include spectrum planning, spectrum engineering and spectrum authorization. Spectrum monitoring helps spectrum managers to plan and use frequencies, avoid incompatible usage, and identify sources of harmful interference. Key spectrum monitoring activities explained in this section include data collection and compliance enforcement.

Properly designed and functioning spectrum management processes including planning, authorization and engineering activities require data derived from monitoring technical procedures and from components which are characterized by varying degrees of complexity and cost. Spectrum monitoring and compliance activities help users to avoid incompatible frequency usage through identification of sources of harmful interference.

Furthermore, spectrum use planning and resolution of spectrum scarcity issues can be accomplished through study and analysis of spectrum occupancy data. Maintaining interference free assignments includes the use of data and electro magnetic compatibility (EMC) verification activities, as well as monitoring and enforcement activities needed to ensure user compliance with licence conditions and technical standards.

In the next three parts of this section, we expand on the topic of Spectrum Monitoring and demonstrate its importance in supporting spectrum management activities. In **the first section**, we provide more detailed explanations of spectrum monitoring objectives, activities and strategies. Spectrum monitoring technology is outlined in **the second section**. The **last section** deals with compliance enforcement activities.

Reference Documents

- **National Spectrum Management Handbook**
- **Spectrum Monitoring Handbook**
- **Supplement to the Spectrum Monitoring Handbook**

5.6.1 SPECTRUM MONITORING

Even though electromagnetic spectrum is theoretically boundless, the portion currently useful for key applications such as communications, while substantial, is finite. In practice, the properties of radio wave propagation and electronic equipment limit radio communications to frequencies allocated between 9 KHz and 30 GHz. These properties also constrain particular types of communications systems to certain portions of the allocated spectrum, limiting the spectrum available for specific uses.

The demand for interference-free frequency assignments is steadily increasing. This is a result of the worldwide liberalization of telecommunications, the subsequent appearance of new market entrants along existing operators of competitive wireless services, and users of frequencies for non-telecommunications applications. Making interference-free assignments requires the use of data and involves Electromagnetic Compatibility (EMC) verification activities. These monitoring and enforcement activities are also needed to ensure user compliance with licence conditions.

Accomplishing this involves several management and process models. Monitoring and enforcement of licence and technical standards has traditionally been a responsibility of spectrum regulators, whether within independent agencies, or attached to the Ministry of Telecommunications. Departments such as Defence and Transport also often have responsibility over frequencies allocated to governmental use. In addition to public sector agencies, private sector participants are sometimes involved in the monitoring and problem resolution processes. These include industry associations, advisory councils, etc. In some countries, band management organizations govern specified frequency ranges under government authorization.

Regulators in developing countries may not have access to a sufficient amount of monitoring capacity or expertise to engage in the full range of monitoring activities. Careful decisions are needed to determine what investments to make in equipment and development of processes or formalized activity. Administrators will also have to decide what use of which segments of spectrum are most important to monitor. Priorities will need to be set to make efficient use of existing equipment and capabilities, including outsourcing and utilizing existing industry sector resources.

In the next sections we discuss **spectrum monitoring objectives** and provide an overview of related technical topics including: **emissions and interference**; a description of **spectrum monitoring activities**, as well as a perspective on **how countries cooperate and coordinate monitoring activities**.

5.6.1.1 SPECTRUM MONITORING OBJECTIVES

Spectrum Planning and Authorization are central functions supported by spectrum monitoring. Monitoring supplies information used in determining compliance with rules and regulation, such as license conditions, and in achieving compliance with technical and operational standards. It provides general measurements which are used by the spectrum manager to understand and plan channel and band usage as well as confirm the effectiveness of current planning and authorization activities. Understanding the level of spectrum use or occupancy in comparison to assignments is important for efficient use of the spectrum resource. Spectrum monitoring provides statistical information on the technical and operational nature of spectrum occupancy. Conversely, spectrum authorization and spectrum engineering functions support spectrum monitoring by providing accurate, complete and timely information on current assignments and licences.

The overall goal of spectrum monitoring activities is to support the proper functioning of the general process of spectrum management. Central objectives for spectrum managers include the following:

- Spectrum efficiency in determining planned and actual frequency usage and occupancy, assessing availability of spectrum for future uses;
- Compliance with national spectrum management regulations to shape and sustain radio environments and user behaviour, maximizing the benefit of the spectrum resource to society;
- Resolution of interference problems for existing and potential users.

One radiocommunication system is more "spectrum efficient" than another if it conveys the desired information using less of the spectrum resource. Spectrum efficiency also involves the arrangement of communication systems within the spectrum resource. In this broader sense, spectrum is used inefficiently when systems are not packed together as tightly as possible in frequency bands (as when excessive guard bands are used), or when portions of frequency bands are unused while other bands with similar physical characteristics are congested. The allocation of frequency bands, the development of channeling plans, and the assignment of frequencies to specific systems all affect spectrum efficiency.

In order to promote spectrum efficiency, spectrum managers must possess some means of quantifying spectrum use and evaluating various radio technologies and frequency selection techniques. Management decisions can then be based on the relative spectrum efficiency of the various technologies and techniques. Data is collected through spectrum monitoring measures of spectrum occupancy and utilization for purposes of making assignments including the effects of spectrum reuse and band clearing efforts. As well, as spectrum becomes scarcer in highly congested areas, monitoring data is used to support spectrum engineering activities including validation of tolerance levels, determining the probability of interference and development of band-sharing strategies.

In addition to supporting assignment and authorization activities, spectrum monitoring supports the second goal: compliance with licence conditions and regulations through determination of deviations from authorized parameters, identification of sources of interference and location of legal and illegal transmitters.

A radio system can deny the use of part of the spectrum resource to another system that would either cause interference to, or experience interference from, the first system. A radio system is said to "use" spectrum resources when it denies other systems the use of those resources. Spectrum use can be quantified, subject to certain assumptions, both for a single radiocommunication system and for a related group of systems.

The facilities, equipment and approach employed in achieving these objectives will depend heavily on current use and congestion, technical capacity of the spectrum management organization and funding of spectrum management operations.

Reference Documents

- Fundamentals of Spectrum Analysis, Rohde & Schwarz
- Spectrum Analysis Basics
- Spectrum Monitoring Handbook

5.6.1.2 EMISSIONS, INTERFERENCE AND SPECTRUM USE

This section explains the differences in meaning between emissions and interference and conveys the importance of each to spectrum monitoring. It also provides an explanation for spectrum use and occupancy.

The International Telecommunication Union has created a system which classifies radio emissions according to the bandwidth, method of modulation, nature of the modulating signal, and type of information transmitted on the carrier signal. These form the technical basis for establishing equipment specifications for radio systems designed to operate within certain frequencies.

Emissions of a radio transmitter are authorized to an assigned frequency band within the necessary bandwidth and tolerance for the frequency band. Emissions which do not meet technical parameters are unwanted emissions consisting of spurious emissions and out-of band emissions. These types of emissions can be generated accidentally or through distortions caused by various components of the radio system.

Transmission of radio signals emitted by a radio transmitter can therefore be in-band in accordance with technical parameters or unwanted and due to several causes including out-of-band emissions and spurious emissions.

Electromagnetic Interference (EMI) is a term applied to unwanted emissions from both intentional and unintentional radiators. EMI or interference is the negative effect on reception of radio signals by a radio receiver caused by emissions by radio transmitters or other sources of electromagnetic waves. The negative effect on reception can vary by degree from permissible, to acceptable to harmful interference resulting in partial degradation to complete loss of information. Other sources of electromagnetic waves causing interference include devices such as radio receivers, electrical motors, and electronic devices. The need to turn off computers, video players, and CD players during take-off in an aircraft is due in part to the possibility of interference to navigational and communication aids.

Spectrum managers are therefore interested in both emissions and interference. Emissions by transmitters can become a source of interference. Planning to use frequencies requires that the spectrum manager understand how frequencies are being used and the technical characteristics and performance of the transmission devices operating within and adjacent to the frequency band(s). Interference causes problems and can ultimately impair radiocommunication services. Determining the nature and source of interference are important objectives for the spectrum manager.

Practice Notes

- Definitions: Electromagnetic Interference (EMI)

Reference Documents

- Electromagnetic Compatibility - the EMC Directive 2004/108/EC, 2004
- Fundamentals of Spectrum Analysis, Rohde & Schwarz
- ITU Radio Regulations: Article I, Section VI – Characteristics of Emissions and Radio Equipment
- Spectrum Analysis - Amplitude and Frequency Modulation
- Spectrum Analysis, Application Note 150

5.6.1.3 SPECTRUM MONITORING ACTIVITIES

This section outlines the monitoring activities associated with specific spectrum monitoring objectives reviewed in Section 6.1.1: Spectrum Management Objectives.

Compliance with Rules and Regulations

Monitoring is done to obtain detailed information on the technical or operational characteristics of radio systems. Radio Equipment Standards are discussed in **Section 2.4.4**. The spectrum manager will monitor radio equipment to determine conformity with applicable standards. This can be done as part of an equipment certification process where measurements can be taken and recorded and then used in analyzing the compatibility of radio systems - Electromagnetic Compatibility (EMC).

One of the most important technical parameters to measure is the emission of radio transmitters. This is done to determine whether the transmitter is operating within specified limits.

The modulation techniques and types of systems employed and frequencies vary. The spectrum manager needs to choose the measuring system carefully and to ensure capabilities exist with the spectrum management agency to effectively monitor and analyze frequency bands. Circumstances will vary by country and monitoring solutions should be tailored to meet needs, budget and institutional capacity.

Interference Issues

Spectrum monitoring activities determine measurements of radio waves and radiation causing interference to authorized transmitters and receivers. Interference may be the result of authorized emissions causing unintended results such as spurious emissions. Interference may also be caused by unauthorized transmitters or devices operating beyond technical specifications. In either case, the spectrum manager will use a combination of engineering analysis and data obtained from spectrum measurements to resolve problems associated with interference problems.

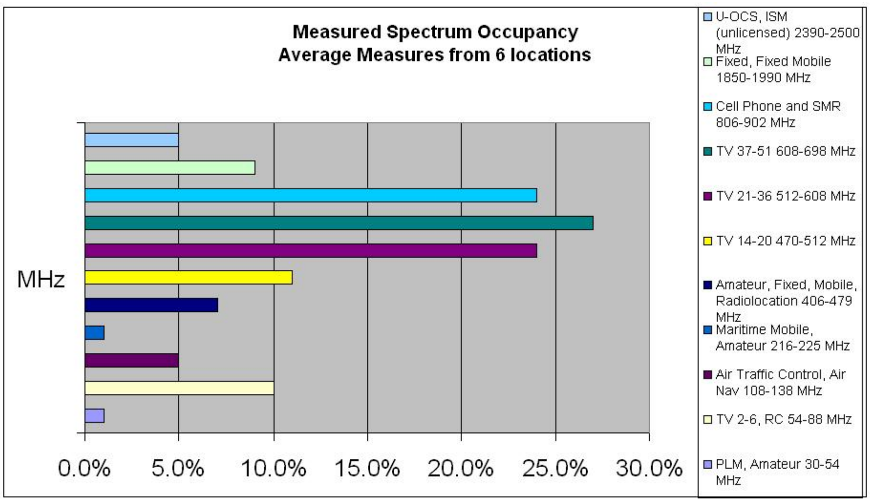
The identification of unauthorized transmitters can be very difficult to achieve, especially in congested areas and where various services share the same frequencies. In some bands, where spectrum sharing is encouraged through the use of Class Licences or Radio Frequency Authorizations, no protection is provided from acceptable levels of interference. For more information on this topic, see **Section 3 Authorizations** and **Section 4 Spectrum Sharing**.

For a brief description of common types of interference see **Section 6.3.2: Solving Interference Problems**.

Frequency Use and Occupancy

Access to radio spectrum is at a crossroads. More and more technological alternatives are becoming available and demand from both public and private sectors is increasing very rapidly, if not exponentially. There is increasing recognition that the root of the problem is that most of the spectrum is actually unused, and that the present system of spectral regulation is grossly inefficient. Current spectral regulation is based upon the premise that slices of the spectrum, representing uses within specified upper and lower frequency bounds, must be treated as exclusive domains of single entities: the recipients of exclusive licences to use specific frequency bands.

Spectrum measurements are critical to policy makers and researchers in the development of new spectrum access technologies. Specifically, spectrum occupancy studies identify what spectrum bands have low or no active utilization (and thus may be appropriate for spectrum sharing). They provide information on the signal characteristics within these bands, which is needed to design spectrum sharing algorithms.



◂ **Figure: Figure: Sample Spectrum Occupancy Report**

Note: Each band averaged over six locations. Source: National Science Foundation: M.A. McHenry Shared Spectrum Co.

Practice Notes

- Guidelines for Investing in Monitoring and DF Systems
- Guidelines for Site Selection: Fixed Stations

Reference Documents

- Radio Monitoring - ITU Measurement Request

5.6.1.4 INTERNATIONAL SPECTRUM MONITORING COOPERATION

Member countries of the International Telecommunication Union typically operate monitoring facilities which aid spectrum managers in the prevention, detection, and control of (harmful) interference to radio transmitters. This is done to ensure that frequencies are used in accordance with the internationally planned spectrum framework. Since it is recognized that development and duplication of monitoring facilities is both uneconomical and operationally inefficient, cooperation exists among member countries in the operation of an international monitoring system. Article 16 of the Radio Regulations lays down the provisions governing the establishment and operation of the international monitoring system.

Stations comprising the international system check for transmissions that have effects beyond national boundaries, particularly for frequencies below 30 MHz, are in accordance with the internationally agreed conditions of operation. This includes checking frequency, bandwidth, emission type and usage. Where non-compliance with any prescribed condition is determined, the ITU provides for an infringement report to be sent via the Radiocommunication Bureau to the country responsible.

A good example of the far-reaching implications of interference is the international cooperation is demonstrated in the case of maritime coast stations and interference with maritime mobile services in New Zealand, Belgium and the United States.

Cooperation also occurs between countries on a bilateral basis and involves non-governmental organizations and industry associations who advise regulators on policy and technical matters. For example, broadcast and microwave propagation issues and solutions are identified and analyzed by associations and confirmed through spectrum monitoring tasks performed by the regulator.

Practice Notes

- New Zealand - International cooperation in spectrum management Ministry of Economic Development

Reference Documents

- ITU: ARTICLE 16, International Monitoring, Radio Regulations 2004

5.6.2 SPECTRUM MONITORING TECHNOLOGY

Fixed, remote, unmanned and mobile monitoring stations can be combined to provide a network of integrated tools for verification of licensing compliance, channel occupancy, spectrum planning, and regulatory enforcement. Those can also provide greater flexibility in the design of national and regional monitoring systems. Monitoring equipment and integrated software tools are very complex and expensive and integrated monitoring systems can be very expensive as well. Fortunately, advances in computerization, monitoring technology, and security techniques have permitted greater use of remote unmanned monitoring techniques involving integrated spectrum observations.

Alongside advances in technology, tactics and work practices are also changing. There is a reduced emphasis on continuous monitoring of all utilized spectrum to focus on areas of known problems and congestion. Memoranda of agreement can be used whereby an agency of government or non-governmental organizations (NGOs) assumes responsibility for essential monitoring activities and shares information on problems affecting civilian applications. Another example involves industry associations taking responsibility for monitoring and taking steps to resolve interference problems in fixed-link microwave services. Finally, the spectrum regulator concentrates its monitoring resources on public priority frequency bands affecting essential services, including air navigational aids, fire, safety, ambulance, police and areas of concentrated commercial activity such as is typically found in VHF/UHF.

Spectrum management policy decisions involve trade-offs: the desire and needs of the regulator and industry for complete and accurate information; cost of implementation and maintenance; and accountability and technical capabilities.

Practice Notes

- Guidelines for Investing in Monitoring and DF Systems

Reference Documents

- Mobile Radio Spectrum Monitoring System - Jordan
- Mobile spectrum monitoring unit
- Spectrum Monitoring Handbook

5.6.2.1 MONITORING EQUIPMENT

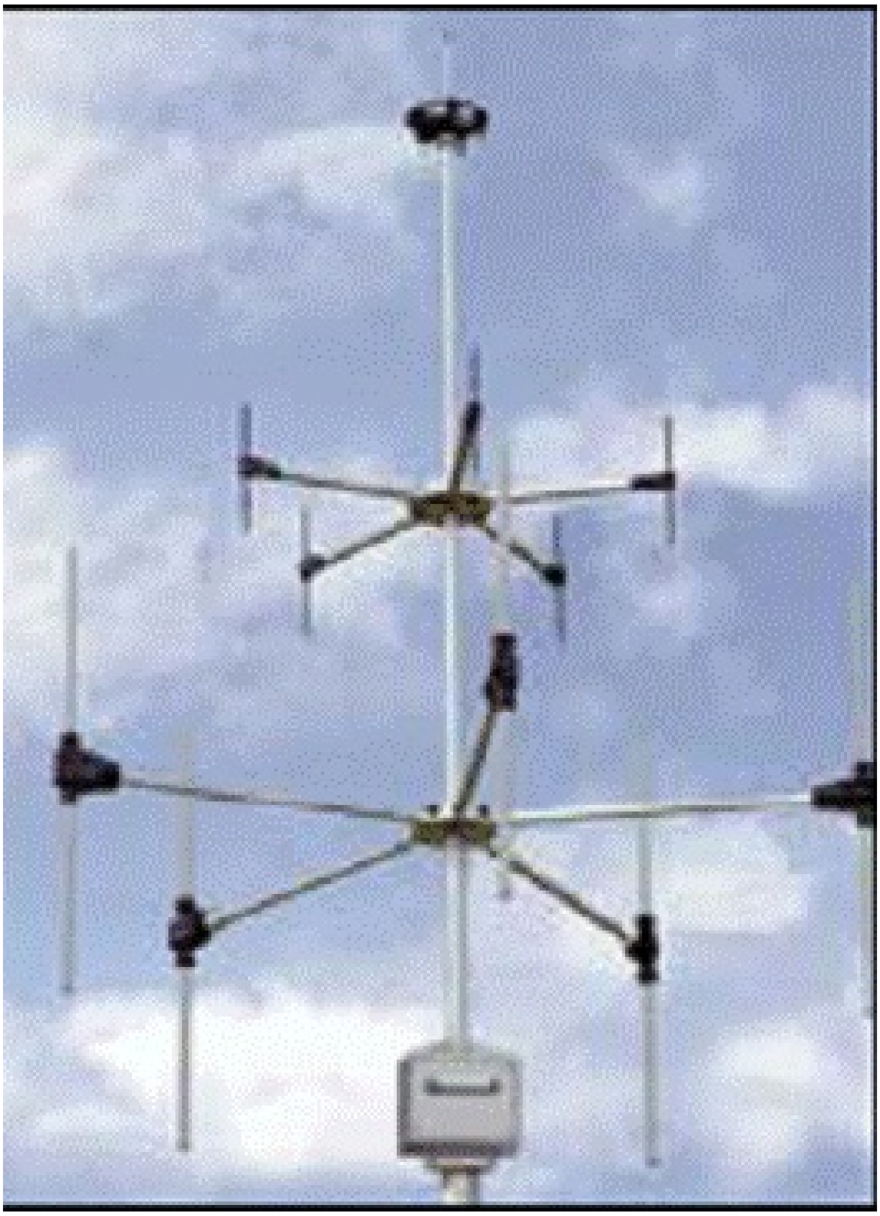
The basic types of monitoring equipment include radio receivers, spectrum analyzers, direction-finding equipment and antenna. These basic types can be further categorized by frequency range (HF, VHF, UHF, etc.) and signal type – analogue or digital. With the advent of spread spectrum and computer-based radio technologies like Cognitive Radio, the sophistication, complexity and prices for monitoring equipment have risen. As well, the approaches to monitoring and the architecture of the spectrum manager's monitoring system have a bearing on the types of systems needed and the configuration of operations and resources. The approaches to system architecture are outlined in Monitoring System Architecture. Options and strategies for configuring and resourcing Spectrum Monitoring Operations are discussed in Monitoring Operations – Options and Strategies.

The regulator's monitoring capabilities depend on three types of equipment: antennas, spectrum analyzers, and radio direction-finding equipment.

Antennas

An antenna is simply an electronic component designed to radiate energy and transmit or receive radio waves. Antennas have practical use for the transmission and reception of radio frequency signals (broadcast radio, TV, etc.), which have different propagation characteristics and can transmit, in the case of low frequencies, over great distances. Different antenna types are used for different radio frequencies and for different coverages. All antennas radiate some energy in all directions but careful construction results in large directivity in certain directions and negligible power radiated in other directions. There are two fundamental types of antennas, which, with reference to a specific three-dimensional (usually horizontal or vertical) plane, are either omni-directional (radiate equally in the plane) or directional (radiate more in one direction than in the other).

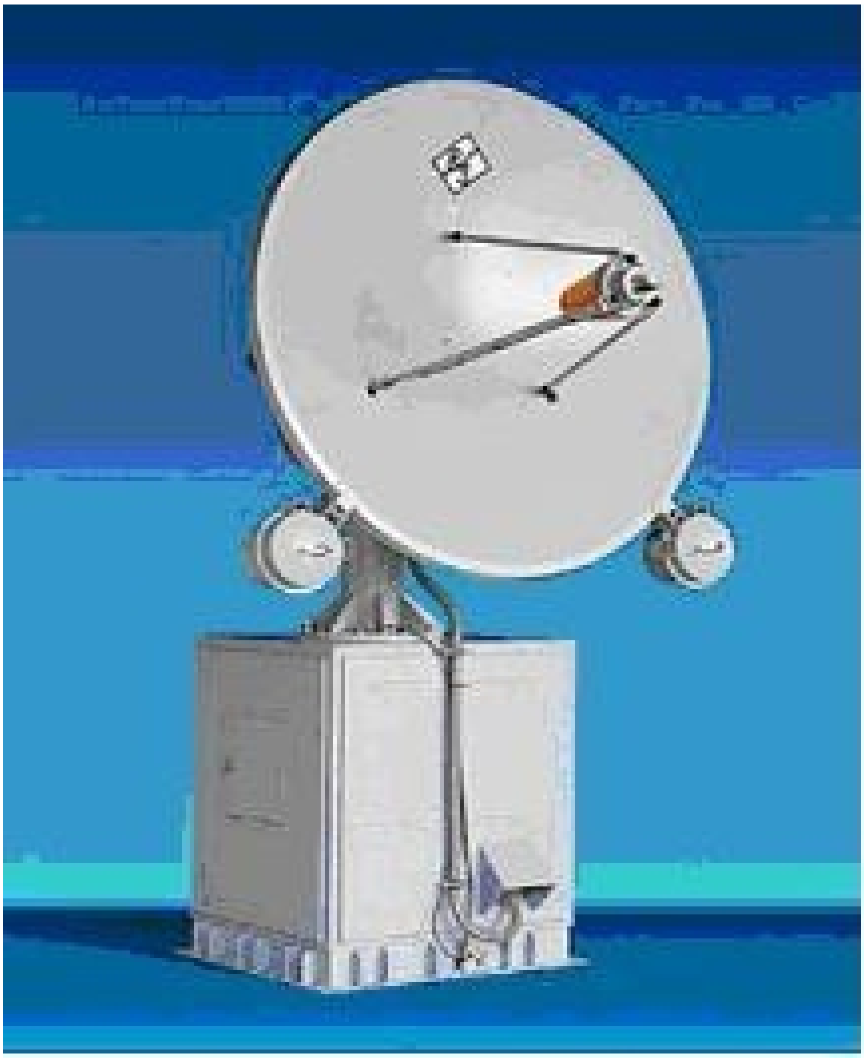
Antennas are linked to either radio receivers or signal generators of direction-finding equipment. As mentioned in the previous paragraph, different antenna types are needed for each application. Antenna products encompass a wide range of highly sensitive active and passive antennas which can be applied in Mobile and Stationary Systems, providing complete coverage of the frequency range from 100 Hz to 30 GHz and beyond in the case of some manufacturers. Examples of different antenna types (HF or VHF) and application (stationary and mobile) are depicted below. Antennas are used often under extreme weather conditions and need to be designed to operate in those conditions.



◂ Fixed VHF/UHF Station (Argus-Thales)

◂ **Mobile HF/VHF/UHF Antenna (Argus-Thales)**

◂ Fixed HF Antenna (Rohde & Schwarz)

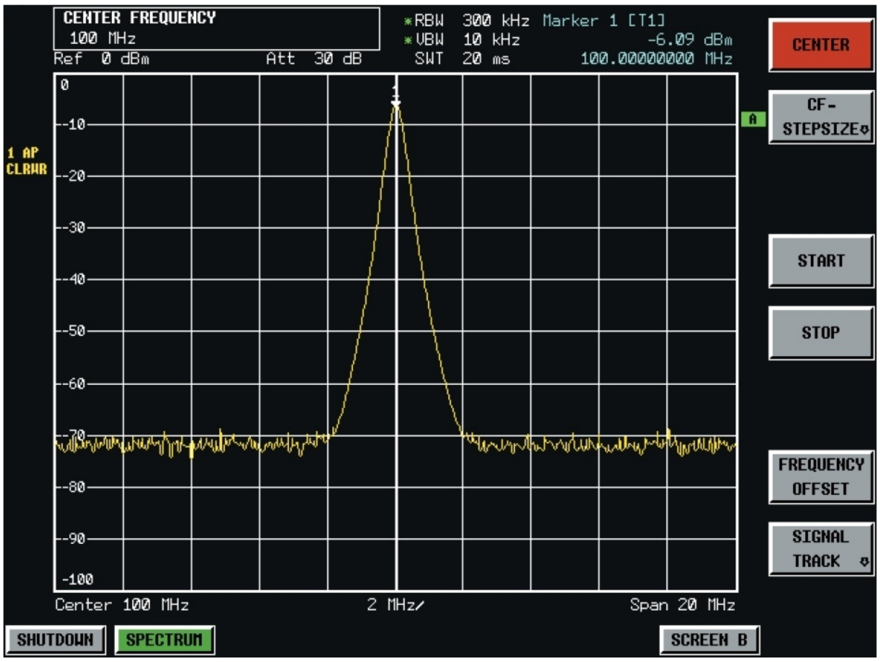


◂ Rotatable Microwave Antenna System - 1GHz to 40GHz (Rohde & Schwarz)

Spectrum Analyzers

Since regulatory agencies allocate different frequencies for various radio services, it is critical that each service operate at the assigned frequency and within the allocated channel bandwidth. Due to scarcity, transmitters and other intentional radiators will be planned to operate at closely spaced adjacent frequencies. Power amplifiers and other components used in these systems are measured to determine the amount of signal energy that spills over into adjacent channels and causes interference. The concern is that these unwanted emissions, either radiated or conducted (through the power lines or other interconnecting wires), might impair the operation of other systems. The design or manufacture of electrical or electronic products also involves the testing for emission levels versus frequency according to Technical Standards set by various government agencies or industry standards bodies. The common measurements taken by a spectrum analyzer include frequency, power, modulation, distortion, and noise. Understanding the spectral content of a signal is important, especially in systems with limited bandwidth. Transmitted power is another key measurement. Too little power may mean the signal cannot reach its intended destination. Too much power may drain batteries rapidly, create distortion, and cause excessively high operating temperatures. Measuring the quality of the modulation is important for making sure a system is working properly and that the information is being correctly transmitted by the system. Tests such as modulation degree, sideband amplitude, modulation quality and occupied bandwidth are examples of common analogue modulation measurements. It is important to note that for digital modulation techniques there are additional measurements which need to be taken, including: error vector magnitude (EVM) and phase error versus time, among other measurements. There are several basic types of spectrum analyzers. These are: Fourier, Vector Signal and Superheterodyne Analyzers. Each type is briefly described in the next few paragraphs. Fourier signal analyzers measure the time-domain signal and then use digital signal processing (DSP) techniques to perform a fast Fourier transform (FFT) and display the signal in the frequency domain showing both phase as well as magnitude of the signal. Like Fourier analyzers, Vector signal analyzers (VSA's) measure the time domain signal, but have the advantage of extending to the 5-6 GHz. RF frequency range. VSA's offer faster, higher-resolution spectrum measurements, demodulation, and advanced time-domain analysis. They are especially useful for characterizing complex signals such as burst, transient or modulated signals used in communications, video, broadcast, sonar, and ultrasound imaging applications.

Because the signals that people must analyze are becoming more complex, the latest generation of spectrum analyzers include many of the vector signal analysis capabilities previously found only in Fourier and Vector signal analyzers. Superheterodyne analyzers are able to mix; that is, to translate frequency at frequency ranges above the audio range.



◂ Typical Spectrum Analyzer Display (Rohde & Schwarz)

◂ Automated Field Strength Measurement Equipment (Rohde & Schwarz)

Radio Direction-Finding Equipment

Radio Direction-Finding, or RDF, is the technique for determining the direction of a radio transmission. Radio direction-finding using triangulation techniques can also be used to determine the location of a radio transmission. Radio direction-finding is used by spectrum managers to locate the source of radio frequency interference. There are two common technical approaches to radio direction-finding. The first approach involves the use of directional antennas which are designed to be more sensitive to signals received in some directions rather than in others. As the antenna is turned in various directions, a signal being received will either increase or decrease in strength. All other things being equal, the direction in which the signal is strongest is the likely direction in which the radio transmitter is located. The movement of the antenna and the determination of the peak signal strength can be made by a human operator or can be done automatically by electronics. The second approach exploits the effects of phase shift. Fixed antennas are deployed in a precise geometric pattern and an electronics system switches between the antennas very rapidly. By computing the amount of phase shift present on the signal from antenna to antenna, a direction to the signal source can be computed. There are anomalies of radio propagation which at ground level can affect both of these techniques. Common potential problems include reflections or multi-path loss. In a multi-path situation, the radio signal may be arriving at the antenna or antennas from multiple directions, perhaps because the signal is reflecting off nearby buildings, hills, or metal structures such as fences. The strongest signal may, in fact, be coming from a reflection rather than the direct path, especially if the direct path includes terrain features that might attenuate the signal. This can result in false directional readings. The preceding paragraphs provide a brief summary of the main types of equipment used in monitoring. The complexity and cost of equipment varies with the level of computer integration, number of functions and types of analysis performed and the speed at which a number of frequencies can be scanned and analyzed. Simple systems for VHF/UHF monitoring can be comprised of several fixed antennas, receivers and limited function spectrum analyzers. More complex systems can consist of multiple sites and mobile and fixed stations. Monitoring System Architecture is further explored in **Section 6.3.2.**

RELATED INFORMATION

Recommended HF Receivers, Spectrum Monitoring Handbook, ITU, 2002: Chapter 2, Table 15, p. 135

Recommended VHF/UHF Receivers, Spectrum Monitoring Handbook, ITU, 2002: Chapter 2, Table 16, p. 136

Practice Notes

- **Guidelines for Investing in Monitoring and DF Systems**

Reference Documents

- **Antenna Basics**
- **Fundamentals of Spectrum Analysis, Rohde & Schwarz**
- **ITU-D Study Groups - Recalibration of Radio Monitoring Equipment, August 2000**
- **ITU: ARTICLE 16, International Monitoring, Radio Regulations 2004**
- **Spectrum Analysis, Application Note 150**

5.6.2.2 MONITORING SYSTEM ARCHITECTURE

Design Considerations for Spectrum Monitoring Systems

Due to spectrum congestion and sophistication of wireless communication technologies, it is an ever-increasing challenge to monitor spectrum, particularly considering the rapid growth of wireless, satellite, and point-to-point communication devices. Regulators are asked to hunt for and resolve RF interference in this crowded and complex spectrum.

There are two likely scenarios. There is a-priori information on the emitters to be tracked or tested, e.g., approximate frequency and amplitude. Here, traditional spectrum analysis techniques and equipment will work extremely well. Alternately, there is no prior knowledge.

Without control of the RF/microwave airspace and with little information about the target signals, the RF spectrum-monitoring task is a discovery process. Signals of interest reveal themselves to spectrum monitoring because many wireless signals vary in power, duration, and bandwidth. Some of the complex interactions between systems may actually be harmonics of known emitters, translated into frequencies where they become unwanted interferers. There can be thousands, even tens of thousands of irrelevant signals that need to be ignored when capturing data on emissions of interest.

Key considerations in the design of spectrum monitoring systems include types of equipment, speed and sophistication of data capture and processing, degree of integration with software tools for analysis and comparison with other license and type approval data. Other considerations include proximity to active airspace, staff skills, and mobile versus fixed locations.

State-of-the-art spectrum monitoring equipment is highly integrated. Integration typically involves the use of graphical user interface (GUI) based spectrum management tools and systems which are specifically designed to operate multiple electronic components simultaneously and remotely over data protocols such as TCP/IP. This allows for an integrated network system for management of the radio spectrum using remote devices. These devices can be located at existing government sites and facilities on the outskirts of population centres. Remote devices permit access to monitoring equipment from anywhere through compatible computer, a modem and a telephone line or network connection (LAN or WAN). Remote devices can be controlled in several ways:

- Locally from the server;
- Remotely across a LAN;

- Modem over a WAN.

Architecture Components

There are equipment and organizational and functional aspects to architecting spectrum monitoring systems.

The key technical equipment components are described in **Section 6.3.1 Monitoring Equipment**. Additional equipment components in a monitoring system include: buildings, power supplies, mobile vehicles and man portable components.

Organizational components include centralized, regional and remote locations for siting of monitoring equipment in stations and operational staffing or use of unmanned remote capabilities, where applicable.

In addition to technical equipment, functional components of spectrum monitoring systems include: central monitoring control; operational consoles for operation of equipment and analysis of data; and data networking and management systems for data communications and repository.

Practice Notes

- **CRMO South Korea – Monitoring System Architecture**
- **Guidelines for Investing in Automated Systems_ITU-R SM.1370**

Reference Documents

- **DGPT Indonesia: Networked Radio Monitoring Solution**
- **TRC Mobile Spectrum Monitoring System**

5.6.3 ENFORCING COMPLIANCE

Spectrum management also requires that users comply with licence requirements and technical rules and regulations. Without effective regulations and enforcement procedures, the integrity of the spectrum management process can be compromised. The spectrum regulator needs an appropriate framework and process for responding to and managing complaints and for settling disputes. Consideration needs to be given to penalties, remedies, enforcement and alternative dispute resolution (ADR) mechanisms for industry disputes with the aim of ensuring rapid resolution.

5.6.3.1 MONITORING COMPLIANCE WITH TECHNICAL STANDARDS

Monitoring is used to obtain detailed information on the technical and operational characteristics of radio systems which are in use or are being tested for future use. Measurements will typically include frequency, power and emission spectrum of a transmitter. Licence conditions can be verified against actual use of equipment aiding in the determination of electromagnetic compatibility (EMC).

Because technical standards are associated with certain allocations and assignments, the spectrum manager can detect the existence of unauthorized transmitters which affect other users by causing interference and by reducing the value of licensed spectrum.

Practice Notes

- **Mauritius - Compliance with Technical Standards**

5.6.3.2 SOLVING INTERFERENCE PROBLEMS

Electromagnetic interference (EMI) is a term applied to unwanted emissions from both intentional and unintentional radiators. Here, the concern is that these unwanted emissions, either radiated or conducted (through the power lines or other interconnecting wires), might impair the operation of other systems. Almost anyone designing or manufacturing electrical or electronic products must test for emission levels versus frequency according to regulations set by various government agencies or industry-standard bodies. Resolution of interference problems is often a difficult task for spectrum managers since the source of interference is not necessarily known nor easily identified.

Through the ITU, an international framework has been established taking form as the International Frequency Allocation Table (Article 5 of the Radio Regulations). This table is used to protect against harmful interference, and coordinate for services of an international nature. Examples include satellites, maritime and aeronautical services (devices). International harmonization of allocations and other operational matters is necessary to allow users to operate safely and effectively (e.g. international air travel, ships at sea, etc.). Spectrum managers are particularly concerned about interference problems affecting public safety and security services including; ambulance, fire fighting, police, and navigational services at airports. The Radio Regulations set forth the principles under which spectrum will be managed and requires Member States to prevent harmful interference.

◄ **Box ITU Radio Regulations: Article 4**

The Regulations therefore set out with regards to interference:

- Member States undertake that, in assigning frequencies to stations, which are capable of causing harmful interference to the services rendered by the stations of another country, such assignments are to be made in accordance with the Table of Frequency Allocations and other provisions of these regulations;
- Any new assignment or any change of frequency or other basic characteristic of an existing assignment shall be made in such a way to avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the Table of Frequency Allocations in this Chapter and the other provisions of these Regulations, the characteristics of which assignments are recorded in the Master International Frequency Register.

Coordination with the complainant is often needed, even if only to know the frequency of the receiver operation. Direction finding equipment is often used to determine the source of interference. Deciding on what to use will depend on the range of the affected frequencies. Sources of interference can be from atmospheric effects such as precipitation, long-range HF and UHF frequencies from across national borders, or from intentional efforts to interfere with transmissions, a practice sometimes referred to as “jamming”.

The sources of interference are broad and varied. (See Section 4.3.2 Interference Management)Other sources of offending interference can come from industrial applications of radio energy, such as microwave dryers used in manufacturing. Understanding sources of emission, developing and adopting relevant technical standards while also having access to technical tool’s methods and processes are developed by spectrum managers to resolve these types of interference problems.

The main steps for resolving interference problems are:

- Communication and Acknowledgement of an interference problem by a user;
- Diagnosis of an interference problem by the regulator, spectrum manager or some other relevant authority;
- Identification through monitoring and measurement of the potential source of interference;
- Confirmation of the source of interference and communication with responsible persons;
- Determining steps to correct and mitigate interference such as the use of filters, reducing transmit power, re-locating transmit antennae, and changing transmit frequencies.

Joint Task Group 5-6

GE06, WRC-07 and the work of Joint Task Group 5-6 are excellent examples of the coordinated planning work done in the advance to study and rectify potential interference problems. Resolution 749 (WRC-07) and Agenda item 1.17 of WRC-12 tasks the ITU-R Sector “to conduct sharing studies for Regions 1 and 3 in the band 790-862 MHz between the mobile service and other services in order to ensure adequate protection of services allocated to the band and to take appropriate action." Joint Task Group 5-6 (JTG 5-6) was established to study how mobile services can share the band 790-862 MHz band with:

the Broadcasting service (Issue A);

the Aeronautical radionavigation service (Issue B); and

the Fixed service (Issue C).

These issues were further sub-divided by cases according to either an ITU-R Region (for Issue B and Issue C) or to whether the countries were or were not Contracting Members of the GE06 Agreement (Issue A). Appropriate methods have been proposed for each issue and case.

The work of the Joint Task Group in providing the text for the draft CPM Report addressing the results of sharing studies for fixed, mobile and broadcasting services in the band 790-862 MHz in Regions 1 and 3 was completed in May 2010 and indicated that there is a need to protect certain other primary terrestrial services from the newly allocated mobile service in Region 1. Of particular significance is ensuring coordination and interference avoidance between mobile services and aeronautical radionavigation services (ARNS) in those countries where ARNS has a primary allocation.

Practice Notes

- Interference Management - Various Approaches.

Reference Documents

- FCC Spectrum policy task force Staff Working Group Paper Report of the Interference Protection Working Group, 2002.
- Spectrum Analysis - Amplitude and Frequency Modulation

5.6.3.3 INSPECTIONS

In the course of conducting exercises to resolve interference problems, the spectrum manager may be required to enter user premises and inspect radio equipment to determine compliance with licence conditions and technical standards.

An important aspect of fulfilling these tasks is the requirement under law and regulation to establish the powers, authorities, duties and obligations of the spectrum manager/inspector and protection of rights for the public under circumstances where inspection of property is necessary.

Equipment Seizure and other Enforcement Actions

There are (hopefully rare) occasions when the user of a transmitter causing harmful interference is endangering the public in a persistent and wilful manner and the reasonable course of action requires the spectrum manager to seize equipment to prevent such endangerment.

Again, it is necessary to provide the spectrum manager with the appropriate authority to seize equipment under carefully defined conditions to prevent abuses of power and ensure the user's right to due process.

When it is determined that harmful interference may be caused by any particular equipment, the spectrum manager may, by first informing the person in writing, direct the owner or user of that electrical, electronic or radiocommunication equipment to do, at their own expense, any one or more of the following:

- Take suitable measures to eliminate or reduce the interference or disturbance;
- Remedy a fault in or the improper operation of the equipment;
- Modify or alter the equipment; or
- Disconnect the equipment.

Otherwise, the owner or user risks having the equipment seized by the spectrum manager.

Reference Documents

- Canada: Radiocommunication Regulations, 2002
- ITU-R: Report ITU-R SM 2130 (2008), Inspection of Radio Stations
- Nigeria: NCC Closes Down Illegal Wireless Operators in Nigeria, Global Insight, 2003
- Nigerian Regulator Confiscates Bourdex Equipment for Frequency Infringements, Global Insight, World Markets Research Centre, July 2005
- Radiocommunications Act (Canada)
- The Telecommunications Act, 2001 (Trinidad & Tobago)
- Trinidad and Tobago: Recommendation for Radio Spectrum Regulations, 2005

5.6.3.4 EQUIPMENT SEIZURE AND OTHER ENFORCEMENT ACTIONS

There are (hopefully rare) occasions when the user of a transmitter causing harmful interference is endangering the public in a persistent and wilful manner and the reasonable course of action requires the spectrum manager to seize equipment preventing future endangerment.

Again, it is necessary to provide the spectrum manager with the appropriate authority to seize equipment under carefully defined conditions ensuring the user's right to due process and preventing abuses of power.

Typically, when the spectrum manager determines that harmful interference may be caused by any particular electrical, electronic or radiocommunication equipment, whether subject to licensing or not, the spectrum manager may, by first informing the person in writing, direct the owner or user of that electrical, electronic or radiocommunication equipment to do, at their own expense, any one or more of the following:

- Take suitable measures to eliminate or reduce the interference or disturbance;
- Remedy a fault in or the improper operation of the equipment;
- Modify or alter the equipment; or
- Disconnect the equipment.

Otherwise the owner or user risks having the equipment seized by the spectrum manager.

The Radio Regulations of Singapore, Trinidad and Tobago and Canada provide examples of the types of regulation used to define the actions of spectrum managers when it comes to enforcement action.

Practice Notes

- **Radiocommunication Act of Canada - R-2,1985, Revised 1989**

Reference Documents

- **Singapore-Telecommunications (Radio-communication) Regulation, 2001**
- **Trinidad and Tobago: Recommendation for Radio Spectrum Regulations, 2005**

5.7 INTERNATIONAL AFFAIRS

Radio waves do not respect national borders and many uses of the radio frequency spectrum have an impact outside the territory of the country in which the operation occurs. International harmonization of spectrum utilization is important for many applications because of roaming users e.g., maritime, aeronautical, mobile telephony, etc. International harmonization can also reduce equipment costs through economies of scale and can reduce the possibility of harmful interference. There are two types of international activities, namely project activities and transactional activities.

Reference Documents

- **India: International Regulatory Aspects of Radio Spectrum Management**

5.7.1 INTRODUCTION TO INTERNATIONAL AFFAIRS

Radio waves do not respect national borders and many uses of the radio frequency spectrum have an impact outside the territory of the country in which the operation occurs. Sometimes this is deliberate as, for example, in short wave broadcasting or international satellite communications or sometimes it is simply unavoidable. International harmonization of spectrum utilization is also important for many applications because users of communications services are not stationary (roaming) e.g., maritime, aeronautical, mobile telephony, etc. International harmonization can also reduce equipment costs through economies of scale and can reduce the possibility of harmful interference.

The governance of spectrum use on a global basis is a core responsibility of the **International Telecommunication Union (ITU)** and, in particular, its **Radiocommunication Sector (ITU-R)**. The ITU is a specialized agency of the United Nations with its headquarters located in Geneva, Switzerland. It is important to recognize that the ITU is not a global regulatory authority in the way that a national regulator is within its own jurisdiction since the rules for international regulation and cooperation are written by those governed by them, i.e., by the Member States of the ITU. These rules are administered by the ITU-R's Radiocommunication Bureau (BR) in Geneva and conformity with the rules is based on goodwill rather than on the kind of regulatory sanctions found at the national level. The mission of the ITU-R sector is, *inter alia*, to ensure rational, equitable, efficient and economical use of the radio frequency spectrum by all radiocommunication services, including those using satellite orbits and to carry out studies and adopt recommendations on radiocommunication matters.

The **ITU's Telecommunication Development Sector (ITU-D)** has well-established programmes of activities. These programmes are designed to facilitate telecommunication connectivity and access to information and communication services (ICTs), foster ICT policy as well as technology development, assist in regulatory and network readiness, expand human capacity through training programmes, formulate financing and cybersecurity strategies. Some of these programmes are also designed to address topics of interest to spectrum regulators.

In addition to activities carried out within the ITU framework, there are often, of course, bilateral and multi-lateral agreements by which the use of spectrum is harmonized across national borders. There are two general categories of international activities, namely project activities and transactional activities.

Practice Notes

- **Canada: Policy Statements - Planning, Consultation (National and International)**

Reference Documents

- **ITU: Radio Regulations, 2004**

5.7.2 PROJECT ACTIVITIES

International project activities are those which have a defined beginning and ending date. Like all types of project activities, tasks and sub-tasks can be defined and milestones established. Appropriate resources must be committed over the lifetime of the project.

The ITU World Radio Conference and related Regional Conferences and Study Groups are described **in the first of the four following sections**. Projects undertaken by international bodies such as the World Trade Organization and the International Civil Aviation Organization are described **in Section 7.2.2**. Project activities related to other global or regional inter-governmental organizations are highlighted **in Section 7.2.3**. Bilateral and memoranda of agreement between countries are described **in the last section**.

5.7.2.1 ITU RELATED PROJECT ACTIVITIES

Project activities of the ITU consist of, primarily, World Radio Conferences, Study Groups and Development Conferences. The general purpose and scope of each of these activities is described here in this section. A more detailed description of WRC **2003** and **2007** along with the agenda for **WRC 2011** can be found in the next section, **Recent World Radio Conferences**.

ITU radiocommunication conferences are held every two to three years. One of the main jobs done at the radio conferences is the review, and, if necessary, revisions to the Radio Regulations (See **Section 2.3.4 Radio Regulations**), the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits.

ITU-R World and Regional Radiocommunication Conferences establish treaty level regulations, agreements and plans for the global use of the radio frequency spectrum. Revisions to treaties are made on the basis of an agenda determined by the **ITU Council**, which takes into account recommendations made by previous world radiocommunication conferences.

The general scope of the agenda of world radiocommunication conferences is established four to six years in advance, with the final agenda set by the ITU Council two years before the conference, with the concurrence of a majority of Member States.

Under the terms of the ITU Constitution, a WRC can:

- revise the Radio Regulations and any associated frequency assignment and allotment plans;
- address any radiocommunication matter of worldwide character;
- instruct the Radio Regulations Board and the Radiocommunication Bureau, and review their activities;
- determine the questions to be studied by the Radiocommunication Assembly and related Study Groups in preparation for future Radiocommunication Conferences.

On the basis of contributions from administrations, the Special Committee, the Radiocommunication Study Groups, and other sources (see Article 19 of the Convention (Geneva, 1992)) concerning the regulatory, technical, operational and procedural matters to be considered by World and Regional Radiocommunication Conferences, the Conference Preparatory Meeting (CPM) shall prepare a consolidated report to be used in support of the work of such conferences.

ITU-R Study Groups, in addition to advancing radiocommunication science, prepare the technical, regulatory and operational basis for the treaty level Radiocommunication Conferences. The work of the Study Groups is overseen by the Radiocommunication Assembly which normally takes place in association with a World Radiocommunication Conference.

While other ITU-R Study Groups deal with specific radio services, ITU-R Study Group 1 focuses specifically on Spectrum Management and Study Group 3 addresses radiowave propagation. As part of its work, Study Group 1 has produced handbooks on national spectrum management, on spectrum monitoring and on computer-aided techniques for spectrum management.

Project activities include preparing for and participating in these ITU conferences, assemblies and meetings. It is important for all spectrum regulators to keep abreast of the activities undertaken within the ITU's Radiocommunication Sector (ITU-R) since many of these activities have a direct impact on the national regulation of the radio frequency spectrum. For more information on the broad scope of the ITU-R's activities, see (**www.itu.int/ITU-R/**).

In addition to ITU-R activities, the **ITU's Development Sector (ITU-D)** is committed, among other things, to assisting spectrum regulators in carrying out their responsibilities. This occurs through workshops and other training opportunities, publications, virtual conferences, the **Global Symposium for Regulators**, regional meetings of regulators, sharing of legislation and country experiences, etc. For more information, see **www.itu.int/ITU-D/treg/** .

ITU-D Study Group 2 on the development and management of telecommunication services and networks also addresses several topics related to spectrum management including the development of a software based **Spectrum Management System for Developing Countries (SMS4DC)**, information on the calculation of spectrum fees, etc.

The ITU Development Conference adopted Resolution 9 (Rev. Doha, 2006) on the participation of countries, particularly developing countries, in spectrum management. Cooperative work has been performed pursuant to this Resolution by experts participating in a joint group between ITU-R and ITU-D. The text of this resolution is available at: **www.itu.int/ITU-D/conferences/wtdc/2006/pdf/dohaactionplan.pdf**

To follow all ITU activities related to spectrum management is very resource intensive and priorities must be established so that the most critical activities are closely monitored. A cost effective way of involvement in ITU work is to participate in the ITU related activities of regional and sub-regional telecom organizations. These organizations can be an efficient and effective way by which countries can influence global decisions. A brief description of these organizations is given below along with their web sites where more information may be found.

A compilation of the legislation of different countries may be found at: **www.itu.int/ITU-D/treg/profiles/LegislationSelect.asp?lang=en**

A database related to the establishment of spectrum fees is available at: **www.itu.int/ITU-D/study_groups/SGP_2002-2006/SF-Database/index.asp**

A set of Best Practice Guidelines for Spectrum Management to Promote Broadband Access adopted at the Global Symposium for Regulators 2005 is available at: **www.itu.int/ITU-D/treg/bestpractices.html**

Practice Notes

- **AFRICAN TELECOMMUNICATIONS UNION**
- **ASIA-PACIFIC TELECOMMUNITY**
- **CARIBBEAN TELECOMMUNICATIONS UNION**
- **CEPT EUROPEAN CONFERENCE OF POSTAL AND TELECOMMUNICATIONS ADMINISTRATIONS**
- **CITEL INTER-AMERICAN TELECOMMUNICATION COMMISSION**
- **COOPERATION COUNCIL FOR THE ARAB STATES OF THE GULF**
- **REGIONAL COMMONWEALTH IN THE FIELD OF COMMUNICATIONS**

Reference Documents

- **Resolution 9 - (Rev. Doha, 2006) Participation of Countries, particularly developing countries, in spectrum management, 2006**

5.7.2.2 RECENT ITU WORLD RADIO (WRC) AND REGIONAL RADIO CONFERENCES (RRC)

Important decisions were taken on global allocation at 5 GHz. for mobile wireless access systems, thereby paving the way for the use of wireless devices that do not require individual licences, those of which can be used to create broadband networks in homes, offices and schools. These networks are also used in public facilities in so-called "hot spots", such as airports, cafés, hotels, hospitals, train stations and conference sites, which offer broadband access to the Internet. The use of these frequency bands is subject to provisions that provide interference mitigation mechanisms and power emission limits in order to avoid interference into other radiocommunication services operating in the same spectrum range.

The 2003 conference also adopted a new Resolution which enables the deployment of new technologies for wideband and broadband public protection and disaster relief applications. WRC-2003 opened the door for the commercial introduction of a new mobile information service: two-way real-time broadband connectivity to aircraft passengers and crew. There were many other decisions dealing with other services such as; aeronautical services, future development of 3G mobile applications, earth stations on board vessels, the protection of radio astronomy, amateur radio regulations, the sound broadcasting satellite service, the radionavigation-satellite service, sharing criteria for VSAT applications and land, ship and airborne radars, etc.

ITU Regional Radiocommunication Conference – 2004: Inter Alia resolutions were adopted by the first session of the Regional Radiocommunication Conference held in Geneva for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC-04).

ITU Regional Radiocommunication Conference – 2006: At RRC-06, a treaty agreement was signed at the conclusion of ITU´s Regional Radiocommunication Conference (RRC-06) in Geneva, heralding the development of ´all-digital´ terrestrial broadcast services for sound and television

ITU World Radiocommunication Conference – 2007: The three main issues addressed at WRC-07 were: determining standards for advanced mobile services; identifying and agreeing on new spectrum allocations IMT-Advanced Wireless Broadband Services; and discussing ways to improve the framework and approach to spectrum management . An important goal of the conference was to earmark the use of spectrum on a worldwide basis facilitating its development by tapping into the higher frequencies beyond 1GHz, leading to an increase in the data capacity of new systems.

IMT Standardization

The ITU initiated the standardization of systems beyond IMT-2000 – known as IMT-Advanced or 4G - as early as 2000. Collectively, the IMT-2000 standards became the basis for what the industry and regulators came to refer to as “third-generation” or “3G” mobile systems, distinguishing them from the existing generations of analogue (1G) and digital (2G) mobile systems. IMT-2000 envisions transmission speeds ranging from 2 megabits per second (Mbit/s) on a stationary or nomadic basis, up to 348 kilobits per second (kbit/s) at vehicular speeds.

The actual standards as presented in the same GSR Discussion Paper referenced are:

- IMT-Direct-Sequence (IMT-DS) - Also known as Wideband-Code Division Mulitple Access (W-CDMA) or UMTS Terrestrial Radio Access – Frequency Division Duplexing (UTRA-FDD), used in the Universal Mobile Telecommunications System (UMTS) 3G standard.
- IMT-Multi-Carrier (IMT-MC) - Also known as Code Division Multiple Access 2000 (CDMA2000), the successor to second-generation (2G) CDMA.
- IMT-Time-Division (IMT-TD) - This comprises: TD-CDMA (Time Division - Code Division Multiple Access) and TD-SCDMA (Time Division - Synchronous Code Division Multiple Access).
- IMT-Single Carrier (IMT-SC) - Also known as Enhanced Date rate for GSM Evolution or “EDGE” .
- IMT-Frequency Time (IMT-FT) also known as Digital Enhanced Cordless Telecommunications or “DECT”.

While WiMAX and IMT-2000 developed along different paths, they were evolving toward functional equivalency. Both provide broadband Internet access (roughly equivalent to a DSL line), as well as voice connectivity. WRC – 2007 ultimately adopted a resolution adding the WiMAX air interface specification as the 6th IMT-2000 technology. They also modified the general naming conventions for IMT technologies so that:

- 3G technologies will continue to be known as “IMT-2000”;
- 4G technologies will be known as “IMT-Advanced”, and;
- Collectively, all of the 3G and 4G technologies will be known as simply “IMT”.

Digital Dividend Bands

Prior to WRC-07, the frequency band 790-862 MHz was allocated to Regions 1 and 3 of the broadcasting service and the fixed service on a primary basis. In Region 2 the mobile service was allocated on a primary basis and, additionally, in nineteen countries of Region 1, to the aeronautical radionavigation service (ARNS) on a primary basis (RR No. 5.312).

A decision of the WRC-07 was to allocate the 790-862 MHz sub-band in Region 1 (covering the European Broadcasting

Area and Africa) to the Mobile Service for IMT technologies such as 3G, 4G, WiMAX on a primary basis, except for aeronautical mobile, and on shared basis with the broadcasting service until 17 June 2015. However, the amount of spectrum vacated by television broadcasting services, and making way for DTT according to the Final Acts of WRC-07, varies by region. Box 7.2.1 shows the size of the Digital Dividend resulting from Digital Switchover by ITU Region.

Insert Box

Spectrum Management Guidelines

The ways to further improve the framework and approach to spectrum management was an important topic discussed at length at WRC-07, and it led to agreement on Resolution 951 which established guidelines for evaluating and developing concepts related to four options identified in the resolution for enhancing the framework and for preparing solutions to be discussed at WRC.12. The four options include: keeping current practices, revising current service definitions, creating new service definitions, and introducing composite definitions.

ITU World Radiocommunication Conference – 2012 . The agenda for WRC-12 can be viewed at **www.itu.int/ITU-R/index.asp?category=study-groups&rlink=rcpm-wrc-11-studies&lang=en**.

There are over 35 agenda items with several examples listed below:

- 1.14 to consider requirements for new applications in the radiolocation service and review allocations or regulatory provisions for implementation of the radiolocation service in the range 30-300 MHz, in accordance with Resolution[COM6/14] (WRC-07);
- 1.19 to consider regulatory measures and their relevance, in order to enable the introduction of software-defined radio and cognitive radio systems, based on the results of ITU-R studies, in accordance with Resolution [COM6/18] (WRC-07);
- 1.20 to consider the results of ITU-R studies and spectrum identification for gateway links for high altitude platform stations (HAPS) in the range of 5 850-7 075 MHz in order to support operations in the fixed and mobile services, in accordance with Resolution 734 (Rev.WRC-07).
- Resolution 749 (WRC-07) and Agenda item 1.17 of WRC-12 tasks the ITU-R Sector "to conduct sharing studies for Regions 1 and 3 in the band 790-862 MHz between the mobile service and other services in order to ensure adequate *protection* of services allocated to the band and to take appropriate action." See Box 7.2.2 below.

Insert Box

- In view of the complexity and importance of WRC-12 Agenda item 1.17 issues, a dedicated Joint Task Group 5-6 (JTG 5-6) was established to study how mobile service can share the band 790-862 MHz band with:
    - the Broadcasting service (Issue A);
    - the Aeronautical radionavigation service (Issue B); and
    - the Fixed service (Issue C).
  - These issues were further sub-divided by cases according to either an ITU-R Region (for Issue B and Issue C, also See See RR provision No. 5.2.). or to whether or not the countries were Contracting Members of the GE06 Agreement (Issue A). Appropriate methods have been proposed for each issue and case.
  - The work of the Joint Task Group, in providing the text for the draft CPM Report addressing the results of sharing studies for fixed, mobile and broadcasting services in the band 790-862 MHz in Regions 1 and 3, was completed in May 2010 and indicates that there is a need to protect certain other primary terrestrial services from the newly allocated mobile service in Region 1. Of particular significance the need for coordination and interference avoidance between mobile services and aeronautical radionavigation services (ARNS) in those countries where ARNS has a primary allocation. See RR provision No. 5.312).
  - Coordination between GE06 Contracting and Non-Contracting member states requires careful consideration of the spectrum sharing studies. Sharing options are outlined in the Annexes attached to the report. However, a number of interference issues are not yet resolved, suggesting that further study of interference issues is necessary. In some cases, a consensus could not be reached around a single option. This implies that digital switchover will occur at different times over the period leading up to analogue shut-off.

Practice Notes

- ITU Allocations for Broadband Wireless Access

5.7.2.3 PROJECT ACTIVITIES RELATED TO OTHER GLOBAL INTER-GOVERNMENTAL ORGANIZATIONS

It is important for countries to be aware of, and participate, as appropriate, in activities that touch on spectrum matters in other international bodies in addition to activities within the framework of the International Telecommunication Union. These organizations include, for example, the World Trade Organization (WTO), the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), the World Meteorological Organization (WMO), etc.

A reference is provided below to the West African Common Market (ECOWAS) approach which aims at developing common policies to achieve greater coordination and harmonization in the access, use and development of ICT technologies including wireless in support of development goals.

Practice Notes

- Inter American Convention on an International Amateur Radio Permits

Reference Documents

- West African Common Market Project - Harmonization of Policies Governing the ICT Market in the UEMOA - ECOWAS Space - Final Guidelines, ITU, September 2005

5.7.2.4 OTHER BILATERAL AND MULTILATERAL PROJECT ACTIVITIES

In addition to activities in the ITU and other global, intergovernmental organizations, often bilateral and multilateral agreements for the use of the spectrum must be developed. Such agreements might, for example, set out how two or more countries will coordinate their use of certain frequency bands. Establishing such agreements requires negotiations between the spectrum authorities in the respective countries and possibly the involvement of foreign affairs ministries depending on the legal status of the resulting agreement which can take the form of a simple exchange of letters, a memorandum of understanding, a treaty, etc. Some multilateral agreements can also be established through participation in the regional and sub-regional telecommunication organizations (e.g., CITEL's Inter American Convention on an International Amateur Radio Permit, the agreement within the framework of CEPT between the Administrations of Austria, Belgium, the Czech Republic, Germany, France, Hungary, the Netherlands, Croatia, Italy, Liechtenstein, Lithuania, Luxembourg, Poland, Romania, the Slovak Republic, Slovenia and Switzerland on the coordination of frequencies between 29.7 MHz and 39.5 GHz for the fixed and land mobile services).

CEPT's HCM Agreement which is the unofficial designation of the Agreement between the Administrations of Austria, Belgium, the Czech Republic, Germany, France, Hungary, the Netherlands, Croatia, Italy, Liechtenstein, Lithuania, Luxembourg, Poland, Romania, the Slovak Republic, Slovenia and Switzerland on the Coordination of frequencies between 29.7 MHz and 39.5 GHz for fixed service and land mobile service.

Reference Documents

- CITEL_Radio Amateur Permits Agreement

5.7.3 TRANSACTIONAL ACTIVITIES

Transactional international activities are those activities which are of an ongoing nature. Specific types of transactions are processed over an extended period of time. These types of activities lend themselves to process engineering and electronic data processing support.

Practice Notes

- ITU Publications

5.7.3.1 ITU RELATED TRANSACTIONAL ACTIVITIES

Under the **ITU Radio Regulations**, there are requirements for the regular submission of spectrum related information such as details concerning frequency assignments to the **ITU's Radiocommunication Bureau** for purposes of coordination with other countries and for registration in the Master International Frequency Register (MIFR). This information is published every two weeks in an ITU-R publication known as the **Radiocommunication Bureau's International Frequency**

Information Circular (BR IFIC). The BR IFIC contains details on the current and intended frequency usage by ITU Member States.

The BR IFIC is composed of two parts. The first part deals with space services. It contains information on the frequency assignments to space stations, earth stations and radioastronomy stations submitted by countries to the Radiocommunication Bureau for recording in the Master International Frequency Register, as well as those that are submitted under the relevant provisions of the Radio Regulations or which are subject to the Appendices 30 and 30A Plans for the Broadcasting Satellite Service and the Appendix 30B Plan for the Fixed Satellite Service Plan. The information published corresponds to the recorded assignments as well as the notifications still being processed.

The second part of the BR IFIC deals with terrestrial services. It contains a permanently updated edition of the International Frequency List with regard to terrestrial services, as well as permanently updated versions of the frequency allotment or assignment plans for terrestrial services that are drawn up under the auspices of the ITU. In addition, it contains information on the frequency assignments submitted by countries to the Radiocommunication Bureau for recording in the Master International Frequency Register and in the various regional or worldwide Plans/Agreements.

In order to protect a nation's sovereign rights, there is also a need to analyze on a regular basis the regulatory material published by the ITU in order to determine if there is a potential impact on the country's use of the spectrum and, if so, involvement in the relevant procedures set out in the Radio Regulations is required.

The BR International Frequency Information Circular is published on CD-ROM ROM (for space services) and on DVD (for terrestrial services) every two weeks. One copy of the BR IFIC (consolidated package) is provided to the ITU Member States' Administrations responsible for radiocommunication matters.

There is also a need for submission of information for publication by the ITU in various service documents. Such documents include List IV – List of Coast Stations, List V – List of Ship Stations, List VI –List of Radio-determination and Special Service Stations, List VII A – List of Call Signs and Numerical Identities of Stations Used by the Maritime Mobile and Maritime Mobile-Satellite Services, List VIII – List of International Monitoring Stations and List VIII A – List of Stations in the Space Radiocommunication Services and in the Radio Astronomy Service (twice per year on DVD). Again, there is a need to review these publications on a regular and ongoing basis.

5.7.3.2 INTERNATIONAL BORDERLINE FREQUENCY COORDINATION

Coordination of frequency assignments and freedom from harmful interference form essential features of modern global radiocommunications networks. A lack of coordination is both economically and technically inefficient. For a discussion of economic and technical efficiency see **Section 1.3 - Objectives of Spectrum Management**.

Article 4 of the ITU **Radio Regulations** – Assignment and use or radio frequencies states the member states shall:

- Endeavour to limit the number of frequencies and spectrum used;
- Undertake to make assignments which are in accordance with the Table of Frequency Allocations;
- Make changes to assignments will be made to avoid harmful interference; and,
- Not seek protection for frequencies not in accordance with the Table of Frequency Allocations.

Member states are required to notify the ITU-R and update the Master International Frequency Register (MIFR) in order to facilitate coordination. The Radio Regulations describe the four steps involved in the notification process which are: notification, publication using the **International Frequency Information Circular (IFIC)**, examination and finally registration in the MIFR.

There are several examples where international frequency coordination has taken place on a regional basis using radio service specific coordination agreements. The HCM Agreement (Vilnius 2005) which superseded the previous “Berlin Agreement - 2003” amongst 17 European countries requires the participant countries to actively coordinate, register and resolve issues using harmonized calculation models for specified Fixed and Land Mobile Services.

Practice Notes

- **Australia: Australian Communications and Media Authority – Frequency Coordination for Satellites**

Reference Documents

- **The HCM Agreement (Vilnius 2005)**

5.7.3.3 OTHER TRANSACTIONAL ACTIVITIES

In addition to transactions involving the ITU, there are transactional activities that need to be carried out on a bilateral or multilateral basis. For example, pursuant to bilateral or multilateral agreements, there may be a need for submission of frequency assignment information for purposes of frequency coordination with adjacent or nearby countries. Often such activities are automated to the extent feasible.

5.8 DEVELOPING SPECTRUM MANAGEMENT CAPACITY

Strategies for organization, function, process development, staffing, staff retention and training are important considerations for spectrum regulators. These capacity building strategies flow from legislation, policy and the regulatory framework including which other agencies are involved in certain aspects of spectrum management. Spectrum regulatory functions include:

- Spectrum planning of the future steps required to achieve optimal spectrum use by charting the major trends and developments in technology and considers the needs of current and future users of the radio spectrum.
- Spectrum engineering including the evaluating of information, capabilities and technology choices to support decisions affecting the allocation, allotment and assignment of radio spectrum. Identifying solutions to interference problems and technical compatibility among radio systems are key areas of focus.
- Spectrum authorization involves licensing of radiocommunication equipment and the making of frequency assignments.
- Spectrum monitoring and compliance activities help by avoiding incompatible frequency usage and through identification of sources of harmful interference.

Practice Notes

- **Guidelines for Standard Terms of Reference for Spectrum Management Projects.**

Reference Documents

- **SAMPLE TERMS OF REFERENCE AND STATEMENTS OF WORK FOR SPECTRUM MANAGEMENT CONSULTING PROJECTS**

5.8.1 INTRODUCTION TO DEVELOPING CAPACITY

The contemporary view of capacity building goes beyond the conventional perception of training. The central concerns of spectrum management – to promote spectrum access and efficient use, to resolve conflicting demands, to manage change, to enhance coordination and avoid interference, to foster communication and consultation and to ensure that data and information are shared – require a broader view of capacity development. This definition covers both institutional and individual capacity building.

Spectrum regulators need to consider strategies for developing the spectrum management organization including human resource development, spectrum management functions, process development, staffing and staff retention, and training. These capacity building strategies flow from legislation, policies and the regulatory framework including which other agencies are involved in certain aspects of spectrum management.

The traditional spectrum management regulatory functions include:

- Spectrum planning of the future steps required to achieve optimal spectrum use by charting the major trends and developments in technology and considering the needs of current and future users of the radio spectrum.
- Spectrum engineering including the evaluation of information, capabilities and technology choices to support decisions affecting the allocation, allotment and assignment of radio spectrum. Identifying solutions to interference problems and technical compatibility among radio systems are key areas of focus.
- Spectrum authorization involves licensing of radiocommunication equipment and the making of frequency assignments.
- Spectrum monitoring and compliance activities help by avoiding incompatible frequency usage and through identification of sources of harmful interference.

How spectrum managers fulfill these requirements and meet strategic operational and organization goals represent formidable challenges made more difficult in an environment characterized by change and innovation. These types of capacity building problems are not new nor are they unique to spectrum management. Solutions do exist for developing planning and implementing processes that will improve organization structure, function and to develop necessary and required skills.

Practice Notes

- Capacity Assessment Grids
- Guidelines for Standard Terms of Reference for Spectrum Management Projects.

Reference Documents

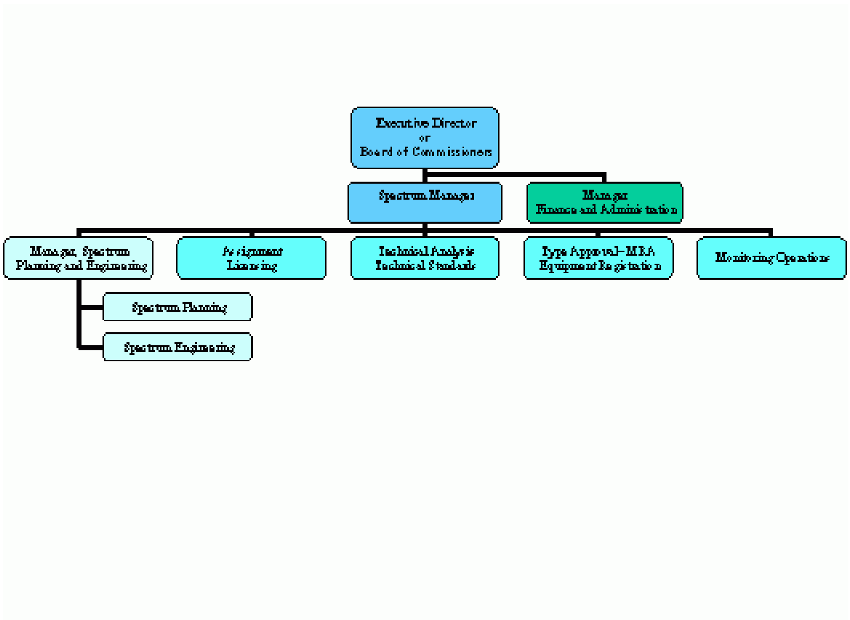
- TAS-SMO Organization Plan, 2005

5.8.2 ORGANIZATION

There is little point in developing strategies for spectrum management capacity building without a thorough understanding of the mandate under which the spectrum management organization operates. The country's legal and regulatory frameworks along with policies concerning governance provide the defining building blocks for the spectrum management organization. For example, as was described in Sections I and III, the spectrum management regulatory function is, in some cases, combined with telecoms and broadcasting regulation or it can function separately as a stand alone organization. The implication here for capacity building is the need to develop and maintain human resource skills independently of other organizations or to find ways of sharing in the development and utilization of human resources through strategies such as matrix management or centres of excellence within the combined regulator.

No two spectrum management organizations will be organized in the same manner, yet there are some similarities in structures organized around the key functions of planning, engineering, and authorization and monitoring. Cost and resource availability put pressure on spectrum managers to create organization and design functions which ensure productivity is achieved through sharing and cross-fertilization of skills.

For purposes of illustration, a model organization chart and functional mapping of key responsibilities are presented below for purposes of clarifying the understanding of spectrum management functions and ctivities.



As pointed out earlier, one of the outcomes of the analysis of structure and function is the potential for sharing common resources such as engineering staff in both the planning and engineering functions. As well, it is possible for administrative staff to support spectrum management and telecommunications and/or broadcasting regulatory staff. Another important consideration is deciding to utilize outsourcing options for common services and infrastructure such as information systems and software applications, and human resource management staff. The determining the structure of the desired organization has a direct bearing on staff recruitment, training and capacity building.

Practice Notes

- **Guideline: Spectrum Management Regulatory Functions, Skills, and Institutional Capacity**

Reference Documents

- **A Comparative Analysis of Spectrum Management Regimes**

5.8.3 HUMAN RESOURCES AND TRAINING DEVELOPMENT

Human resource planning and development through training are essential components of the overall plan and strategy to build capacity within the spectrum management organization. In this section, we explore many of the themes and topics associated with the need to hire, train and retain skilled human resources.

5.8.3.1 HUMAN RESOURCES

Spectrum Management is knowledge-based requiring skilled and committed personnel who are able to keep pace with continuous progress in radio technologies along with increasing complexity and demands coming from improved data handling capabilities and engineering analysis methods used to accommodate the number and variety of users seeking access to the spectrum resource. Providing a challenging and rewarding experience for staff, trainees and new recruits means giving them the tools and support they need for learning and development throughout their careers.

Issues related to new technologies, dynamic market conditions and effective regulatory responses can easily overtake the attention and focus of the spectrum management organization. At the same time, human resource management is strategic to organization development and goal achievement but sometimes relegated to the tail-end of the agenda. The reasons for the lack of focus are often related to budgetary and salary constraints which prevent the recruitment of necessary skilled resources especially when the regulator is competing for the same resources with the private sector or when there is a general lack of sufficient talent or skilled numbers of recruits to draw upon.

There are many challenges for Spectrum Management Organizations to educate, to attract and to keep needed professionals and staff. Some of the trends creating the challenge include the following:

- A continuing shortage of funds and sustainable revenues to support regulatory activity.
- It is more than probable that governments will face significant shortages of qualified professionals over the next 5 to 10 years in both developed and developing countries for very different reasons. In developed countries, changing demographics and the impending shortage of skilled resources has been well documented. In developing countries, the challenge to educate sufficient numbers while the population and economies grow will continue.
- Hurdles exist to some sources of relief for looming shortages. The approach to licensing of foreign-trained experts creates problems as does emigration of locally and foreign educated nationals to richer countries.
- Spectrum managers and other government agencies will face stiff competition nationally and regionally to recruit and retain professional leaders in radiocommunication engineering, economics and finance and legal affairs.
- In addition to pay and benefits, the national and international reputation of the spectrum manager, the telecommunications sector, workload, support for professional development, and roles and responsibilities between professions will be among a number critical factors for professionals in deciding where they choose to pursue their careers.
- Competitive wages needed to attract appropriate personnel are constantly at odds with efforts to control government budgets and to divert more resources away from the telecoms and spectrum regulator to other government priorities.
- Roles and responsibilities among the related professions are changing due largely to innovation and change in the use of technology and changes in the telecoms marketplace. Multi-disciplinary teams are likely to become more common along with the emergence of new types of working arrangements (e.g., outsourcing).
- New regulatory requirements arising from new approaches to service will affect how spectrum management professionals work with each other and with stakeholders.

Strategies

Spectrum managers need to develop and maintain strategic human resource development plans which identify needs, gaps in capability and strategies to fill or compensate for deficiencies in human resource numbers and skills. Strategies need to be consistent with overall government policy and legislation governing public service employment yet responsive to changing requirements. Planning and development of strategies are essential.

Several helpful references to review are listed below:

- Robert L. Katz, Skills of an Effective Administrator, Harvard Business Review: Reprint 74509.
- Frederick Herzberg, One more time: How do you motivate employees? Harvard Business Review: Reprint 87507.

5.8.3.2 TRAINING DEVELOPMENT

Spectrum managers are responsible for ensuring their agency and staffs promote and ensure the efficient use of the radio frequency spectrum resource. To satisfy this responsibility, spectrum managers must not only understand current spectrum-dependent technologies, but also understand the likely interference interactions between the services provided by incumbent spectrum users and the services envisioned to be provided through the use of cutting edge technologies. Obtaining or developing effective training programs for spectrum managers, and making these programs available to private sector entities can help to ensure that all spectrum managers operate from a common frame of technical and analytical reference.

Spectrum managers should be able to use the latest spectrum management analysis tools. Spectrum managers should also be aware of the commercial services available that could satisfy their functional requirements for spectrum services.

There is also a need for additional spectrum management expertise. Spectrum management needs highly-trained staff capable of adapting to technological change, instituted engineering recruitment and training programs.

There is a similar need for such training throughout the spectrum management community. By building in-house expertise, non-government spectrum managers and spectrum users can make more informed choices on equipment purchases and on other spectrum management issues.

Practice Notes

- **Guideline: Spectrum Management Regulatory Functions, Skills, and Institutional Capacity**
- **Training at ITU**

5.8.4 BUSINESS PROCESSES

There are numerous complex tasks and processes within the spectrum management organization which need to be planned:

- Routine tasks and methods are associated with licensing of radiocommunications, type approval of radio equipment and routine monitoring. Routine tasks are supported by well defined administrative processes which can be dramatically improved and made more cost effective through the use of efficient information management systems. Quality of service can be improved by placing service points of presence close to clients and users.
- Technical tasks require staff with extensive formal and methods-based training and experience. Frequency assignment, technical standards, spectrum engineering, information systems and radio monitoring are tasks that require these levels of training. Core professionals/specialists work closely with clients.
- Conceptual and coordination tasks. These are associated with planning, coordination, consultation, and strategic initiatives associated with international consultation on spectrum planning matters.

Several techniques (Business Process Re-engineering, Process Improvement, Performance Management Framework, to cite a few), developed in the area of management science are available to the spectrum manager to assist in the design and evaluation of improved, more effective business processes. If a decision is made to re-engineer the processes of the organization to better align them with changing market dynamics, technology or regulation, it is important to stage the training and development of staff so that the training effort coincides with the creation of new processes and systems to support them.

Reference Documents

- **ITU: Spectrum Management Systems for Developing Countries, 2006**
- **Not a “Tool Kit”: Practitioner’s Guide to Measuring the Performance of Public Programs**

5.8.5 CONSULTATIVE PRACTICES

The Spectrum Management Organization needs to communicate and consult with stakeholders to be effective. The spectrum manager needs to take effective measures to provide information on the policies, rules and practices of the administration and provide mechanisms for feedback to evaluate polices, rules and practices. Consultation is another means for building overall support for compliance by users. Another impetus for consultative mechanisms for stakeholders arises from the need for improved short term planning and assignment processes which reflect the economic value of spectrum to the public and improved transparency in decision-making. The discussion of consultative processes takes place within a broader discussion of the role, contribution and extent to which industry and stakeholder groups should participate in the implementation and monitoring of the broader agenda of planning and efficient usage of spectrum. Action based on partnerships and involvement of major groups opens up a wider political sphere for the participation of social and economic actors and constitutes a "bottom-up" source of strength.

Consultative processes occur at several levels including international and regional efforts and processes can be formalized, informal or *ad hoc.* Planning subjects range from policy and regulatory framework development and formulation through forecasting of demand and technology application to procedural such as channel planning for broadcasting frequencies.

Industry participants in various segments of the market – mobile, satellite, microwave and broadcasters should be encouraged to form associations which can formulate recommendations reflecting the common needs and interests of the sector. As well, the spectrum manager can request from the associations expert advice on contentious matters such as interference resolution solutions, band channeling plans and band clearing options. Individual licensees and users are not precluded from submitting formal briefs of their own in addition to the industry wide brief submitted to the regulator.

Reference Documents

- **Hong Kong: OFTA, Frequency Bands for Broadband Wireless Applications, 2006**

Next: 6 Legal and Institutional Framework ➡

Legal and Institutional Framework

Approaches for Policymakers, Regulators, and Practitioners

The convergence of telecommunications, broadcasting, and information technology is blurring previously distinct disciplines and technologies, requiring regulatory reform for the information and communication sector. This Module provides resources on various regulatory approaches for regulators, policymakers, and practitioners within the current ICT environment.

6.1 INTRODUCTION

The telecommunications sector has undergone extensive changes in recent years. Many state-owned operators were privatized and the sector experienced a trend of liberalization worldwide, motivated by the evolution of new technologies and services, the growing importance of telecommunications for national economies and the development of international trade in telecommunications services. As a result, in most countries, the telecommunications sector has experienced a fundamental change in structure, from that of monopoly to competition.

Following the period of growth in the telecommunications industry in the late 1990s, the "dot com bubble" burst at the beginning of the 21st century, resulting in a steep drop in stock market value for major operators. The crisis in the telecommunications market affected numerous companies, but did not deter the development of new technologies and the evolution of the information and communications technology (ICT) sector. In order to adapt to these new developments, countries have been undertaking a review of their existing frameworks, enacting new legislation and creating new regulatory authorities to implement the legal and regulatory framework. Such a framework is essential for the sector, particularly as countries move from state control to market competition, and is necessary to attract new entrants as well as private investment.

Based on analysis of legal and regulatory frameworks worldwide, studies conducted by industry experts and institutions such as the World Bank, and information collected by the International Telecommunication Union, this report provides an update of the 2000 Telecommunications Regulation Handbook published by *infoDev*. It serves as a best practice toolkit for regulators and policymakers in the context of the current ICT environment.

The importance of conducting this study is evidenced by the significance of the legal and regulatory framework as an enabler of development of the sector. Effective regulation requires the implementation of a supporting legal and regulatory framework to create an environment that promotes public confidence and ensures stability, transparency, competition, investment, innovation, and growth in the sector. Many of the laws, regulations, and best practice examples examined in this study address the fundamental change in the telecommunications industry from that of monopoly to competition and its evolution within the ICT sector, and provide guidelines for effective regulation for competition. However, while the toolkit highlights best practices for effective regulation, it is important to realize that the implementation of such practices may vary from country to country, requiring consideration of local political, economic, social and other conditions and circumstances in designing the appropriate legal and regulatory instruments.

The study of regulatory reform in today's converged ICT environment can be analyzed by considering three main interdependent and mutually reinforcing aspects: (I) the general legal context of regulatory reform; (ii) the institutional and organizational aspects of regulation; and (iii) the regulatory processes.

This study begins by addressing the question: **Why regulate?** Regulatory intervention is necessary to ensure the successful transition of a monopolistic telecommunications market to a competitive one, to safeguard consumer interests, to maintain an effective competitive marketplace, and to foster the long-term development of the ICT sector. Effective regulation has resulted in many benefits, such as greater economic and technological growth, increased investment in the sector, better quality of service, lower prices and higher penetration rates. The level of regulatory intervention will vary from country to country, and will depend on various factors, including the level of market maturity, the legal and regulatory framework, and the regulatory issues arising from new technologies and services.

In **Chapter 3**, the question of how to regulate is addressed. How regulatory activities are conducted depends on the level of maturity of the market, and the particular cultural, legal and regulatory framework of each country. Regulation does not occur in a vacuum, and is determined to a great extent by different factors such as: (i) the different legal traditions and systems existing in a particular country that determine the structure of the legal and regulatory framework; (ii) the international commitments undertaken by governments that need to be harmonized with national legal and regulatory frameworks; (iii) the impact of other legislation affecting the sector, which can influence the effectiveness of the legal and regulatory framework, and (iv) the level of maturity of the market, which affects the interaction between sector-specific telecommunications legislation and overall competition policy.

Chapter 4 addresses the impact of convergence on regulation. The union of telecommunications, broadcasting, and information technology is dissolving the once clear lines that distinguished the mode of delivery and allowed for the distinct regulation of these different sectors. Convergence can create uncertainty with respect to the regulation and classification of services, to the extent that it occurs at different levels: (i) at the service level, with bundled services (such as the "triple play" of voice, data and video); (ii) at the industry level with mergers among entities of different industries; and (iii) at the network and terminal equipment level, such as the ability to use computers for telecommunications, as well as the introduction of new means of providing traditional services, such as Voice over Internet Protocol (VoIP). Regulators have responded to convergence by adopting more streamlined legislation and regulatory procedures, which allow for greater flexibility in dealing with new technologies and services. Additionally, as regulators revise legal frameworks, they must consider existing rules that are spilling over into the ICT sector such as intellectual property rights, as well as new activities such as spam or computer viruses, which impact consumers in a negative way. **Chapter 5** identifies what it means to be an effective regulator, and the different dimensions of effectiveness, including structural and financial independence and functionality. One of the main benchmarks for assessing the effectiveness of a regulator is the degree of actual and perceived autonomy from government control and industry influence. To be effective, regulators must gain credibility and have the authority to enact and enforce their decisions. Regulatory procedures must be transparent, accountable and predictable and ensure integrity of the process. An effective regulator strengthens public and investor confidence that all market players will be treated equally, and increases the stability and objectivity of the regulatory process. Additionally, Chapter 5 provides an analysis of the organizational and institutional approaches to regulation, and discusses institutional design options, the separation of power and relationship of the regulator with other entities, the legal status of regulators, their funding and staffing process, and the application of an ethics regime. There is no one single model, since each regulator's institutional design, powers, degree of autonomy, composition, and jurisdictional authority depends on the country's legal, political and institutional framework. However, a strong legal framework needs an efficient institutional and organizational framework to support it. To regulate effectively, regulators must create institutional frameworks that provide structural, political, and budgetary independence, as well as sufficient competency and the necessary organizational structure to carry out its functions. As such, regulators must have an adequate number of staff with the proper skills and capacity to carry out the regulatory activities. Moreover, they must be perceived by stakeholders as objective and unbiased. This can be enhanced by ensuring that ethics codes or rules are in place and the regulatory staff has no perceived or actual conflicts of interest.

Lastly, **Chapter 6** addresses the functional aspects for effective regulation including the clear definition of the functions and competencies of the regulator, accountability of regulators, and the implementation of open and transparent regulatory processes. Effective regulation requires that the decision-making process be conducted in a transparent and participatory manner, so that the regulator is accountable to the government and to the public. Transparency in regulation, and the encouragement of public participation in the decision-making process, legitimizes the regulator's actions and fosters consensus building in the industry, which facilitates compliance with regulatory decisions. To function effectively, regulators also need the proper authority and power to intervene in the operation of the telecommunications market, such as licensing operators and services, enforcing laws and decisions, and resolving disputes among licensees. In addition, enforcement of compliance with regulatory decisions is crucial for effective regulation, because without the ability to enforce laws, a regulatory regime is practically meaningless. As markets mature, many regulators are encouraging industry self-regulation, such as industry self-reporting, for enforcement purposes and reliance on alternative resolution techniques to resolve conflicts, which helps regulators to maintain oversight over the growing number of competitors in the ICT sector.

6.2 WHY REGULATE?

To understand the role of regulation in enabling the growth and development of the information and communications technology (ICT) sector and the requirement of a strong legal and regulatory framework for effective regulation, first it is necessary to discuss the need for regulation. This Chapter provides an overview of the reasons for regulation given the structural changes in the telecommunications sector from monopoly to competition, and the importance of regulation in transitioning to an effective competitive environment and fostering the long-term development of the ICT market.

Reference Documents

- **Creating the "Right" Enabling Environment for ICT**
- **European Competitive Telecommunications Association Regulatory Scorecard 2005**
- **Feedback to Regulators from the Private Sector**
- **Introducing Telecommunications Competition through a Wireless License**
- **Morocco: Effective Regulation Case Study**
- **Organisation for Economic Co-operation and Development - Regulatory Reform as a Tool for Bridging the Digital Divide**
- **Regulation and Investment - Sri Lanka Case Study**
- **Subscribing to Monopoly, The Monopolist's Lexicon-Revised**

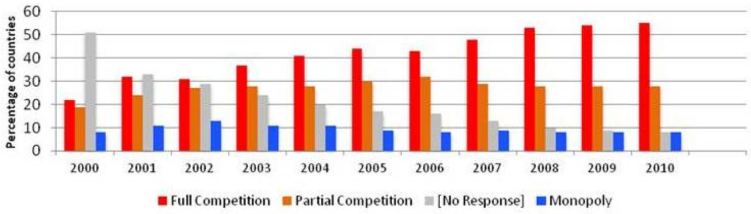
6.2.1 EVOLUTION OF REGULATORY REFORMS

Prior to the telecommunications sector reforms undertaken in many countries during the last two decades, telecommunications services were largely provided under monopoly conditions, either by state entities or, to a lesser extent, by private companies. Often the operator and regulator for telecommunications services was the government; therefore, no regulatory independence existed. This classic model of supply generally concentrated policy-making, regulatory, frequency management and network operating responsibilities in a single entity.

This model worked well for many years in the more developed economies, where long-distance and international tariffs, which stayed high despite significant decreases in costs due to technological change, basically subsidized local services and led to relatively high levels of universal service. However, the model did not work as well in developing countries where networks were generally restricted to urban areas and more accessible to middle/high income consumers. Cross-subsidization kept local prices low for the wealthy, but did not generate sufficient income for infrastructure investment, and low-income consumers were subject to long waiting lists and poor quality of service.[*]

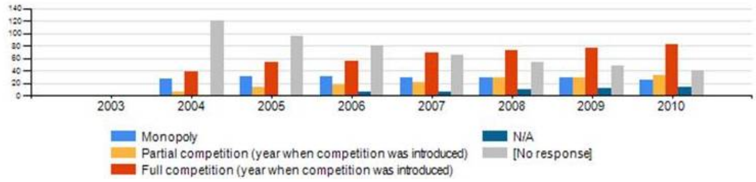
In the 1980s, countries began to recognize the increasingly important role of the telecommunications sector for economic growth. As a result, in primarily developed nations, policies evolved to introduce competition – albeit, often limited in scope, in an effort to inject dynamism into the sector, spur innovation, increase choice, enhance availability, and lower tariffs. In the 1990s, partly as a result of national, regional and multilateral efforts (further discussed in Chapter 3), many countries introduced the first wave of reform by privatizing their national operators. In the second wave of liberalization, which sometimes occurred simultaneous with the privatization or followed soon thereafter, governments began allowing the introduction of new services (*e.g.*, mobile services and value-added services) into the market. These new services generally did not compete directly with the privatized basic telecommunications operator, which often had been granted an exclusivity period, or the non-privatized government-owned incumbent operator. The third wave of liberalization occurred once the incumbent operator's exclusivity period was over and full competition could be introduced.

As shown in the figures below, there has been a global trend towards greater liberalization and the introduction of competition across ICT sectors.[*] In both the mobile services and international gateway markets, for example, full competition is the norm worldwide and has been steadily increasing over the last several years. At the same time, monopolies have declined in favor of the introduction of at least partially competitive markets.



◂ **Figure 2- A: Status of Completion in the Mobile Services Market Worldwide (2000-2010)**

Source: ITU, World Telecommunication Regulatory Database 2011).

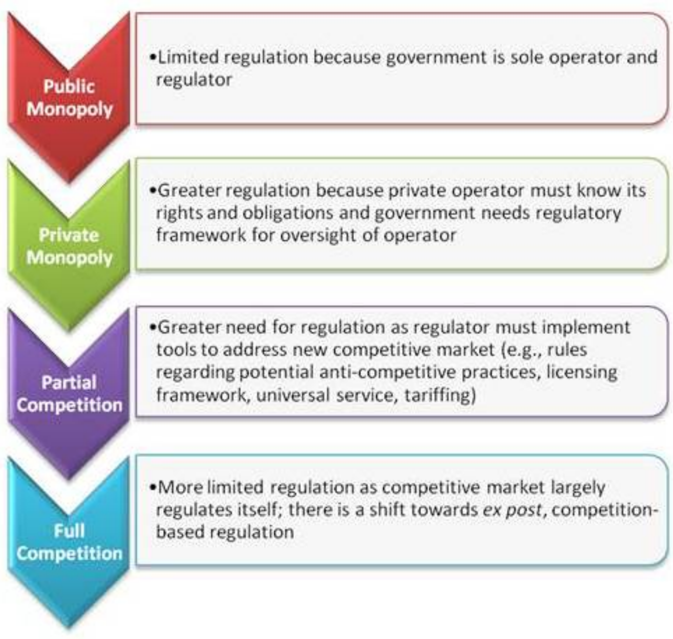


◂ **Figure 2- B: Statue of Competition In International Gateways Worldwide (2003-2010)**

Source: ITU, World Telecommunication Regulatory Database (2011).

6.2.2 REGULATION IN TRANSITION TO COMPETITIVE MARKET

The introduction of competition in the marketplace does not mean regulation is unnecessary. Quite the contrary, the role of the regulator actually increases once governments authorize competition (See Figure 2-C), particularly during the early stages of transition from the former model of monopoly provision to one of effective competition. In order to transition to an effective competitive environment, regulators must establish a regulatory framework that can resolve disputes, address anticompetitive abuses, protect consumers, and attain national goals such as universal access, industrial competitiveness or economic productivity and growth.[*]



◂ **Figure 2- C: Need for Regulation during Transition from Public Monopoly to Fully Competitive Environment**

Source: Telecommunications Management Group, Inc.

As noted in Figure 2-D below, regulation is not an end in itself. Rather it is the vehicle to attain, and subsequently sustain, widespread access, effective competition and consumer protection. The liberalization and introduction of competition in the market requires strategic policies and regulations that establish an effective regulator (as discussed in Chapter 5), remove explicit barriers to entry (*e.g.*, the inability to interconnect with the incumbent operator), and dismantle implicit barriers (such as the potential influence of the incumbent telecommunications operator over the regulator). As such, regulatory reform must include measures aimed at:

- creating independent entities to oversee the introduction of competition in the market and establish regulatory mechanisms for issues such as interconnection, licensing, and tariff rebalancing,
- preparing the incumbent operator to face competition, including timetables setting deadlines for the termination of market exclusivities,
- allocating and managing scarce resources such as numbers and spectrum resources in a non-discriminatory way within the liberalized

market,

- expanding and enhancing access to telecommunications and ICT networks and services, and
- promoting and protecting consumer interests, including universal service and privacy.

◄ **Figure 2- D: Goals of Regulation**

Source: Telecommunications Management Group, Inc.

As effective competition in ICT markets develops around the world, regulators are finding that an overarching *ex ante* approach to regulation, which seeks to prevent market failures through the implementation of sector-specific, forward-looking rules, can be less effective than *ex post*, competition-based frameworks at fostering more innovative markets. Rather than apply blanket prohibitions or obligations on certain activities as found under an *ex ante*framework, *ex post* regulation uses competition law to remedy specific instances of anti-competitive conduct.[*] Currently, about 100 countries have adopted competition laws, of 25 percent are developing countries.[*]

In transitioning from an *ex ante* to *ex post* regulatory framework, it is necessary to ensure that an effective framework is in place capable of identifying, reviewing and enforcing alleged anti-competitive behaviors. As the ICT markets in a country mature and regulators begin phasing out certain *ex ante* regulations, it is important to consider, on a case-by-case basis, sunset provisions or transition periods so that stakeholders, including service providers and consumers, are able to adapt to the new *ex post* regulatory environment.

Countries that have traditionally relied on strong state intervention, especially where ICT providers have been largely owned or supported by the government, may face particular challenges in the development and implementation of an *ex post*, competition-based framework due to lack of legal precedent and experience in this area. For countries without a general competition law regime, it is possible for the ICT regulatory authority to establish an *ex post* framework for the ICT sector.[*]

However, even where competition in ICT markets is robust, policy makers may find that targeted *ex ante* rules are needed to direct certain market activities, such as wholesale access or unbundling obligations on the physical network layer (see Box 2-1). When adopted, *ex ante* regulation should be narrowly tailored to address the specific instances of expected market failure and should follow three broad guidelines: 1) *ex ante* rules should reflect the country's stated policies and objectives in the activities to be regulated; 2) *ex ante* rules should first seek to resolve potential market failure at the wholesale level; and 3) *ex ante* rules should be reviewed on a regular basis and withdrawn once effective competition in the relevant market exists or the rules are no longer warranted. In other words, *ex ante* regulation should be considered a temporary measure meant to facilitate a competitive market.

- **Regulation should reflect national conditions and goals**

Countries have different socio-economic, geographic, and political circumstances. In addition, their level of infrastructure development can vary widely. As a result, solutions to reach national goals that were effective in one country may not translate to another and must be tailored. Therefore, imposing *ex ante* regulation will require a fact-based assessment of a country's the market conditions and entails the collection, review and analysis of detailed information in order to attempt to accurately predict future behaviour and outcomes. *Ex ante* regulation should be targeted to address the specific problem(s) detected. A clear and accurate demarcation of the circumstances where market forces will not deliver desirable outcomes will be key to implementing targeted *ex ante* regulation in the coming decade.

- **Regulation should first attempt to resolve market failure at the wholesale level**

In liberalized ICT markets, any *ex ante* regulation should be primarily focused on wholesale services and facilities. Where a regulator identifies competitive concerns at the retail level, narrowly-tailored regulation of wholesale inputs identified as bottlenecks is generally preferred, allowing other links in the value chain of end-to-end services to be more responsive to the competitive process. This approach ensures that competitive concerns at the retail level are adequately addressed while also limiting *ex ante* regulation to those areas where the benefits to consumers cannot be achieved using *ex post* regulation.

- **Regulation should be periodically reviewed and phased-out when warranted**

The dynamic nature of ICTs requires regulators to monitor and periodically reassess competitive conditions in the marketplace. Technological changes can quickly impact the ICT market, displacing the rationale for *ex ante* regulation or shifting its focus towards other links in the ICT value chain. Periodic monitoring requires regulators to devote significant time and resources to reviewing and revising targeted *ex ante* regulation since static regulation may stifle innovation and investment. Given their resources, when adopting *ex ante* regulation, regulators should strike the right balance between safeguarding the interests of consumers and promoting long-term development of the sector. Although *ex ante* regulation may be necessary in the short term, the goal is to reduce *ex ante* rules as competition develops and, ultimately, for ICT services to be disciplined primarily by competition law.

◂ **Box Imposing targeted ex ante regulation on the physical layer.**

Source: Telecommunications Management Group, Inc. (TMG)

6.2.3 REGULATION IN A FULLY COMPETITIVE ENVIRONMENT

In a fully competitive environment, there is a more limited need for regulation. However, regulatory authorities still have a critical role to play, particularly given the dynamic role of the sector and the unsettled issues that new technologies may introduce into the regulatory environment. Moreover, in certain areas, regulators need to maintain a prominent role because market forces often fall short of creating the conditions necessary to satisfy public interest objectives such as universal access and service.

Universal access/service policies are generally directed at achieving objectives such as the promotion of economic productivity and growth; the promotion of political and social cohesion through the integration of isolated communities into mainstream society; the improvement of delivery of government services; and the elimination of economic and social disparities between the "information rich" and the "information poor."1 In certain areas of a country, however, significant upfront investments, high operating costs, and uncertain demand make it difficult to reach these objectives on commercial grounds. Thus, government initiatives directed at providing telecommunications access and services to rural, remote, and unserved areas may need to be adopted. In such cases, regulators should narrowly define and identify the areas and services that will benefit from government subsidies or incentive programs so as to avoid closing the door to private investments in areas where market forces alone do not provide an incentive to offer services in such areas.2

Similarly, despite the increased reliance on market forces in the telecommunication sector, regulatory agencies must ensure that spectrum use is properly managed and allocated. This role cannot be left solely to market forces, since the introduction of new technologies may be limited by interference, inefficient spectrum use, or lack of access to spectrum (*e.g.*, introduction of digital television).

Despite the benefits of new technologies, regulators also must be attentive and responsive to the regulatory issues that arise from the implementation of these new technologies and their related services. For example, in today's environment, regulators are grappling with how to address issues such as spam and consumer concerns regarding privacy, which were not issues of concern to regulators ten years ago. In addition, while new technologies often offer consumers greater choices at lower prices, regulators have a responsibility to ensure that consumers are aware of the potential limitations that may exist with these lower-price offerings (*e.g.*, emergency services may not available through such services; services offered may be of a lower quality of service). Moreover, as these new services gain prominence regulators also will need to consider whether they should be subject to obligations imposed on other providers (*e.g.*, universal service).

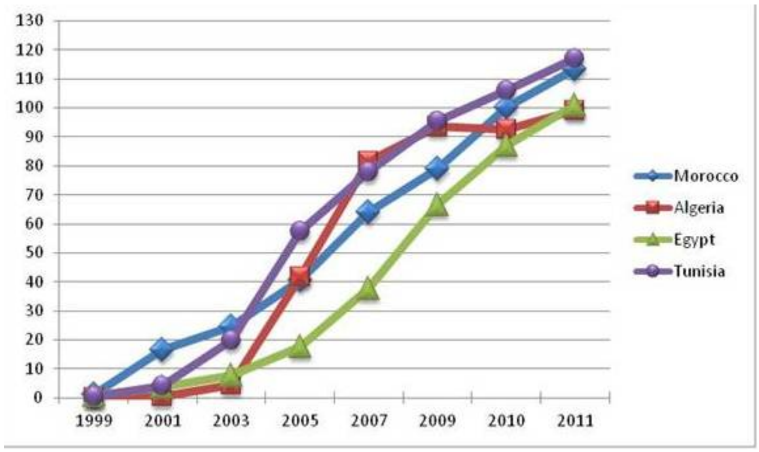
6.2.4 BENEFITS OF REGULATION

Effective regulation has proven to result in greater economic growth, increased investment, lower prices, better quality of service, higher penetration, and more rapid technological innovation in the sector.

Increased Investment

Liberalization in the telecommunications sector has been greatly encouraged by World Trade Organization (WTO) commitments and obligations, particularly the WTO Reference Paper on regulatory principles.[*] Early evidence of the impact of liberalization under the WTO's Basic Telecommunication Agreement (BTA) in low income Sub-Saharan African countries shows that growth in telecommunications revenues as a percentage of GDP is higher in countries that have made GATS commitments in telecommunications.* Thus, investors are likely to be more willing to commit capital and technology in countries with WTO telecommunications commitments, as they are likely to be rewarded with higher revenues. Uganda, for example, reformed its telecommunications sector and enjoyed healthy revenue growth, while Ethiopia, which had not reformed, experienced much lower revenue growth.*

Morocco understood how important effective regulation was to attract foreign investment to developing economies as it began laying the groundwork for privatization and liberalization of its telecommunication market in the late 1990s. It passed the Post Office and Telecommunication Act (Loi sur la poste et les télécommunications) in August 1997 and created the National Agency of Telecommunications Regulation (Agence Nationale de Réglementation des Télécommunications, ANRT) in February 1998. By designing its vision for a liberalized market in a clear and transparent way, the Moroccan framework inspired investor confidence, which was reflected in the country's auction of a second mobile digital cellular licence in 1999. The winner, Medi Telecom (a joint venture of Spain's Telefonica and Portugal Telecom along with local investors) paid USD 1.1 billion for a 15 year license. This was the largest investment ever in Morocco and one of the highest prices ever paid for a mobile licence (in relation to the population).* From being the country with the second lowest telephone penetration in the North Africa region, Morocco became the country with the one of the highest (Figure 2-E). The number of mobile subscribers grew from 375,000 in 1999 to over 9 million by year-end 2004. By 2009, there were over 25 million mobile subscribers in Morocco.* While just over 1 percent of the population had a mobile phone in 1999, this had risen to almost one-third by 2004 and exceeded 100 per cent mobile penetration by 2010. In December 2000, the incumbent operator, Maroc Télécom, was partially privatized through the sale of 35 per cent of its equity to Vivendi Universal, a French conglomerate. The privatization was regarded as one of the most successful ever in a developing country, generating MAD 23 billion (USD 2.3 billion).* Morocco's success clearly illustrates how effective regulation of the sector can trigger dramatic increases in ICT development.



◂ **Figure 2-E: Mobile Telephone Penetration in Selected North African Countries**

Source: ITU ICT EYE, ICT Statistics: Mobile Cellular Subscriptions (1999-2011)

As shown in Figure 2-E, mobile penetration rates in other North African countries have also soared since 2003, particularly Algeria and Tunisia, which surpassed Morocco around 2005. Notably, both Algeria and Tunisia initiated comprehensive liberalization reforms prior to achieving higher mobile penetration rates. In 2000, the Algerian government issued a draft telecommunications policy providing a roadmap toward liberalization and market reforms and a draft Telecommunications Law creating a separate, independent ICT regulator and providing for a multi-operator market.* At the time, the telecommunications sector, including fixed line and mobile telephony, operated under full monopoly market structures and investment in the telecommunications sector as a whole was less than USD 150 million per year.* Algeria requested assistance from the World Bank to design and implement market reforms. By 2002, the new telecommunications law and all key secondary legislation were adopted and privatization was achieved by 2004. In addition, two new mobile licences were awarded to private operators in 2004 through a transparent and competitive bidding process, which led to tremendous growth in the mobile services sector. As shown in Figure 2-E, Algeria's mobile penetration rate increased from fewer than five in 1999 to nearly 42 subscriptions per 100 inhabitants by 2005, soaring to 100 percent penetration by 2011. The World Bank concluded that one of the main lessons of Algeria's reforms is that "competition, brought about by liberalization in the telecommunications sector, is the most effective driver for sector performance."* Investors consider the regulatory environment to be a critical factor in their analysis of whether or not to invest in a country. They often have a set of regulatory conditions that must be present for them to consider an investment in a particular country. A report **4** presented at the ITU's 2002 Global Symposium for Regulators summarizes several key findings from the private sector on this issue:

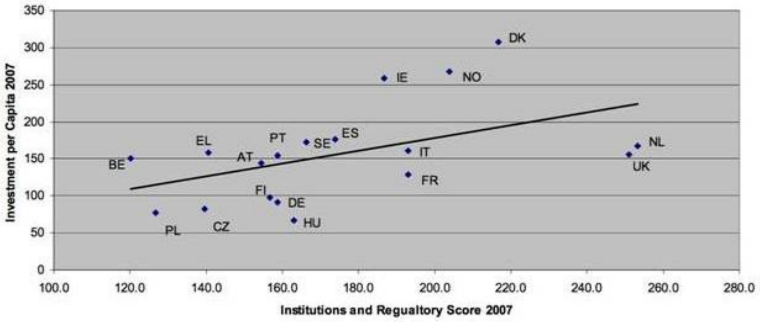
• Regulatory issues are a key factor in market entry and expansion decisions;

• Interactions between regulators and operators are most challenging during times of transition;

• Companies look at the overall regulatory environment – not just specific regulations. Transparency and responsiveness are important factors in the willingness of companies to enter and stay in markets;

• Companies employ a variety of ways to ensure that regulatory information is factored into business planning and decision-making.

Further, as noted by the European Competitive Telecommunications Association (ECTA), a link exists between good regulation and the amount of investment attracted into a country. ECTA has designed a "scorecard" to assess regulation in the European Union. It compared the results of the scorecard to investment in the ICT sector and found that"…effective regulation continues to have a strong and positive impact on the level of investment in telecommunications networks and services."* Countries that rank high in the scorecard tend to have higher levels of telecommunications investment in relation to total investment in the economy (Figure 2-F). ECTA reiterated the relationship between liberalization and investment in its 2009 Scorecard, stating that "[o]nce again, therefore we find that pro-competition regulation is strongly associated with higher levels of investment in the electronic communications market."*

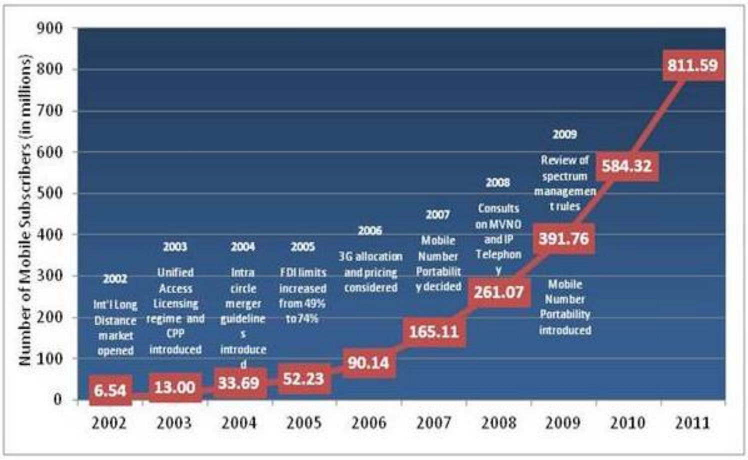


◂ F: Relationship between ECTA Scorecard and Investment

Source: ECTA, "Regulatory Scorecard".

Economic Growth and Consumer Benefits

Developing economies in Asia have made significant strides towards pro-competitive regulation and in return have achieved considerable progress in bridging the digital divide. One such country is India, where the Telecom Regulatory Authority of India (TRAI) has made a comprehensive reform of the regulatory framework to promote technological neutrality and take advantage of inter-modal competition.* Competition was enhanced by issuing additional mobile licenses in 2001 and 2002 and awarding wireless local loop (WLL) licenses in 2002. Another relevant measure taken by TRAI was to move from a receiving-party-pays (RPP) to a calling-party-pays (CPP) structure in an effort to spur mobile take-up. The results of these policies have brought economic growth to the sector and produced a marked increase in mobile subscribers and a fall in mobile tariffs (see Figure 5-F). By contrast, the failure to adopt such measures, along with other factors such as delay in the introduction of a sufficiently pro-competitive interconnection regime between fixed and mobile services, has been identified as one of the causes that slowed investment and customer growth in the mobile market in Sri Lanka.*

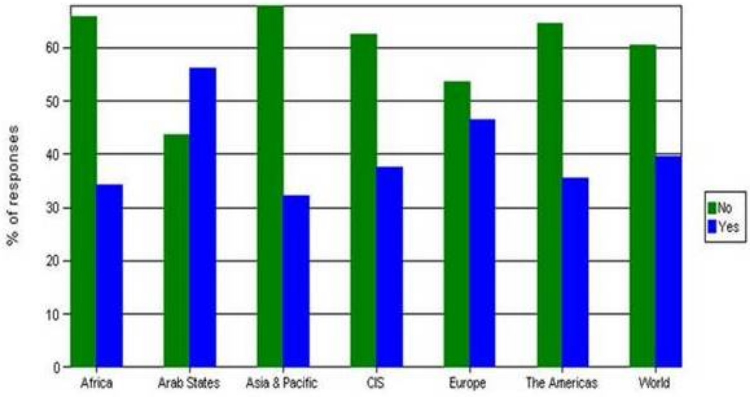


◂ Figure 2- G: India's Regulatory Reforms for Mobile Services and Increase in Mobile Subscriptions 2002-2011)* TRAI, Annual Report 2005-2006 and Annual Report 2009-2010. http://www.trai.gov.in/traiannualreport.asp.

Source: TRAI, Annual Report 2005-06, Annual Report 2009-10 and Annual Report 2010-11.

Growth of New Services

In order to promote the growth of new products and services, a flexible regulatory framework capable of adapting to the rapid pace of technological developments is needed. As such, the implementation of a unified licensing or general authorization regime helps to stimulate the growth of new and innovative services by allowing licensed operators to offer a broad range of services under a single authorization. In some instances, however, it may be unclear how current regulations and licensing rules apply to new services, particularly those involving converged technologies. In these cases, it is important that ICT regulators act as quickly as possible to offer guidance on the regulatory treatment of these technologies and services, keeping in mind that liberalization provides the greatest opportunity for investment and growth. Voice over Internet Protocol (VoIP), also called IP telephony or Internet telephony, has been one of the most successful converged technologies over the last decade, despite the fact that the rules regarding the general provision and use of VoIP is unclear or explicitly banned in many countries. Nonetheless, over 60 per cent of countries worldwide have reported to the ITU that specific VoIP policies are in place (see Figure 2-H).



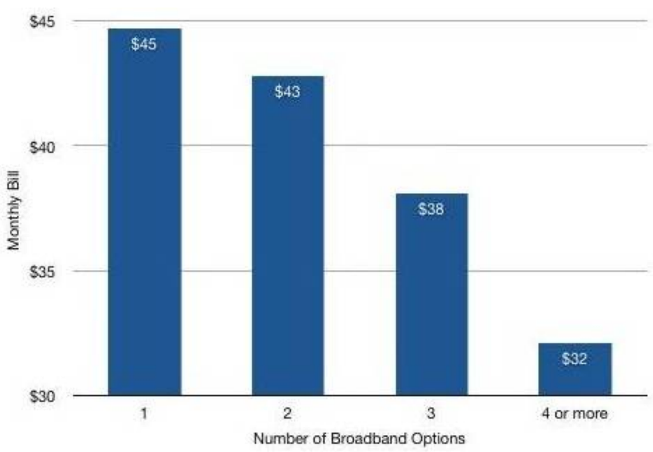
◂ **Figure 2-H: VoIP Policies, 2011 or latest data available**

Source: ITU, Telecommincation Regulatory Database, 2011.

Converged technologies, including VoIP, promote facilities-based competition by allowing DSL, cable modem, fiber network and wireless service providers to compete directly with one another. VoIP boosts service-based competition by enabling new service providers, such as Skype, to compete with incumbent operators without owning their own network infrastructure, which is likely to result in new and better services, as well as improve incentives for domestic and foreign investment.[*] VoIP also offers substantial cost advantages to facilities-based operators since the"[t]ransmission over IP-based networks can cost as little as a quarter of equivalent PSTN transmission."[*] In addition, VoIP can reduce maintenance costs for network operators by 50 to 60 per cent since an IP call typically requires only 10 per cent of the bandwidth required for a PSTN call. Ultimately, "[i]f policy frameworks restrict competition, or stop convergence from playing out in a market, they lead to suboptimal outcomes that reduce the development impact of ICT. Consequently, developing countries can increase access to advanced technologies and innovative, high-quality services by opening markets, promoting competition, and removing regulatory barriers to new technologies and business models."[*]

Lower Prices for Consumers

In a competitive market, operators typically pass on cost-savings to consumers through lower retail tariffs, such as by replacing circuit-switched telephony with VoIP.[*] Even if some operators choose not to reduce retail tariffs, consumers can take advantage of lower prices in a liberalized environment by switching to other service providers and/or technologies. For example, it has been shown that lower prices for international telephone calls are highly correlated with the level of competition. In Africa, one of the regions of the world where competition in long-distance telephony is lowest, prices for both international telephone calls and broadband services are much higher than in other regions of the world.[*] A 2009 survey conducted in the United States by the Pew Research Center found that retail prices for broadband services are closely correlated to the number of broadband providers available—the average monthly bill was USD 32 in areas with four or more providers as compared to USD 45 in areas with only one provider (see Figure 2-I).[*] Regulators must often intervene to remedy shortcomings in competition that may include imposing some form of regulation, such as setting interconnection rates, to force incumbent operators to charge competitive operators wholesale cost-oriented rates. It may also be necessary to eliminate restrictions on resale to allow entry of multiple operators and stimulate competition.



◂ **Figure 2-I: Competition in the Broadband Market Results in Lower Consumer Prices**

Source: Jordan Golson, "Competition Breeds Lower Broadband Prices," GigaOm, June 17, 2009, ***http://gigaom.com/2009/06/17/competition-breeds-lower-broadband-prices/***

Liberalized markets in the same region and at similar income levels typically have penetration rates higher than those with non-liberalized markets. For example, the Latin American countries of Belize and Brazil have similar income levels but fixed-line penetration rates varied considerably, as of 2011. In Belize, where the incumbent operator maintains a monopoly on fixed-line provision, the fixed-line telephony penetration rate is 9.07 lines per 100 inhabitants while the fixed-line broadband penetration rate only 3.05 lines per 100 inhabitants.22 In contrast, Brazil's fixed-line markets are considered fully competitive—the country's fixed-line penetration rates are more than double that of Belize, at 21.88 lines per 100 inhabitants for fixed-line telephony and 8.56 lines per 100 inhabitants for fixed-line broadband.

As demonstrated in Chapter 3, regulation is impacted by a variety of factors, including legal traditions, multilateral and regional commitments, other legislation and the nature of the marketplace. Thus, while the design of the regulatory framework may vary, certain critical elements should be included in an effective regulatory framework. These features, discussed in Chapters 5, 6, and 7, relate to elements for effective regulation, aspects to consider when designing the regulatory framework, functional aspects of the regulatory authority, and decision-making, accountability, consumer protection, dispute resolution and enforcement powers. Consideration and proper implementation of these features are the formula for success and will facilitate the benefits to consumers, the market, and the economy that have been achieved in many countries that have undergone regulatory reform.

6.3 LEGAL CONTEXT OF REGULATORY REFORM

The development of an effective regulatory framework for the ICT sector requires the establishment of a comprehensive set of laws, rules, and regulations that clearly identifies the contractual obligations and property rights of governments and stakeholders. The structure of this framework is determined, in part, by the legal and constitutional system of each country. This Chapter discusses these issues and other factors that impact the legal context of regulatory reform, including international and regional commitments, telecommunications-related legislation, and competition policy.

Practice Notes

- Box 3-5: United States Tripartite Review [3.3.2]
- Foreign Ownership in Canada [3.4.2]
- Foreign Ownership in the United States [3.4.2]
- Spam Legislation in Australia, China, Malaysia, and the United States [3.4.4]
- Table 3-1: Countries Committing to WTO Reference Paper with Different Legal Traditions [3.1.2]
- Table 3-2: Jamaica and Brazil - Comparison of Telecommunications Laws in Civil and Common Law System [3.1.3]
- Table 3-5: Entity with Jurisdiction over Competition Issues in the Telcommunications Sector in Certain Countries with both a Telecommunications Regulator and Competition Authority [3.3.2]
- Table 3-6: Foreign Telecommunications Ownership Restrictions in Selected Countries [3.4.2]
- Understanding GATS [3.2.1]

Reference Documents

- Armenia World Trade Organization Schedule of Specific Commitment
- Australia - Foreign Ownership in the Telecom Sector
- Australia Telecommunications Competition Regulation - Inquiry Report
- Bangladesh - World Trade Organization Schedule of Specific Commitments
- Black Economic Empowerement ICT Charter - Draft 4
- Brazil - Perspectives on the Expansion and Modernization of the Telecommunications Sector
- Central American Free Trade Agreement - Chapter 13
- Chile - Decreto Ley 211 - Ley de Competencia
- Chile - Ley General de Telecomunicaciones
- Comments of FCC General Counsel Wright - Introducing the Transactions Team Presentation on Timely Consideration of the Applications Accompanying Mergers
- Competition Law and Policy in Chile - A Peer Review
- Consolidated Version of the Treaty Establishing the European Community
- Creating the “Right” Enabling Environment for ICT
- Directorate General Competition - Best Practices on the Conduct of EC Merger Proceedings
- Dominican Republic - Proyecto de Ley de Defensa de la Competencia
- Draft Black Economic Empowerment Charter for the ICT Sector
- EC Merger Regulation
- EU Accession Negotiations Guide
- EU Directive on Competition in the Markets for Electronic Communications Networks and Services
- European Commission Recommendation on Relevant Product and Service Markets Susceptible to Ex Ante Regulation
- European Regulators Group - Common Position: Appropriate Remedies in the New Regulatory Framework
- Federal Communications Commission - Foreign Ownership Guidelines
- Foreign Direct Investment in Developing Asia
- Foreign Direct Investment in Latin America
- Foreign Direct Investment in Least Developed Countries

- GATS - Schedule of Specific Commitments - Supplement 1 Revision 1
- GSM Tax Report
- ICASA Foreign Ownership Regulation
- India - Competition Act 2002
- India - New Telecom Policy 1999
- India - Telecom Regulatory Authority of India Act 1997 - Chapter I
- India - Telecom Regulatory Authority of India Act 1997 - Chapter IV
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- India - Telecom Regulatory Authority of India Act 1997 - Chapter III
- India - Telecom Regulatory Authority of India Act 1997 - Chapter V
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- Organisation for Economic Co-Operation and Development Overview of Regulatory Reform in Germany 2004
- Procedimiento no Contencioso: Operacion de Concentracion entre Empresas: Telefonica Moviles-Bellsouth
- South Africa Competition Act as Amended
- South Africa Competition Second Amendment Act 2000
- South Africa Independent Communication Authority of South Africa and Competition Commission MOU
- South Africa Policy Framework
- Speech by Viviane Reding: The Review of the Regulatory Framework for E-Communications
- Summary of the OECD Roundtable on Communications Convergence
- The Digital Trade Agenda of the US - Parallel Tracks of Bilateral, Regional and Multilateral Liberalization
- The Relationship between Competition Authorities and Sectoral Regulators - Contribution from Chile
- Tratamiento del Control de Fusiones en el Anteproyecto de Ley de Defensa de la Competencia de la Republica Dominicana: Consideraciones Institucionales
- Treaty of the Economic Community of West African States
- UN General Assembly - World Summit on the Information Society Resolution
- US - Competition Organisation for Economic Co-operation and Development 2005
- US - Trade Act of 2002
- US 1992 Horizontal Merger Guidelines
- US Spam Act
- US Supreme Court Decision - Verizon v Trinko LLP 2004
- US Telecommunications Act of 1996
- West African Common Market Project: Harmonization of Policies Governing the ICT Market in the UEMOA-ECOWAS Space
- World Trade Organization - Services Sectoral Classification List

6.3.1 IMPACT OF DIFFERENT LEGAL TRADITIONS ON THE REGULATORY FRAMEWORK

3.1.1 SNAPSHOT OF DIFFERENT LEGAL TRADITIONS

Regulation does not occur in a vacuum, and the establishment of a legal and regulatory framework is determined in large part by a country's specific legal tradition. The conception of law and legal system differs depending on the country and is often rooted in perceptions based on customs, culture, religion, and politics.[*] For example, in certain countries, law is viewed as a "model code of behaviour," while in others it is considered an "instrument of compulsion."[*] Today, we have numerous classes of legal systems: civil, common, socialist, Islamic, Hindu, and

African, to name a few. Among these, the most prominent in modern times are common law and civil law legal traditions. The map on Figure 3-A shows some of the predominant legal systems around the world.

It is difficult to point to one country that has a pure legal tradition without influence from other systems. For historical reasons, as well as political and economic influences, the legal systems of countries are often an amalgamation of various legal systems, incorporating elements of different legal traditions. For example, many countries in the Middle East and Africa have legal systems based on a mixture of legal traditions. Algeria has a mixed legal system (i.e., socialist, French civil law, and Islamic law) whereas Cameroon has a civil law system, with elements of common law. Moreover, sometimes two countries may have different legal systems, but may have similar elements in their legal frameworks; for example, both may have the same type of government structure (e.g., federal republic versus unitary state).[*] This occurs in countries such as Brazil, the United States, and Germany, where there is a distinction between federal law and state law, as opposed to countries that follow a unitary state model, such as China, France, and United Kingdom.[*]

◂ **Figure 3- A: Legal Traditions Around the World**

Source: Université d'Ottawa [University of Ottawa] Faculty of Law, **http://www.droitcivil.uottawa.ca/world-legal-systems/eng-monde.php**

Note that this map only includes Civil law, Common law, Customary law, Muslim law, and Mixed law systems. Other legal systems such as the African legal system and the Socialist Legal System are not depicted in this map.

6.3.1.1 SNAPSHOT OF DIFFERENT LEGAL TRADITIONS

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◂ Figure 3- A: Legal Traditions within the World

Source: Université d'Ottawa [University of Ottawa] Faculty of Law,
http://www.droitcivil.uottawa.ca/world-legal-systems/eng-monde.php

Note that this map only includes Civil law, Common law, Customary law, Muslim law, and Mixed law systems. Other legal systems such as the African legal system and the Socialist Legal System are not depicted in this map.

6.3.1.2 REGULATORY FRAMEWORKS IN DIFFERENT LEGAL SYSTEMS

The last two decades years has resulted in dramatic changes in the telecommunications regulatory frameworks of many countries as a result of market liberalization. Some degree of regulatory reform has been implemented in most countries, including the establishment of independent regulators in 131 countries by 2005.[*] As a result of these changes, regulatory models have been developed incorporating internationally recognized best practices, despite the countries having different legal traditions. In implementing these models, the legal tradition has influenced the procedure and approach towards the achievement of the policy and regulatory goals that support such best practices, but has not necessarily determined the content of the telecommunications regulatory framework.[*]

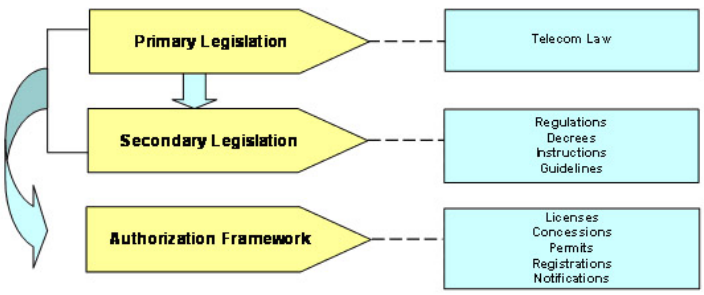
Similarly, the process of globalization and world trade has played a significant role in shaping the content of a country's regulatory framework. As further discussed in Section 3.3, countries seeking to attract investment in their telecommunications sectors, strengthen their economies and engage in bilateral and multilateral trade integration, are often required to fulfil several regulatory preconditions aimed at the removal of market barriers. For example, the World Trade Organization (WTO) Reference Paper, which articulates the principles of a telecommunications regulatory framework, has been adopted by close to 90 countries throughout the world. (See **Table 3-1** for examples of countries with different legal traditions that have committed to the WTO Reference Paper.) This Reference Paper requires countries to establish an independent regulator, as well as incorporate fundamental tenets into their telecommunications regulatory framework regarding interconnection, universal service, competitive safeguards, licensing criteria, and allocation and use of scarce resources.

Practice Notes

- **Table 3-1: Countries Committing to WTO Reference Paper with Different Legal Traditions [3.1.2]**

6.3.1.3 IMPLEMENTATION OF REGULATORY DESIGN

The design of legal instruments used to regulate the telecommunications sector may vary depending on the legal tradition of a country. Generally, however, the legal framework follows a hierarchy beginning with primary legislation, such as laws and decrees from which secondary legislation such as regulations, resolutions and guidelines follow (see Figure 3-B). This legislation, in turn, provides the legal basis for the regulator or the relevant ministry to issue authorization instruments such as licences, concessions, and permits to operators. This legal hierarchy provides certainty and predictability to consumers and other stakeholders because it specifies the rights and obligations (*i.e.*, the rules of the game) that apply to the sector. Such hierarchy provides assurances to stakeholders that secondary legislation (*e.g.*, rules, decrees and instructions) cannot be used by the government to nullify certain rights and obligations set forth in primary legislation. This stable environment, in turn, encourages investment and increases consumer confidence in the sector.



◂ Figure 3- B: Hierarchy of Regulatory Frameworks

Primary Legislation

The primary legislation for the sector should consist of the framework that will be used to regulate the sector. To the extent possible, this should be issued through a legal instrument not susceptible to easy revocation by a government authority in order to ensure stability and predictability. It should lay out the basic elements and framework, such as the establishment of the regulator, the powers and responsibilities of the regulator, the role of the minister responsible for communications (if applicable), enforcement powers and ability to sanction. While the primary legislation should address fundamental regulatory issues such as universal service and interconnection, the details of such issues are better addressed through secondary legislation. When looking at primary legislation in both civil and common law traditions, many of the same elements are included, as noted in **Table 3-2**.

In countries with civil law traditions, however, subject areas covered by the principle of legal reserve (*i.e.*, subject matters that have been constitutionally reserved to regulation by an instrument with the hierarchy of a law) also may need to be included within the text of primary legislation. Such subject areas typically encompass direct limitation of individual rights (*e.g.*, the right to free enterprise and property, or freedom of speech) as well as the regulation of prohibited conduct and applicable sanctions. Moreover, in civil law jurisdictions it is often the case that in order to regulate certain matters through secondary legislation, they must be referred to in the primary legislation. Further, the extent of specificity contained in the primary legislation from civil law jurisdictions is mixed. In certain countries, such as Bulgaria,[*] the primary legislation is quite comprehensive, including extensive details regarding the licensing framework, universal service, interconnection, consumer interests, fees, and sanctions; whereas, in countries such as Algeria,[*] the primary legislation address similar issues, but the provisions are much less detailed.

Secondary Legislation

The more detailed elements of regulatory issues may be addressed best in secondary legislation, which can be amended and modified more easily to complement the pace of technological development without the intervention of the legislature. Typical regulatory issues addressed through secondary legislation include interconnection, competitive safeguards, numbering, universal service, and tariffs.

Secondary legislation may take different forms (*e.g.*, regulations, instructions, decrees, guidelines) and depending on the jurisdictions there may be a hierarchy with regard to the secondary legislation. For example, in Spain, regulations may only be issued by the minister, as the regulator only has authority to issue "instructions." This challenges the independence of a regulator to establish its own policy because the ministry can always issue a regulation that modifies an "instruction" issued by the regulator.

Authorization Instruments

A variety of "authorization" instruments are used by governments to grant an entity the right to undertake certain activities in the telecommunications sector (*e.g.*, provide telecommunications services, operate networks, and use spectrum). These instruments include concessions, franchises, delegations, licences, permits, and other forms of authorizations.[*] Typically, the general authorization framework is set forth in the primary legislation and further expanded upon and described in specific detail in secondary legislation.

Administrative acts and administrative contracts

In civil law jurisdictions, the "authorization" instrument often is either a unilateral administrative act or a bilateral administrative contract. A bilateral administrative contract when used as an "authorization" instrument generally is a concession, franchise, delegation or other type of agreement. However, not all contracts entered into with public entities are administrative contracts. In comparison to licences, concessions, franchises and delegations are more often in the form of an administrative contract than a unilateral administrative act. Typically, an administrative contract requires the consent of the parties to be amended. Thus, some investors find concessions (as well as franchises and delegations) to be a more attractive vehicle than a licence.

Usually, a telecommunications licence is a unilateral administrative act, rather than an administrative contract. Although different views exist as to whether an administrative act can be unilaterally amended or revoked, it is considered a more flexible instrument than an administrative contract.

In certain jurisdictions, such as Jordan, the "licensing" instrument consists of a licence and an administrative contract (*i.e.*, licensing agreement). Jordan's Telecommunications Law provides that "the licence shall be issued by virtue of a resolution by the Board, provided that a contract of an administrative nature is drawn including the following terms and conditions in addition to any other conditions stipulated in this law, or the regulations issued pursuant thereto, or any exceptions determined by the Board: (…)."[*]

Shift away from concessions

While moving towards liberalization, some countries permitted the delivery of telecommunications services through the unilateral issuance of licences or concession contracts between the relevant government authority and the private party authorized to provide a particular service. As countries implement regulatory reforms, however, they are typically shifting away from concessions and moving to licences, permits, notifications and registrations which tend to be more straightforward and uniform. Moreover, in many countries, licensing instruments are much more streamlined, with the terms and conditions associated with the licence generally addressed in secondary legislation rather than the licence. From a regulator's standpoint, this is a less cumbersome process because changes do not have to be introduced to each licence that has been issued, rather changes can be introduced by amending, or issuing new secondary legislation.

Practice Notes

- **Table 3-2: Jamaica and Brazil - Comparison of Telecommunications Laws in Civil and Common Law System [3.1.3]**

6.3.2 IMPACT OF MULTILATERAL AND REGIONAL COMMITMENTS

Significant developments have taken place on a global (*e.g.*, WTO) and regional (*e.g.*, EU) level to foster the trend of market liberalization and competition. As countries make global and regional commitments to open their telecommunications markets to foreign investment and harmonize local legislation with that of other countries in similar geographic or economic situations, such commitments may serve as a means to accelerate regulatory reform, facilitate global or regional best regulatory practices, and provide telecommunications investors with a level of certainty and predictability. A list of countries that established independent regulators after undertaking WTO and other regional commitments can be found at the **ITU ICT Eye**. In addition, such multilateral and regional frameworks also serve to establish government accountability in ensuring a certain level of transparency and market-oriented regulation.

The extent and consequences of such commitments vary by country and generally have less to do with a country's legal system, and more to do with a country's political and economic situation and the level of development and competition in its telecommunications market.

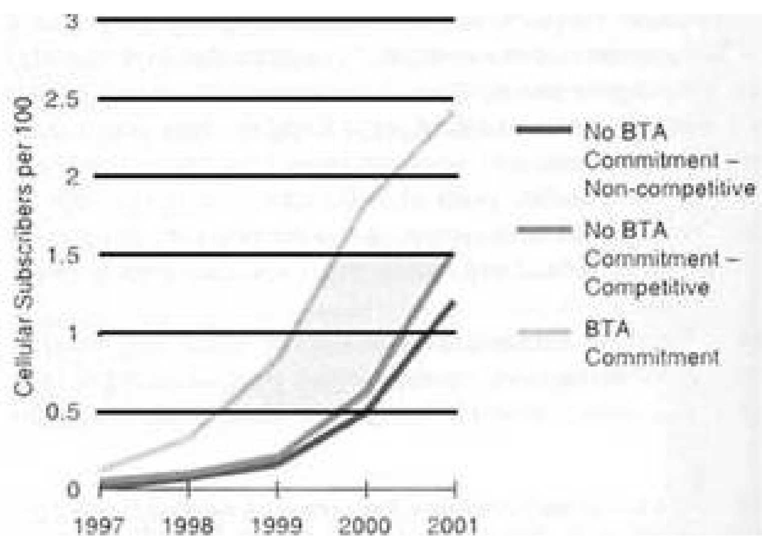
6.3.2.1 ROLE OF THE WORLD TRADE ORGANIZATION

Created in 1994 as a result of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), the World Trade Organization (WTO) is a global international trade organization that develops international commerce rules and mediates trade disputes among its members. The WTO brings together 148 members**1** that participate in negotiations and binding commitments concerning the promotion of competition and the liberalization of international trade of goods and services.

General Agreement on Trade in Services

Concluded in 1997 under the auspices of the WTO, the Fourth Protocol to the General Agreement on Trade in Services (**GATS**) represents one of the major steps towards liberalization of the global telecommunications marketplace and the establishment of liberalization.2 The purpose of GATS is to facilitate liberalization of trade in services. Two types of obligations exist under GATS: (i) general obligations that apply to all members and all service sectors covered under GATS regardless of whether or not specific commitments have been made; and (ii) sector-specific commitments regarding market access and national treatment for sectors and activities that members agree to open to international trade.

- Under the general obligations, there are two main principles: (i) WTO member countries must afford each other most favored nation (MFN) treatment (i.e., prohibition on discrimination that requires countries to afford "treatment no less favourable than that accorded to like services and service suppliers of any other country");3 and (ii) countries must ensure transparency of local regulations (e.g., countries should publish measures of general application, and allow a period of public comment prior to their issuance).
- Sector-specific commitments are made regarding market access;4 national treatment;5 and other additional commitments.6 WTO members make commitments on market access and national treatment based on one of the following four modes of supply: (i) cross border supply;7 (ii) consumption abroad;8 (iii) commercial presence;9 and (iv) presence of natural persons.10 Studies show that since 1997, countries that made GATS commitments have experienced faster levels of fixed-line penetration, mobile subscribership, and telecommunications sector revenues.11 In particular, just between 1997 and 2001, low-income Sub-Saharan Africa countries that scheduled commitments out-performed those that did not (see Figure 3-C).[*]



◂ Development/Economic Impact of WTO on Low-Income Countries in Sub-Saharan Africa

Basic Telecommunications Agreement

The series of telecommunications commitments that make up a portion of the GATS are referred to as the WTO Basic Telecommunications Agreement (BTA).**13** (See Box 3-1.) The BTA established the basis for structural reform of the telecommunications sector aimed at removing barriers to entry and competition, and the adoption by the majority of members of certain pro-competitive regulatory principles that are set out in the "Reference Paper on Regulatory Principles."**14**

These telecommunications commitments apply to basic telecommunications and certain value-added services, but not to audiovisual services. To date, 105 of the 148 WTO members have made commitments under the BTA. Ninety-eight WTO members have made specific commitments on basic telecommunications and 89 members with respect to value-added telecommunications services.**15**

Definitions/Coverage:

Telecommunications services (covered under the BTA):

- *basic telecommunications services* are public and private telecommunications services that involve end-to-end transmission of customer supplier information. These include voice telephone services, packet-switched data transmission services, circuit-switched data transmission services, telex services, telegraph services, facsimile services, and private leased circuit services.
- *value added-services* are services for which suppliers enhance the form or content of the customer's information, thereby "adding value" to the customer's information, and include electronic mail, voice mail, on-line information and data base retrieval, Electronic Data Interchange (EDI), enhanced/value-added facsimile services, including store and forward, and store and retrieve, code and protocol conversion, on-line information and/or data processing (including transaction processing), and other services.

Audiovisual services involve the dissemination of content, including motion picture and video tape production and distribution services, motion picture projection services, radio and television services, radio and television transmission services, and sound recording.

Key Documents:

- GATS (general obligations and Fourth Protocol);
- GATS Annex on Telecommunications;
- Schedules of specific commitments and exemptions (country-specific); and
- Reference Paper.

The purpose of GATS is not to regulate competition, but to ensure that members that have made commitments do not establish regulations that would hinder the international trade of services.

WTO membership does not entail automatic submission to the BTA as countries must expressly make commitments through their respective schedule of commitments. These schedules may contain modifications or derogations from the overall text. Members are free to include in their schedules the sectors and activities that will be covered under the commitments. Commitments are made by identifying a particular subsector in the respective schedule and therefore only the services listed in a schedule are open to international trade, subject to any limitations or conditions set forth in the applicable schedule. As a result, if a sector or activity does not appear listed in a schedule it means that a commitment has not been made regarding that sector or activity, and it is not open to international trade.[16]

Countries can make BTA commitments as part of their accession to the WTO, as part of a formal round of negotiations (*e.g.*, the Doha round of negotiations launched in November 2001), or unilaterally. As a result of the MFN treatment imposed under GATS, a telecommunications commitment made by a WTO member benefits all members regardless of whether or not such other members have made commitments. GATS rules also apply to the provision of services by monopoly service providers, to the extent the provider has been granted special or exclusive rights to provide the service under monopoly (*i.e.*, the rules do not apply to *de facto* monopolies).[17]

Telecommunications services and audiovisual services appear as different subsector classifications under the main "Communications" sector heading of the GATS Services Sector Classification List.[18] While the structure of these schedules is the same, countries were given the flexibility of creating distinctions or sub-divisions within the telecommunications sector heading (*i.e.*, local, long distance and international; wire and radio-based; public or non-public; and resale or facilities-based services), making limitations on market access or national treatment, and in certain cases, adding technological conditions (*e.g.*, for satellite access). As a result, the items and terms included under each classification vary among members, creating potential discrepancies in the manner in which countries classify different types of services.[19]

These commitments are important documents that establish international obligations undertaken by countries and are a clear reference for potential foreign investors on the countries' liberalization strategy. Countries may decide to gradually open their market to competition or to take a more aggressive approach. However, they must clearly specify in their commitments where and for how long they wish to restrict their commitments.

Ghana, for example, undertook commitments aimed at phasing in competition over a given period. More specifically, Ghana committed to:[20]

- Duopoly operators for the provision of local, domestic and international long distance services, and private leased circuit services for an exclusive five-year period, ending in 2002. Additional suppliers of local services can be licensed to supply underserved areas where duopoly operators have declined right of first refusal.
- Full competition in data transmission, Internet and Internet access (excluding voice) and teleconferencing.
- Mobile services (terrestrial and satellite-based) including mobile data services, fixed satellite services, paging and cellular with the reservation that cross-border voice services can only be supplied through commercial arrangements with the duopoly operators.
- The Reference Paper on regulatory principles.

However, Ghana stated in its commitments that the government would conduct a review of its policy after the duopoly period so as to determine whether to license additional telecommunications services suppliers. Pursuant to the country's Telecommunications Policy implemented in 2005, Ghana has opened several markets to competition, including international gateway, mobile services, and fixed satellite services.[*]

This is different from Jordan's WTO commitment where the Government specified that no restrictions would exist after 1 January 2005. Jordan's commitments are based on a WTO Chairman's Note S/GBT/W/2/Rev.1 dated 16 January 1997. This Note foresees that unless otherwise noted in the sector column, any basic telecommunications service listed encompasses local, long distance, and international services for public and non- public use; that it may be provided on a facilities-basis or by resale; and that it may be provided through any means or technology (*e.g.*, cable, wireless, or satellites).*

Jordan's commitments also indicate that it has removed market access limitations on spectrum availability pursuant to another WTO Chairman's Note S/GBT/W/3 dated 3 February 1997. This Note recognizes the right of all WTO members to exercise spectrum/frequency management that may affect the number of service suppliers provided this is done in accordance with the relevant provisions of GATS.

The effects of the BTA extend beyond the countries that have made commitments thereunder, with some countries, such as the United States, adopting parallel commitments under bilateral agreements beyond the scope of the WTO (see Box 3-2).

◂ **Box 1Beyond the WTO: U.S Harmonization Efforts**

Given the slow progress of the Doha Round of negotiations and the uncertainty as to the treatment of certain converged services under the WTO classification framework, the United States has sought to fulfil certain of its trade objectives by means of such bilateral and regional trade agreements. As a result, numerous countries have adopted telecommunications commitments outside the scope of the WTO that are similar to, or which extend beyond, those under the BTA pursuant to these bilateral and regional free trade agreements.

In 2002, the U.S. Congress passed the Trade Promotion Authority Act allowing the executive branch to negotiate trade agreements where Congress can only vote to approve or reject the agreements, without making any modifications (this process is referred to as "fast-track authority").22 Within this authority is the mandate for the United States Trade Representative (USTR) to ensure that the agreements concluded foresee and prevent trade barriers in digital services, including the trade of digital services and goods (the "digital trade agenda").23 Under such fast-track authority and the USTR mandate, to date the United States has concluded eight free trade agreements (and is in the process of negotiating three other agreements, including the U.S.-Andean FTA with Peru, Ecuador and Colombia, and the U.S. SACU FTA, with five member countries of the Southern African Customs Union (SACU) -- Botswana, Lesotho, Namibia, South Africa and Swaziland) where countries have generally agreed to an open and competitive telecommunications market, and removing barriers to the trade of digital goods and services.24 In broad terms, all trade commitments under the FTAs (except for few carve-outs – *e.g.*, Costa Rica, under the CAFTA), provide for: (i) reasonable and non-discriminatory access to the networks of the signatory parties; (ii) the right of telecommunications companies to interconnect with networks in the signatory countries at nondiscriminatory, cost-based rates; (iii) non-discriminatory access to facilities, such as telephone switches and submarine cable landing stations; (iv) the ability to lease elements of telecommunications networks on non-discriminatory terms and to resell such telecommunications services; (v) the recognition by each signatory of the importance of supplying services by electronic means as a vehicle to establish a vibrant e-commerce environment; (vi) non-discriminatory treatment of digital products; and (vii) the protection of intellectual property rights. To a large extent, these principles parallel those under the WTO's Reference Paper, but extend these obligations to digital services and goods that may not be covered under certain countries' WTO commitments.

The United States has also used the FTA as a means to further expand the scope of WTO commitments of certain countries or to achieve some of the same objectives sought under the WTO. For example, the recently approved U.S.-Central American Free Trade Agreement (CAFTA) is directed to promote trade liberalization between the United States and Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. Although some of the CAFTA countries are WTO members, they had not fully adopted the BTA or the WTO Information Technology Agreement. However, in signing CAFTA these countries committed to a chapter on telecommunications services that incorporates many elements of the BTA and the Reference Paper. In addition, CAFTA, which was substantially modeled after the ten-year old North American Free Trade Agreement (NAFTA), also contains a relevant section directed to the liberalization of telecommunications among the signing parties. Thus, through CAFTA, Costa Rica, for the first time made a commitment to open its market to foreign competition in Internet services, private data networks, and wireless services. CAFTA also requires the Dominican Republic, Guatemala, Honduras and Nicaragua to join the WTO ITA so that U.S. high-tech exports enter their markets duty-free.*

WTO Reference Paper

The Reference Paper, which consists of six principles that serve as a "checklist of 'success' of telecommunications reform in many countries," * was conceived as a necessary instrument for the removal of regulatory barriers to market access, and its implementation is aimed at preventing anticompetitive practices by major suppliers.* Members may adopt the Reference Paper in whole or in part, and by doing so, they commit to maintain appropriate regulatory measures to ensure a competitive marketplace, as well as transparent and fair regulatory procedures. The six Reference Paper principles are:

- *Competitive safeguards*: Members are required to establish competitive safeguards preventing major suppliers from engaging in anticompetitive conduct. The Reference Paper does not define competitive safeguards or anticompetitive practices; this is left for each member to determine in its national legislation. However, the Reference Paper lists certain examples of anticompetitive practices including: anticompetitive cross-subsidization; use of information obtained from competitors with anticompetitive results; and withholding technical data.
- *Interconnection*: Major suppliers (*i.e.*, those with the ability to materially affect the terms of price and supply in the market by exploiting their control over "essential facilities" or their position in the market) of members are required to provide interconnection upon request,

under non-discriminatory terms and conditions, and at cost-orientated rates that are transparent and feasible.

- *Universal service*: Members have the right to define the kind of universal service obligation they wish to maintain, provided such obligations are not anticompetitive *per se*, and are administered in a transparent, non-discriminatory and competitively neutral manner. Universal service obligations may not create unnecessary burdens on service suppliers.
- *Public availability of licensing criteria*: To the extent a licence is required, members should make publicly available: (i) the licensing criteria and the time it will take to decide on a licence application; and (ii) the terms and conditions of individual licences.
- *Independent regulators*: Members should ensure that the regulatory authority is separate from, and not accountable to, any supplier of basic telecommunications services, and that their decisions are impartial with respect to market participants. This requirement seeks equal, transparent and objective treatment of all operators in the market.
- *Allocation and use of scarce resources*: Allocation and use of scarce resources (*i.e.*, frequencies, numbers, and rights of way) should be carried out in an objective, timely, transparent and non-discriminatory manner, and the allocation of frequency bands should be made publicly available. Details of government-use frequencies do not have to be made publicly available.

To date, close to 90 countries have committed to adopting the Reference Paper.[*] The Reference Paper has been criticized for its general nature and the fact that it does not prescribe the manner in which these principles should be applied. However, it has provided countries with a baseline approach of what are considered the "minimum standards of international good practice."[*] Moreover, it can be, and has already been, used as a vehicle to evaluate the appropriateness of existing measures or the lack thereof under the WTO's dispute settlement mechanism (the decisions of which are binding upon WTO members). (See Section on "WTO Dispute Settlement Mechanism" below for a discussion on the U.S.-Mexico Panel Report.)

Annex on Telecommunications

Concluded at the Uruguay Round, the GATS Annex on Telecommunications recognizes that access to and use of public telecommunications networks are essential to the effective provision of services covered under GATS and requires WTO members to allow suppliers of scheduled services to use the "public telecommunications transport network and services" on reasonable and non-discriminatory terms.[*] This obligation extends to any kind of service sector for which a schedule has been made accepting specific market access and national treatment (*e.g.*, value-added services, banking services, legal services, and computer services) regardless of whether the particular country has liberalized its basic telecommunications sector. As a result, the Annex on Telecommunications does not deal with market access to basic telecommunications (as this is dealt with in each member's schedule) and does not specifically require liberalization of telecommunications services; rather it deals with the ability of service suppliers to access such services. Such ability is limited by the right of the network owner to establish access and use conditions that address public service responsibilities, the protection of the technical integrity of the network or to deny use of the network for services not covered under any schedule of commitments.

Audiovisual Services

Also under the "Communications" sector list are audiovisual services (*i.e.*, motion picture and videotape production services, motion picture projection services, radio and television services, sound recording, and others). These services are not covered under the BTA, and the national laws of each country are used to interpret the services that fall under the audiovisual subsector (*e.g.*, for most WTO member countries, satellite services fall under broadcasting/audiovisual activities, but under U.S. legislation these are considered telecommunications services).**32**

Audiovisual services are not as liberalized as telecommunications services and many countries maintain rules prohibiting foreign ownership of broadcasters and reception of foreign satellite television programming. Some countries expect to achieve greater liberalization of these services through the Doha Round of negotiations; however, there have been challenges in achieving a unified approach since a division exists between those countries with a strong interest to export audiovisual services and those whose cultural and/or economic objectives direct them to protect their domestic industries.

New Round of Services Negotiations

WTO members commit to progressively liberalize trade in services through periodical rounds of negotiations.33 The Doha Round of negotiations launched in 2001 (i.e., Fourth Ministerial Conference in Doha, Qatar) included negotiations of telecommunications services and audiovisual services, and there were proposals to: (i) update the listing of services; (ii) negotiate an e-commerce classification; (ii) enhance provisions on regulatory independence; and (iii) limit licensing and universal services fees. More generally, the 2001 Doha Ministerial declaration reaffirmed the GATS Treaty and adopted the position that the negotiations on trade in services must be "conducted with a view to promoting the economic growth of all trading partners and the development of developing and least-developed countries."[*]

Although further Ministerial discussions on the Doha negotiations have taken place in Cancún in 2003, Geneva in 2004, Hong Kong in 2005 and Geneva in 2006 and 2008, negotiations are still underway. In the current Doha Round of negotiations, the objectives of many of the negotiating requests made by WTO members to their trading partners regarding telecommunications are related to additional reforms to open markets and the binding of recent reforms, including a commitment to refrain from increasing a rate of duty beyond an agreed-upon level.[*]

At the 2005 Hong Kong Ministerial, a new sector-specific negotiating mechanism was mandated by the trade ministers, including the following negotiating objectives as outlined by WTO members in the Chairman's note to the Trade Negotiations Committee:[*]

- achievement of broad telecommunications coverage in a technology-neutral manner and significant commitments in all modes of supply;
- cooperation with least-developed countries and developing countries to promote new and improved offers and to provide technical assistance to support this process;
- reduce or eliminate exclusive rights, economic needs tests (i.e., tests using economic criteria to decide whether the entry into the market of a new foreign firm is warranted), restrictions on the types of legal entity permitted and limitations on foreign equity;

- commitment to all provisions of the telecommunications reference paper; and
- elimination of exemptions to most-favored nation (MFN) treatment to ensure non-discrimination.

Regulatory Impact of WTO commitments

WTO commitments constitute legally binding obligations on members, enforceable through the WTO's binding dispute settlement process. As a result, the impact of WTO commitments on a country's regulatory framework can be seen through voluntary compliance of a member's commitments or as a result of enforcement through the WTO's dispute settlement mechanism.

Voluntary Compliance

WTO commitments may have a greater impact on developing countries than on developed countries. For many developed countries, adoption of the GATS principles was a reinstatement of pro-competitive liberalization policies that were already in place and compliance with GATS did not require substantial legislative reform. However, for many developing countries, liberalization of their telecommunications market required certain reforms to their telecommunications legislation and structure.

GATS seeks the establishment and enforcement of a framework without creating unnecessary barriers to trade. [*] It explicitly recognizes members' right to regulate the supply of services in order to meet national policy objectives, and therefore liberalization does not imply deregulation. One of the main objectives of GATS with respect to developing countries is to increase their participation through progressive liberalization, taking into account their development levels.[*] To achieve such liberalization and comply with GATS telecommunications commitments, many WTO members were required to modify their laws to reflect compliance with their international commitments (*e.g.*, implementing transparent regulatory structures and procedures,establishing an independent regulator; and removing market access barriers). While GATS does not require members to privatize the incumbent operators, many countries did engage in privatization and liberalization efforts as a means to introduce competition in the market. However, even when countries have adopted the legal and structural reforms necessary to comply with their WTO commitments, effective competition and adequate enforcement of a regulatory framework may sometimes be hindered by the size of the market and the country's lack of technical, financial, and human resources.

For example, Bangladesh has been WTO a member since its inception in 1995. Bangladesh did not expressly agree to adopt the Reference Paper.[*] Instead, Bangladesh agreed to review the creation of regulatory disciplines, including specific commitments to: [*]

- issue licences to two additional fixed-line operators;
- introduce full competition in voice and data transmission over closed user groups and Internet access services;
- grant licences to four mobile telephone service suppliers; and
- make no limitations on national treatment (subject to certain subsidies and tax benefits that may only be extended to national operators).

In 2001, Bangladesh approved the Telecommunications Act, establishing an independent regulator and setting the stage for telecommunications reform. Mobile licences were also issued to four companies, which has permitted growth and competition in the sector. Licences were also granted to fixed-line operators, but competition and growth in this market has been slower as a result of interconnection issues with the fixed incumbent telecommunications operator.[*] Bangladesh is expected to privatize the incumbent operator and remove additional barriers that still exist in the mobile services market (*i.e.*, restrictions on interconnection with the incumbent operator).[*]

Also illustrative of the impact of the WTO is Uganda. Although a founding WTO member, Uganda made GATS commitments on basic telecommunications unilaterally (*i.e.*, not as a part of formal negotiating rounds) and revised these commitments in 1999 as a result of the introduction of competition and privatization of the incumbent operator. In its schedule of specific commitments Uganda:

-
    - agreed to adopt the Reference Paper;
    - maintained the right of duopoly major licence holders and other pre-existing licence holders over international gateway services (including international roaming for mobile services) "according to the terms of those licences"; and
    - agreed to grant licences to three mobile carriers.

Uganda began its telecommunications liberalization process in 1994 with the introduction of competition in the mobile sector where three operators currently compete. Liberalization of the fixed-line market began in 1997 when it awarded a second licence to a fixed-line operator, granting it "shared-exclusivity" with the incumbent telecommunications operator until 2005. In 2006, a new, technology-neutral licensing regime was adopted that further liberalized the telecommunications sector, including the licensing of more than a dozen facilities-based operators.[*]

Other countries that were not WTO founding members, but have acceded to the WTO post BTA, have been required to undertake significant market restructuring as part of their accession, including dismantling of their monopoly telecommunications operators. For example, Croatia and Georgia, which entered telecommunications commitments in 2000, were required to open their telecommunications market to competition by removing existing monopolies by 2003 and 2004, respectively.[*] In 2001, Moldova also agreed to lift the existing monopoly by 2003.[*]

WTO Dispute Settlement Mechanism - Effects of the DSB decision within Mexico

The impact of WTO commitments in the shaping of national legislation also can be seen in the context of the dispute settlement mechanism provided in GATS. WTO Dispute Settlement Body (DSB) rulings are binding for the members upon which judgment has been passed, and are automatically adopted unless there is a consensus to the contrary.[*] In this sense, dispute settlement constitutes a coercive mechanism for enforcing members' WTO commitments in such cases where voluntary compliance is not forthcoming. Hence, such disputes may arise, for example, when one member takes, or omits to take, certain actions that another member state deems a breach of pre-existing WTO commitments. WTO rules exclude individual service providers from directly seeking relief, but the service provider may seek its country of origin government to put pressure on another country's government to comply with its GATS obligations, and ultimately activate the dispute settlement procedure.

To date, only one telecommunications case has been submitted to the DSB: a case involving trade of services between the United States and Mexico, which resulted in the Report of the Panel on Mexico's Measures Affecting Telecommunications Services (the Panel Report).[*] In 2000, after failed bilateral talks, the United States initiated a WTO consultation proceeding claiming Mexico's failure to comply with its commitments under the GATS Annex on Telecommunications and the Reference Paper with respect to basic and value-added services. Mexico's schedule of commitments (adherence to the Reference Paper, market access, and national treatment) required it to:

- ensure cost-orientated interconnection;
- prevent anticompetitive practices; and
- ensure that foreign service suppliers have access to Mexican public telecommunications networks.

The United States claimed that Mexico:

- Failed to ensure that local operator, Telmex, provide interconnection to U.S. suppliers on cost-orientated, reasonable rates, terms and conditions (*i.e.*, inconsistency with interconnection principles under the Reference Paper).
- Maintained legislation that failed to prevent anticompetitive practices by Telmex, allowing it to establish international interconnection rates on behalf of all of the suppliers in the market (*i.e.*, inconsistency with the competitive safeguards principles under the Reference Paper).
- Failed to comply with the Annex on Telecommunications, as U.S. suppliers were unable to access Mexico's public telecommunications network for the provision of certain international services (*i.e.*, non-facilities based services through Mexican commercial agencies, "comercializadoras," and international simple resale through cross-border leased circuits).

As a result of the failed consultation proceedings, in 2002, a Panel was constituted, concluding with the DSB Panel Report in June 2004 which found that Mexico had breached several of its WTO telecommunications obligations. As a result, the United States and Mexico agreed on an implementation timetable addressing the compliance issues laid out in the Panel Report. According to such compliance agreement, Mexico was required to:

- Revise its International Long Distance Rules (the ILD Rules), eliminating those aspects of the existing ILD Rules that implemented the "uniform settlement rate" system, the "proportional return" system, and the requirement that the carrier with the greatest proportion of outgoing traffic to a country negotiate the settlement rate on behalf of all Mexican carriers for that country. All such practices were deemed by the Panel Report to be a breach of Section 1.1 of the Reference Paper.[*] Thus, the new ILD Rules had to allow the competitive commercial negotiation of international settlement rates.
- Maintain regulations authorizing the issuance of permits for the resale of international long distance public switched telecommunications services. Such regulations would have to regulate commercial agencies (comercializadoras) established in Mexico and permit them to purchase and resell these telecommunications services through the use of capacity of concessionaires. The absence of such regulations was deemed by the Panel Report to be a breach of Article 5 (a) and (b) of the Annex on Telecommunications.

In light of this compliance schedule, Mexico has undertaken the following reforms:

- New international long distance telecommunications rules[*] were approved providing for the competitive negotiation of settlement accounting rates or international interconnection rates, including prices for incoming and outgoing traffic.[*] In addition, foreign operators now are free to decide which Mexican operator they wish to use to terminate their traffic in Mexico.[*]
- With regards to the rules for licensing of "comercializadoras," Mexico issued Regulations for the Resale of Long distance and International Long distance Telecommunications Services, allowing the commercial resale of long distance and international long distance services originating in Mexico. This regulation authorizes the issuance of licences for the resale of international long distance public switched telecommunications services.

Converged Services in the WTO Framework

Regulatory frameworks that are vertically structured around industries and more service-orientated, face greater challenges in adapting to and enabling convergence. While the WTO framework was an important step towards removing traditional barriers to trade and competition in the telecommunications market, its vertically segmented structure may lead to an un-harmonized approach towards convergence. As shown above, communications subsectors are technology oriented, and may not provide the flexibility necessary to accommodate new converged services.

A 1998 note by the WTO Secretariat highlighted that the GATS "classification of services [may be] inadequate […] to meet the rapid changes of the sector […] and any other list that might be devised could become quickly out of date." Moreover, the lack of specificity regarding the scope and services under each commitment creates a degree of uncertainty about members' commitments in connection with converged services. Moreover, WTO members have the flexibility to use their national legislation to interpret or define the category of services for which commitments have been made and therefore the treatment and liberalization of the same service may vary by country. The evolution of convergence has caused the vertical separation of services and industries to disappear, making the WTO's service-based classification obsolete. This also leads to uncertainty regarding the commitments applicable to newly developed services, as such services may potentially fall outside of the scope of existing classification headings and therefore not be subject to any commitment.

Practice Notes

- **Understanding GATS [3.2.1]**

6.3.2.2 REGIONAL FRAMEWORKS

Europe

i. Regional Framework

Beginning in the mid 1990s, the European Commission's Convergence Green Paper **1** commenced the policy formulation debate on the regulatory implications of convergence. This process resulted in the 1999 Review**2** that examined the existing regulatory framework for telecommunications, and presented a series of policy proposals for a comprehensive cross-border regulatory framework covering all transmission networks and services. As a result thereof, in 2002, the EC approved a new regulatory framework (NRF) consisting of a Framework Directive and four principal specific directives:

- the directive on the authorization of electronic communications networks and services (Authorization Directive)*;*
- the directive on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive)*;*
- the directive on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive)*;* and
- the directive concerning the processing of personal data and the protection of privacy in the telecommunications sector (Data Privacy Directive) (hereinafter the Specific Directives).**3**

Also part of the NRF are the Commission Recommendation on Relevant Markets and the Commission Guidelines on Market Analysis which directs regulatory authorities to conduct market analysis of specific markets that may be susceptible to regulation.**4**

Specifically, the NRF seeks to achieve "sustained effective competition without on-going regulatory intervention"**5** by removing regulation where competition has been determined to be effective and refocusing regulation where it does not exist. The general goals of the NRF are to encourage competition in the electronic communications markets, to improve the functioning of the internal market, and to guarantee basic user interests that would not be guaranteed by market forces.

The NRF is intended to be technology neutral, leaving behind such concepts as voice telephony and the distinctions between fixed and mobile communications previously relied upon by the EU for its telecommunications liberalization process during the 1990s. This is a corollary of the lessons derived from convergence, as it has been recognized that rigid regulatory concepts cannot evolve at the same pace as that of technological changes. The Framework Directive stresses the need for the EU member states to ensure that national regulatory authorities make regulation technologically neutral, "that is to say that it neither imposes nor discriminates in favor of the use of a particular type of technology."**6** It should be noted, however, that technological neutrality does not preclude member states from promoting specific services where this is deemed justified, (*e.g.*, digital television as a means for increasing spectrum efficiency).

A relevant aspect of the NRF is that the EU has separated the regulation of transmission from the regulation of content. Therefore, content of services delivered over electronic communications networks using electronic communications services, such as broadcasting content, is excluded from the scope of the framework.**7**

ii. 2009 Telecoms Reform

Although the 2002 regulatory framework contributed to the development of a strong ICT sector across Europe by opening markets and providing greater consumer choice, the European Commission (EC) began the process of reforming the rules in 2007 in order to better facilitate cross-border competition, ensure more effective consumer protections and provide for more efficient utilization of spectrum resources in light of the rapid technological developments in the ICT sector, particularly VoIP and IPTV.8 The EC first proposed a review of the telecoms framework in 2007, which was followed by two years of consultations with service providers, national regulators, consumers and other stakeholders before being discussed and adopted by the Council and European Parliament in December 2009.9 The final telecom rules reform the 2002 directives relating to authorization, access, universal service and data privacy.10 The 2009 directives require all EU Member States to have transposed these new telecom rules by May 2011.

The 2009 telecoms reform package is comprised of 12 main elements:11

1. The right for consumers to obtain fixed and mobile number portability within one working day.

2. Better consumer information, including more detailed consumer contracts that specify, among other things, minimum service quality levels and compensation/ refunds if these levels are not met, as well as options for non-published information and clear information on the qualifying criteria for promotional offers.

3. A new Internet freedom provision explicitly requiring Member States to respect the fundamental rights and freedoms of citizens to access to or use of services and applications, including by respecting the presumption of innocence and the rights to privacy, fair and impartial proceedings and effective and timely judicial review.

4. New guarantees for an open and more "neutral" Internet by granting national regulatory authorities (NRAs)the power to set minimum quality levels for network transmission services, as well as implementing new transparency requirements that ensure, prior to signing a contract, consumers are informed about the terms of service, including traffic management practices and their impact on service quality and other limitations such as bandwidth caps or available connection speed.

5. Better consumer protections against personal data breaches and spam, including protections of subscribers' names, email addresses and bank account information through mandatory notifications for personal data breaches, as well as new rules related to the use of "cookies" and other online devices for tracking, storing and sharing user information.

6. Better access to emergency services by extending the access requirements from traditional telephony to new technologies, including VoIP, and strengthening operators' obligation to pass information about caller location to emergency authorities.

7. NRAs are provided greater independence by eliminating political interference in their day-to-day duties and adding protection against arbitrary dismissal for the heads of national regulators.

8. Improve regulatory harmonization by granting the EC the authority to oversee regulatory remedies proposed by NRAs, such as conditions of access to a dominant operator's network, in order to avoid inconsistent regulation that could distort competition in the single EU telecoms market.

9. Permit NRAs to overcome competition problems by implementing functional separation rules as a last-resort remedy, which would require operators to separate communication networks from their service branches.

10. Bridge the digital divide through better management of radio spectrum, including a stronger emphasis on technology and service flexibility in spectrum use, as well as making more spectrum available for wireless broadband services in regions where building new fiber infrastructure is too costly. In addition, Member States may expand universal service obligations beyond narrow-band internet access.

11. Encourage competition and investment in next generation access (NGA) networks through new rules relating to open access and sharing of network elements, as well as provisions to ensure that telecom operators receive a fair return on their investments.

12. Creation of the Body of European Regulators for Electronic Communications (BEREC), a new European Telecoms Authority that will help to ensure fair competition and more consistency of regulation on the telecoms markets. The role of BEREC is addressed in the following section.

ii. Regional Regulatory/Supervisory Body

Part of the 2009 telecoms reform was the adoption of the regulation establishing BEREC, which replaced the loose cooperation of the European Regulators Group (ERG) created in 2002 with a more transparent and more efficient approach.12 Similar to ERG, BEREC is not a European Community agency, but acts as an advisory body for the European Parliament, the Council and the Commission in the field of electronic communications and provides the exclusive forum for cooperation among the NRAs, particularly for cross-border issues.13 In addition, BEREC, like the ERG, is composed of one member per Member State, which is typically the head of each Member State's NRA. Greater transparency is one of the key differences between ERG and BEREC. In particular, the regulation establishing BEREC sets out the processes for issuing decisions and taking votes; requires BEREC to adopt and make publicly available its rules of procedure; and provides for public participation through consultations.

Overall, BEREC plays several roles as an advisory body, including developing best practices for NRAs to adopt; providing assistance to NRAs on regulatory issues; delivering opinions on the EC's draft decisions, recommendations and guidelines related to the Framework Directive and other telecom directives; and assisting the European Parliament, Council and Commission, as well as the NRAs, in discussions with third parties. Since its inception, BEREC has held several public consultations on a broad range of issues including best practices to facilitate the ability for consumers to switch service providers, ensuring equivalence in access and choice for disabled end-users and solutions for cross-border issues.14

iii. Regional Harmonization Efforts

In 2005, the EC proposed the i2010 – European Information Society 2010, a strategic framework seeking to "build towards an integrated approach to information society and audiovisual media policies in the EU."15 Specifically, the EC recognizes that to address digital convergence, EU rules on information society and media should be consistent, and as a result proposes the following general policies: "(i) completion of Single European Information Space which promotes an open and competitive single market for information society and media (ii) strengthening innovation and investment in ICT research to promote growth and more and better jobs; (ii) achieving an inclusive European Information Society that promotes growth and jobs in a manner that is consistent with sustainable development and that prioritizes better public services and quality of life."16 The Single European Information Space seeks to accelerate the economic benefits of digital convergence through various measures, including a review of the electronic communications framework in 2006, modernizing EU rules on audiovisual services, and defining a new efficient spectrum management strategy in 2005.

All countries seeking accession to the European Union are required to align their legislation to the *acquis communautaire*, (*i.e.*, the entire body of European laws, including treaties, regulations and directives passed by the European Union and decisions of the European Court of Justice). For many candidate countries with transitional economies, negotiating and adopting Chapter 19 of the *acquis* (the telecommunications and IT chapter) requires significant regulatory reform to accommodate the telecommunications *acquis.* Implementation of *acquis* required the establishment of an independent telecommunications regulatory authority and a "separation of policy and law making authorities from ownership interests." As such, candidates are required to:

- Adopt a national telecommunications policy for the development of the sector consistent with EC policy;
- Prepare market players for the pressure of competition expected when they join the EU;
- Prepare the telecommunications market through the transposition and implementation of EC legislation, in particular through price rebalancing;
- Ensure the objective enforcement of the regulatory framework through an adequately resourced and well-trained independent regulatory authority; and

- Address the communications needs of under-developed regions, especially the adoption of a universal service policy.17

Americas

MERCOSUR

i. Regional Framework

Mercado Común del Sur (Common Market of Southern Cone or MERCOSUR) created in 1995, is the economic block formed by Argentina, Brazil, Paraguay, and Uruguay, with Bolivia, Peru, and Chile as associate member states. The MERCOSUR treaty seeks commercial integration among member countries and in particular (i) the free movement of goods and services among the signatory countries; (ii) the coordination of macroeconomic policies in communications; and (iii) the harmonization of national legislation in the relevant areas to strengthen the integration process.18 MERCOSUR does not have a single body of telecommunications rules or directives. Instead, through its regional institutional process, decisions issued by the Common Market Council on relevant commercial matters governed under the MERCOSUR treaty are later adopted into the national legislation of the member states.19

ii. Regional Regulator/Supervisory Body

The Common Market Group of MERCOSUR established Working Subgroup 1 (SGT1), which is responsible for the negotiation of communication related matters under the treaty (*i.e.*, postal services, broadcasting, radio communications, and public telecommunications services). The Common Market Group issued a negotiating directive for SGT1 instructing it to identify adequate steps for harmonization and consolidation of rules and practices in telecommunications.20 The areas subject to review by SGTI included:

- Ongoing identification of spectrum bands that could be subject to harmonization;
- Compilation and consolidation of laws and telecommunications rates of each member state;
- Advance mobile telecommunications services;
- Use of numbering resources within MERCOSUR;
- Convergence of telecommunications networks and services;
- Definition of the structure of common public telecommunications services to be provided in MERCOSUR;
- Establishment of interconnection criteria of the public networks of the member states; and
- The regulatory harmonization of converged services.

SGT1 is responsible for issuing regulatory recommendations to the Common Market Council on matters regarding postal services, radio communications, broadcasting, and public telecommunications services. SGT1 is comprised of four commissions, each one responsible for one of these four sectors of communications. These commissions hold joint meetings to discuss overlapping matters, propose ways of harmonizing legislation where their industries converge and remove legislation that hinders the integration of member states. SGT1 issues recommendations that must be ratified by the Common Market Council, and once ratified, member states must adopt the necessary measures to incorporate them into their national legislation.21 SGT1 has also issued general guidelines followed by the regulatory agencies of the member states with the objective of harmonizing administrative procedures and establishing common approaches on international forums.

iii. Regional Harmonization Efforts

Since its inception in 1995, SGT1 has issued several recommendations that have been incorporated into the national legislation of the member states. These include:

- The provision of basic public telephone services in the bordering areas of MERCOSUR;
- The adoption of common bands for paging and trunking services;
- Manuals and procedures for frequency coordination for radiocommunications and broadcasting services;22
- Adoption of a Unified Code of Emergency Services within MERCOSUR;23
- Regulatory framework for FM radio broadcasting;
- Harmonization of new technologies;24 and
- General rules for international roaming within MERCOSUR.

Other private efforts include the signing of a multilateral agreement, SINTONIA, among Brazil's EMBRATEL, Uruguay's ANATEL, Argentina's TELINTAR and Chile's CTC-Mundo, aimed at serving multinational business customers that operate in the MERCOSUR region in order to ensure integrated, homogenous services throughout the region. This agreement has been further expanded to include Bolivia-based Entel, Paraguay-based Antelco, and Telefónica del Perú in Peru.

OECS

i. Regional Framework

In 1981, Antigua and Barbuda, the Commonwealth of Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines formed the treaty-based Organisation of Eastern Caribbean States (OECS).25 The OECS seeks to promote economic integration and cooperation among its member states, maximizing the benefits of their geographical position to facilitate their collective integration with the global economy. The OECS recognizes telecommunications as an essential tool for economic diversification and five countries (the Commonwealth of Dominica, Grenada, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines) developed a Telecommunications

Reform Project in an effort to seek ways of introducing competition in the sector.26 A review of the sector concluded that the high costs of access to telecommunications services and the lack of physical infrastructure and trained personnel in the sector were factors affecting the development of the telecommunications industry. The OECS governments also recognized the inadequacy of their telecommunications regulatory framework and the need to create regulatory frameworks favourable for development and investment in accordance with the WTO BTA. As a result, the five participating countries agreed to adopt a harmonized regulatory framework and a competitive regulatory authority.

ii. Regional Regulator – ECTEL

On May 4, 2000, the Commonwealth of Dominica, Grenada, St. Lucia, St. Kitts and Nevis, and St. Vincent and the Grenadines (the Contracting States) signed a treaty establishing the Eastern Caribbean Telecommunications Authority (ECTEL) a regional advisory body to promote market liberalization and competition in their telecommunications industry.27 ECTEL's main objectives include promoting market liberalization and competition in the telecommunications sector of the Contracting States and establishing a harmonized regional regulatory regime. ECTEL is headed by a Council of Ministers, including the minister responsible for telecommunications in each of the Contracting States.

ECTEL's functions include:28

- Coordinating with and advising the Contracting States on telecommunications matters to meet the objectives of the ECTEL Treaty;
- Issuing recommendations to the Contracting States on a harmonized regional radio spectrum plan;
- Preparing and recommending the adoption by the Contracting States of harmonized regulation including application forms and other forms in respect of licences, frequency authorizations and tender documents; and
- Designing and conducting open tender procedures for individual licences as requested by Contracting States.

iii. Harmonization Efforts

At the recommendation of ECTEL, each Contracting State adopted harmonized telecommunications legislation and regulations liberalizing the industry and introducing competition.29 Each Contracting State also established establishment of National Telecommunications Regulatory Commissions (NTRCs), with the responsibility of formulating national telecommunications policy, and ensuring efficient, economic and harmonized development telecommunications and broadcasting services in each Contracting State. To date, each Contracting State has adopted harmonized telecommunications regulations dealing with equipment and public networks, interconnection, private network licensing, licensing and authorizations, spectrum management, numbering, tariffs, confidentiality in network and services, and fees. The new regulatory frameworks required all telecommunications licences to be issued on a non-exclusive basis, resulting in the termination of the monopoly service provider's (Cable & Wireless) exclusive rights in the Contracting States. As a result, in 2001, the Contracting States entered into an agreement with Cable & Wireless establishing the terms for a joint collaboration and a gradual transition to full competition.30

CARICOM

i. Regional Framework

In 1973, the Treaty of Chaguaramas established the Caribbean Community (CARICOM) and transformed the Caribbean Free Trade Association (CARIFTA) into the Caribbean Common Market.31 Between 1989 and 2000, the Member States worked towards ensuring greater freedom of movement of goods and services, resulting in the Revised Treaty including new issues such as e-commerce, government procurement, trade in goods from free zones, free circulation of goods, and the rights contingent on the free movement of persons.32 CARICOM has 15 Member States including the five ECTEL countries, as well as Antigua and Barbuda; The Bahamas; Barbados; Belize, Guyana; Haiti; Jamaica; Montserrat; Suriname and Trinidad and Tobago. In addition, there are five Associate Members, namely Anguilla, Bermuda, British Virgin Islands, Cayman Islands and Turks and Caicos Islands.

Among other areas, CARICOM is strongly focused on increasing the deployment and adoption of ICTs throughout the region. For example, the Directorate of Trade and Economic Integration (TEI) within the CARICOM Secretariat has implemented the Information and Communication Technology for Development (ICT4D) program. Although the ICT4D which has the overarching goal of advancing the development of the people in the Caribbean Community through the use of ICTs as a catalyst for transforming the CARICOM Member States into a knowledge-based society.33

ii. Regional Regulator/Supervisory Body

The Caribbean Telecommunications Union (CTU) was established by the Heads of Government of CARICOM Members in 1989.34 It has full legal personality and capacity to contract, acquire and dispose of real and personal property and to be party to legal proceedings. In addition, the CTU possesses immunities and privileges accorded to diplomatic and international organizations of equal status. The CTU was set up on the recommendation of the Ministers for Telecommunications to correct:35

1. the fragmented policy frame of telecommunications sectors of member countries;

2. the problems of frequency incompatibility between and among member countries

3. the lack of Caribbean input in major international issues, which disregarded rights and sovereignty of the Caribbean states, thereby denying them opportunity

4. the absence of coordinating machinery to facilitate an increase in the impact of resources and assistance for Caribbean telecommunications development.

As such, the overarching objective of the CTU is to harmonize telecommunications policies and plans, as well as encourage cooperation among the Member States, to the greatest possible extent. Some of the specific objectives include: (i) facilitating the coordination of planning and development of intra-regional and international communications networks; (ii) promoting ICT awareness; (iii) encouraging the exchange of information and transfer of technology among Member States; and (iv) harmonize, as much as possible, the positions of Member States in preparation for international and regional telecommunications conferences and other meetings.36

iii. Harmonization Efforts – HIPCAR

In response to requests by Member States, the CARICOM Secretariat, the CTU and the ITU, with funding from the EU and ITU, established the three-year project Harmonization of ICT Policies, Legislation and Regulatory Procedures (HIPCAR) in order to encourage competition and growth of ICTs throughout the region.37 The main impetus for the HIPCAR project was the recognition that although the Caribbean countries as a whole had liberalized their telecommunications sectors, they had taken different policy approaches. In order to help CARICOM countries develop similar regulatory frameworks, the HIPCAR project focused on two areas of ICT policy and legislative frameworks, namely information society issues and telecommunications, and is divided into two phases.

Phase I, completed in 2010, focused on developing model policy guidelines and model legislative texts for various issues related to the information society and telecommunications. For sector issues related to the information society, the HIPCAR Project focused on electronic transactions, electronic evidence in e-commerce, privacy and data protection, interception of communications, cybercrime and access to public information (freedom of information).38 For sector issues related to telecommunications, the HIPCAR Project addressed universal access and service, interconnection and access, and licensing.39

Phase II is to be completed in 2011 and is focused on direct in-country assistance to help Member States implement and transpose these models into national policies, laws & regulations. Several CARICOM countries have requested assistance, including Dominican Republic, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago.40

Africa

i. Regional Framework – ECOWAS

The Economic Community of West African States (ECOWAS) is among the various regional economic communities in Africa that have been proactive in creating initiatives to foster cooperation and integration of their telecommunications and information technology activities. As opposed to other African regional initiatives, such as the Southern African Development Community (SADC) the ECOWAS Treaty foresees the harmonization of legislation, including in the telecommunications field, similar to the EU model.

ECOWAS, founded in 1975, is a regional organization of West African States (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo). Its main objective is to form a unified economic zone in West Africa through economic integration and shared development in various industries, including telecommunications.41 In the area of telecommunications, the ECOWAS treaty seeks to establish “common transport and communications policies, laws and regulations.”42 The treaty further requires member states to:

- Develop, modernize, coordinate and standardize their national telecommunications networks in order to provide reliable interconnection among member states;
- Complete, with dispatch, the section of the pan-African telecommunications network situated in West Africa;
- Coordinate their efforts with regard to the operation and maintenance of the West African portion of the pan-African telecommunications network and in the mobilization of national and international financial resources;” and encourages member states to seek private sector participation so as to achieve these objectives.43

In addition, the Council of Ministers44 of ECOWAS has determined that the following items are priorities for the region:45

-
    - Harmonization of regulatory frameworks and institutions.
    - The evolution of a regional regulatory framework - the ECOWAS ICT Task Force has been established to harmonize ICT policies of member countries.
    - Fostering competition.
    - Building a robust Regional Backbone Infrastructure capable of supporting seamless cross-border connectivity.
    - Reducing costs associated with rights of way through the installation of optical fibre cable on power lines to carry electricity supply between countries that have electricity.
    - Granting operating licences on a priority basis to private investors that are interested in entering the markets in the region.

ii. Regional Regulatory/Supervisory Body

In 2002, ECOWAS was responsible for the creation of the West African Telecommunications Regulatory Association (WATRA), the main objective of which is to coordinate dialogue regarding telecommunications and regulation in the West African region. WATRA is an association of regulators and the respective government ministries of West African Territories responsible for telecommunications matters.46

WATRA is intended as a vehicle to foster continued development of information communications technology (ICT) within the subregion, and decisions and directives issued by the Conference of Regulators are binding on all national regulators. In this respect, WATRA encourages the establishment of consistent standards throughout the region to facilitate the deployment of interoperable ICT systems and services. The members expect WATRA to “become a leading forum for regulators in the region to exchange ideas and formulate plans regarding regulatory and technical issues that will accelerate development of infrastructure across the region.”47

Given the limited resources available for the development of regulatory frameworks that promote ICT sector development, WATRA may provide countries with a source of information (*e.g.*, best practices and regulatory modeling) and support in the development of appropriate regulatory structures.

In September 2005, WATRA took on the leading role in approving the ECOWAS telecommunications guidelines on key regulatory issues at an Ordinary General Meeting in Accra.48 These guidelines will be the basis for ECOWAS Telecommunications Directives that are expected to be adopted by ECOWAS Ministers in early 2006. These efforts are a first in Africa and will set an example for other subregions in Africa and around the world.

iii. Harmonization

ECOWAS has undertaken a Telecommunications Regulation Harmonization Project49 aimed at designing a strategy for the harmonization of telecommunications policies in ECOWAS. To date, each ECOWAS country, with the exception of one, has commenced liberalization of the telecommunications sector and has separated postal and telecommunications operation from regulation. In addition, 11 ECOWAS countries50 have established telecommunications regulatory authorities.51

As ECOWAS progresses in its harmonization efforts, some of the challenges it may face include harmonization of existing national ICT policies (*e.g.*, regional spectrum and licensing); evolving common principles for interconnection and universal access; safeguarding the interests of citizens (*e.g.*, control of content); and using ICTs to reduce distance barriers among communities.52 See Box 3-3 for a description of other African regional harmonization initiatives.

Economic community: **South African Development Community (SADC)**

Member states: Angola, Botswana, the Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, United Republic of Tanzania, Zambia, and Zimbabwe.

Related Telecommunications Association: Communications Regulators Association of Southern Africa (CRASA)53

Harmonization Efforts: SADC is among the most advanced regional economic communities with respect to telecommunications liberalization and ICT issues. TRASA has advocated establishment of independent regulators, and is proactive in attracting foreign investment in telecommunications infrastructure development. It advocates the introduction of operators to compete with the incumbent telecommunications operator and the corporatization of the public operator.54 TRASA also has established model ICT policies, legislation document, and regulatory guidelines for the SADC countries.

Economic community: **West African Economic and Monetary Unit (UEMOA)**

Member states: Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal, and Togo.

Related telecommunications association: None

Harmonization efforts: UEMOA is currently working on directives aimed at the harmonization of telecommunications laws of the member countries. Given that all its members are also members of ECOWAS, UEMOA has actively participated in ECOWAS and WATRA workshops on the ECOWAS guidelines and aims to harmonize its directives with ECOWAS.

Economic community: **Common Market for Eastern and Southern African (COMESA)**

Member states: Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, and Zimbabwe.

Related telecommunications association: Association of Regulators of Information and Communication in Central and Eastern Africa (ARICEA)

Harmonization efforts: Through ARICEA, COMESA has been very proactive in member state capacity building. It has initiated programs to harmonize ICT policies and attract foreign investment to the region, and drafted model ICT policies, licensing rules, and frameworks. It also has established an agenda to stimulate regulatory harmonization. In 2011, ARICEA and COMESA began a study on cybersecurity in the region, which is expected to result in draft policy guidelines and draft model bill.55

Economic community: **Central African Economic and Monetary Community (CEMAC) and Economic Community of Central African States (CEEAC)**

CEMAC Member states: Cameroon, the Central African Republic, Chad, Democratic Republic of the Congo, Equatorial Guinea and Gabon.

CEEAC Member States: Angola, Burundi, Cameroun, Chad, Central African Republic, Gabon, Republic of Congo, Democratic Republic of the Congo, Equatorial Guinea, Rwanda, São Tomé and Principe*Related telecommunications association:* Central African Telecommunication Regulators Association (ARTAC)

Harmonization efforts: ARTAC has based itself on other regional models, including CRASA, and seeks to encourage the development of regional harmonized, modern legislative and regulatory structures in the ICT sector.56

◂ Box 1 Other African Regional Initiatives

Source: Box Credit

Asia

ASEAN

Since 2001, the Association of Southeast Asian Nations (ASEAN) has worked towards creating an effective framework to promote growth in the telecommunications industry has been a top priority for, particularly through the ASEAN Telecommunications and IT Ministers (TELMIN). ASEAN is an intergovernmental organization comprised of the Governments of Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. ASEAN has several committees, meetings, and working groups57 focused on promoting liberalization and harmonization of the ICT industry58 and it has developed several ambitious proposals (*e.g.*, the development of a seamless telecommunications network and a uniform regulatory framework among ASEAN countries). However, it has been challenging to achieve concrete results, largely due to the lack of binding authority of ASEAN's decisions on its member countries.59 For example, after the 14th ASEAN Telecommunications Regulators' Council (ATRC) Meeting in 2008, Singapore noted that ASEAN needs a more comprehensive ICT regulatory framework, which could be achieved through the adoption of a rules-based system able to transform ATRC into a more effective and cohesive organization.60

ASEAN countries have signed several framework agreements and declarations vowing to open their markets to competition and work together towards the enhancement of their ICT sectors.61

In 2004, the ATRC agreed to develop non-binding regulatory models on best practices in "(i) competition and management and interconnection; (ii) convergence and new services; and (iii) cooperation on capacity-building."62 The purpose of these models is to serve as guidelines for ASEAN regulators to develop new legislation and regulatory practices to establish their respective systems and processes. Such regulatory frameworks have not yet been developed.

A 2004 study conducted on the "Liberalization and Harmonization of the ASEAN Telecommunications" indicated that all ASEAN member countries were in different stages of market liberalization (*i.e.*, either fully liberalized, substantially liberalized, in transition or in the first stages of policy change).63 The study found that a framework for reform was needed, consisting of three stages: (i) establishing the foundations for a regulatory regime; (ii) fostering network development through the introduction of competition; and (iii) full liberalization.

A second study focused on the objectives identified by the ASEAN Telecommunications Regulatory Council (*i.e.*, interconnection and competition management; convergence and licensing of new service; and confronting the digital divide). The study recognized that work still needs to be done in these areas and that the first priority is the establishment of a "robust regulatory framework," that will ensure effective regulation and an "independent regulator capable of dealing with sector-specific issues of market dominance."64

The Brunei Action Plan, implemented in 2006, focused on enhancing ICT competition and capacity-building among ASEAN countries, particularly through programs that facilitate e-commerce, build emergency response preparedness, promote e-society and cultural initiatives and improve access to ICTs.65 The 9th TELMIN Meeting in 2009 adopted the Vientiane Declaration on Promoting the Realization of Broadband across ASEAN, which seeks to promote "the expeditious development of next generation networks by establishing an ASEAN broadband infrastructure connecting to high speed national information infrastructures through facilitative policies and regulation as well as by leveraging on other regional backbone initiatives, to ensure sufficient capacity and route diversity, to have adequate infrastructure for redundancy and to avoid over reliance on any particular regional system between the ASEAN Member States and to extend broadband access to the ASEAN communities by 2015."66

These initiatives have culminated in the ASEAN ICT Masterplan (AIM2015), which was adopted at the 10th TELMIN in January 2011 and consists of six strategic thrusts:67

1. Economic transformation

2. Empowerment and engagement of people

3. Innovation

4. Infrastructure development

5. Human capital development

6. Bridging the digital divide.

Each of these thrusts includes various initiatives to help achieve the objectives. For example, the goal of economic transformation includes developing a framework that facilitates transparent and harmonized ICT regulations, as well as developing public-private partnerships for the ICT industry. Infrastructure development is to be achieved through various means, including establishing an ASEAN broadband corridor and Internet exchange network while bridging the digital divide will be achieved, in part, by reviewing USO policies and implementing school connectivity programs.

Bilateral Agreements

In addition to opportunities for countries to coordinate within multilateral and regional frameworks, bilateral agreements help to foster further collaboration efforts between countries to increase trade and support investment and development, as well as promote fundamental principles and best practices. For example, the European Union and United States established a bilateral agreement in April 2011, which includes ten principles related to trade in ICT services to be promoted worldwide.68 Other bilateral agreements focus on promoting the development of ICT infrastructure and services between two countries. For instance, France and Israel signed a *Bilateral Agreement for cooperation in the field of telecommunications* in 2009 that includes provisions on cooperation in international organizations, as well as mutual exchange of information and advice on regulatory developments, spectrum management, satellite coordination and promotion of R&D.69 The agreement includes a proposal to hold annual meetings between the two parties to review ways to ensure implementation of the agreement.

6.3.2.3 MULTILATERAL ICT ORGANIZATIONS

International Telecommunication Union The International Telecommunication Union (ITU) is the leading United Nations agency for information and communication technology issues, and the global focal point for governments and the private sector in developing networks and services.1 For 145 years, ITU has coordinated the shared global use of the radio spectrum, promoted international cooperation in assigning satellite orbits, worked to improve telecommunication infrastructure in the developing world, established the worldwide standards that foster seamless interconnection of a vast range of communications systems and addressed the global challenges of our times, such as mitigating climate change and strengthening cybersecurity. Based in Geneva, Switzerland, ITU membership includes 192 Member States and more than 700 Sector Members and Associates.

The Plenipotentiary Conference is the top policy-making body of the ITU. Held every four years, the Plenipotentiary Conference is the key event at which ITU Member States decide on the future role of the organization. Although ITU Sector Members, Regional Telecommunication and Intergovernmental Organizations, and the United Nations and its specialized agencies also attend the Plenipotentiary Conference as observers, the ITU Member States:2

- set the ITU's general policies,
- adopt four-year strategic and financial plans and
- elect the senior management team of the organization, the members of **Council** and the members of the **Radio Regulations Board**.

There are multiple basic texts of the ITU, which establish a binding, global framework for international telecommunications.3 The Constitution of the ITU sets forth the structure of the Union while the Convention addresses the ITU’s diverse and far-reaching activities promoting telecommunications. Other basic texts include the Optional Protocol on the settlement of disputes, the Decisions, Resolutions and Recommendations in force, as well as the General Rules of Conferences, Assemblies and Meetings of the Union.

The ITU is divided into three sectors: 1) Radiocommunication (ITU-R), which manages the international radio-frequency spectrum and satellite orbit resources; 2) Standardization (ITU-T), which is the ITU's standards-making body; and 3) Development (ITU-D), which was established to help spread equitable, sustainable and affordable access to ICTs.

i. ITU-R

The ITU-R’s mission is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including those using satellite orbits, and to carry out studies and approve Recommendations on radiocommunication matters.4 In implementing this mission, ITU-R aims at creating the conditions for harmonized development and efficient operation of existing and new radiocommunication systems, taking due account of all parties concerned.

The primary objective of ITU-R is to ensure interference-free operations of radiocommunication systems through implementation of the Radio Regulations and Regional Agreements, as well as the efficient and timely update of these instruments through the processes of the Regional and World Radiocommununication Conferences (WRCs). WRCs are held every three to four years during which ITU Member States review and revise the **Radio Regulations**, as needed.5 The Radio Regulations is the international treaty governing the use of the radio-frequency spectrum and the geostationary-satellite and non-geostationary-satellite orbits around the world. Revisions to the Radio Regulations are made on the basis of an agenda determined by the **ITU Council**, which takes into account recommendations made by previous world radiocommunication conferences.

The general scope of the agenda of a WRC is established four to six years in advance, with the final agenda set by the ITU Council two years before the conference, with the concurrence of a majority of Member States. Under the terms of the **ITU Constitution**, a WRC can:

- Revise the Radio Regulations and any associated frequency assignment and allotment plans;
- Address any radiocommunication matter of worldwide character;
- Instruct the **Radio Regulations Board** and the **Radiocommunication Bureau**, and review their activities;
- Determine **questions** for study by the **Radiocommunication Assembly** and its **Study Groups** in preparation for future Radiocommunication Conferences.

The ITU-R Recommendations constitute a set of international technical standards developed by the ITU-R. They are the result of studies undertaken by Radiocommunication Study Groups on:

- The use of a vast range of wireless services, including popular new mobile communication technologies:
- The management of the radio-frequency spectrum and satellite orbits;
- The efficient use of the radio-frequency spectrum by all radiocommunication services;
- Terrestrial and satellite radiocommunication broadcasting;
- Radiowave propagation;
- Systems and networks for the fixed-satellite service, for the fixed service and the mobile service;
- Space operation, Earth exploration-satellite, meteorological-satellite and radio astronomy services.

The ITU-R Recommendations are approved by ITU Member States. Their implementation is not mandatory; however, as they are developed by experts from administrations, operators, the industry and other organizations dealing with radiocommunication matters from all over the world, they enjoy a high reputation and are implemented worldwide.

◂ Box 1Overview of ITU-R Radio Regulations

ii. ITU-T

The main products of ITU-T are the sector's Recommendations ("ITU-T Recs"), which provide standards for defining how telecommunications networks operate and interwork.6 There are currently more than 3,000 ITU-T Recs (Standards) in force on topics such as service definition; network architecture and security; from broadband DSL; Gbit/s optical transmission systems; next-generation networks (NGN); and IP-related issues, as well as other fundamental components of today's ICTs. Although ITU-T Recs are non-binding, they are generally complied with due to their high quality and because they guarantee the interconnectivity of networks and enable telecommunication services to be provided on a worldwide scale. In 2007 alone, ITU-T produced over 160 new and revised standards, covering everything from core network functionality and to next-generation services like IPTV.7 The World Telecommunication Standardization Assembly (WTSA) is conducted every four years and is the event that defines the next period of study for ITU-T, as well as sets the general policy for the Sector and establishes the study groups.8

Contribution is the term used to describe membership input into a **Study Group (SG)**.9 This input can basically be on any relevant topic but is typically limited to suggesting new work areas, draft Recommendations, changes to existing Recommendations. Study Groups drive their work primarily in the form of study **Questions**. Each of these addresses technical studies in a particular area of telecommunication standardization. Each SG has a Chairman and a number of vice-chairmen appointed by the World Telecommunication Standardization Assembly (WTSA).

To assist in the organization of the work, the SG may be organized into a number of **Working Parties (WPs)**. The WP is the next organizational unit down within the SG. It coordinates a number of study Questions on a related theme, e.g. the Media Coding Working Party in Study Group 16 deals with all study Questions relating to coding of speech, audio and video streams that we use every day for Internet calls, DVDs, etc.

The team of experts working on a specific Question is known as the **rapporteur group**. Their meetings are chaired by the relevant rapporteur. Considering the text of the Question and guidance from the SG, the participants determine what Recommendations are required and develop text for these Recommendations taking all relevant inputs into account and consulting other relevant parts of ITU-T. During a meeting of the parent WP or SG, the experts will normally meet to progress the work, but they may also meet independently of the parent WP or SG, in a more informal setting, when required.

A Question is the basic project unit within ITU-T. The area of study of the project is defined by the text of the Question, and this is generally approved by the study group itself. For a new Question to be established, it is necessary that a number of Members commit to support the work. Questions address technical studies in a particular area of telecommunication standardization, and are driven by contributions. A Question is normally terminated once the defined work has been completed, or the task is revised in the light of developments, which can be technical, market-oriented, network or service driven. The text for each of the Questions assigned to a study group can be found on its web page.

◂ Box 1Standards Development in the ITU-T Sector.

iii. ITU-D

The ITU Telecommunication Development Sector (ITU-D) goal is to ensure the right to communicate to all people, everywhere in the world, through access to infrastructure and ICT services.10 In this regard, the ITU-D's mission, which encompasses ITU's dual responsibility as a UN specialized agency and an executing agency for implementing projects under the UN development system, is to:

- Assist countries in the field of information and communication technologies (ICTs), in facilitating the mobilization of technical, human and financial resources needed for their implementation, as well as in promoting access to ICTs.
- Promote the extension of the benefits of ICTs to all the world's inhabitants.

- Promote and participate in actions that contribute towards narrowing the digital divide.
- Develop and manage programmes that facilitate information flow geared to the needs of developing countries.

The Telecommunication Development Bureau (BDT) is the executive arm of the ITU-D and is mandated to foster international cooperation in the delivery of technical assistance and support for rolling out and upgrading ICT infrastructure and services in developing countries.11 The BDT is also responsible for implementing projects so as to facilitate and enhance telecommunications development by offering, organizing and coordinating technical cooperation and assistance activities. It provides technical advice and is responsible for the collection, processing and publication of information relevant to telecommunication development.

Held every four years, the World Telecommunication Development Conference (WTDC) is the vehicle through which the ITU-D establishes concrete priorities to help achieve its goals of spreading equitable, sustainable and affordable access to ICTs.12 The WTDC is a high-level platform where Member States and Sector Members come together to set development priorities, strategies and action plans and guide the work of the ITU-D. Preparatory Conferences are held in each of the five ITU-D regions before the WTDC.

Regional Telecommunications Organizations

There are various types of ITU Membership allowing different levels of participation and access to meetings and information. National governments may join the ITU as Member States.13 Private, academic and other non-State organizations may join the ITU as a Sector Member (i.e., member of ITU-R, ITU-T and/or ITU-D sector) or Associate (i.e., member of a particular Study Group within a sector), including telecommunications carriers, equipment manufacturers, funding bodies, research institutions and regional telecommunications organizations (REGORGs).

Regional telecommunications organizations play an important role in preparatory discussions among Member States and Sector Members to facilitate the work of ITU conferences and meetings. In particular, they are instrumental in regional harmonization of policies, standards and frameworks. Additionally, these organizations prepare positions for Plenipotentiary Conferences, WRCs, WTDCs and WTSAs. There are eight regional organizations that are Sector Members in all three ITU sectors (for more on the REGORGs, see **Module 5, Section 7.2.1**):14

- Asia-Pacific Telecommunity (APT)
- Africa Telecommunications Union (ATU)
- European Conference of Postal and Telecommunications Administrations (CEPT)
- Inter-American Telecommunication Commission (CITEL)
- Caribbean Telecommunications Union (CTU)
- European Telecommunications Standards Institute (ETSI)
- League of Arab States (LAS), of which a subset of countries are part of the Cooperation Council for the Arab States of the Gulf (GCC)
- Regional Commonwealth in the Field of Communications (RCC)

Internet Corporation for Assigned Names and Numbers (ICANN)

Formed in 1998, ICANN is a non-profit, public-benefit corporation headquartered in the United States, with participants from across the globe dedicated to keeping the Internet secure, stable and interoperable through its coordination role of the Internet's naming system.15 ICANN is responsible for:

- Managing the IP address spaces (IPv4 and IPv6);
- Assignment of address blocks to regional Internet registries;
- Maintaining registries of IP identifiers; and
- Managing the top-level domain names, such as com, net or org.

Although a corporation, ICANN is structured on a multi-stakeholder model through which it develops policy via bottom-up, consensus-based processes in collaboration with governments and international treaty organizations, as well as businesses, organizations, and skilled individuals.16 To this end, ICANN is made up of several different groups, which represent various Internet-related interests and contribute to all of ICANN's final decisions. There are three "supporting" groups that represent organizations dealing with 1) IP addresses; 2) domain names and 3) managers of country code top-level domain names. In addition, there are four "advisory committees" to provide ICANN with advice and recommendations, which include a wide range of stakeholders, including governments and international organizations, those concerned with the Internet's security and the "at large" community (i.e., average Internet users). Finally, there is a "Technical Liaison Group," which works with the organizations that devise the basic protocols for Internet technologies. For more on ICANN, see the **Practice Note in Section 4.3.4 of this Module**.

6.3.3 MATURITY OF THE MARKET - RELATIONSHIP BETWEEN TELECOMMUNICATIONS LEGISLATION AND COMPETITION POLICY

A growing trend among countries with highly competitive telecommunications markets, is a growing reliance on competition laws to regulate the sector. The relationship between telecommunications legislation and competition policy varies by country, and is influenced by the country's level of economic development and the maturity of the market. Regardless of the regulatory model adopted, it is essential that telecommunications policies be guided by underlying principles of competition in order for markets to develop for the benefit of consumers. The relationship between telecommunications and competition policies is determined by and evolves in response to factors such as market maturity (*i.e.*, the level of competition in the marketplace) and a country's institutional framework. This section will explore the regulatory models adopted by different countries with respect to their telecommunications and competition regimes, existing regulatory trends in the relationship between these two frameworks, and whether such trends can be transferred effectively to developing countries.

6.3.3.1 THE EVOLUTION FROM SECTOR-SPECIFIC REGULATION TO COMPETITION-BASED REGULATION

The degree of competition in the market plays an important role in the development of new regulatory trends. As ICT markets become more competitive, regulators are beginning to transition from *ex ante* to *ex post* regulation. In promoting access to and adoption of ICTs, policymakers must consider whether to: 1) establish sector-specific, forward-looking regulation (*ex ante* regulation) to prevent or promote certain activities, or 2) establish or rely on competition law to remedy specific instances of anti-competitive behavior (*ex post* regulation).1 Due to the fast pace of technological advances and an growing recognition of the value of robust competition, policymakers increasingly have implemented *ex post* rules to foster innovative markets while imposing targeted *ex ante* regulation to address specific market failures, particularly with respect to the network infrastructure.

Ex ante regulation is anticipatory in nature and directed toward situations where market failures are expected to occur. The objective of *ex ante* regulation in the ICT sector is to adopt measures to prevent socially undesirable outcomes or to direct market activity towards desirable ends in light of the anticipated market failure. As addressed in Section 2.2 above, *ex ante* regulation should be narrowly tailored to address the specific instances of expected market failure.

Over the next decade, *ex ante* regulation will likely continue to be targeted at the physical infrastructure underlying network infrastructure and may begin to address challenges in other areas such as services and applications. Consequently, regulations will likely focus to varying degrees on access networks, backbone, backhaul and international connectivity. However, recognizing that the rationales for *ex ante* regulation no longer hold as markets mature and become more competitive, gradual fine-tuning or, in some cases, even full withdrawal of targeted *ex ante* regulation becomes necessary to better reflect competitive conditions in the market and serve consumer interests. When market conditions warrant the phasing out of *ex ante* regulation, regulators should consider implementing transition periods to ensure a smooth shift into an *ex post* regulatory environment. Transition periods allow stakeholders, consumers and service providers to gradually adapt to a new regulatory framework.

Both the United Kingdom and Portugal, for example, adopted transition periods as they moved from *ex ante* forms of regulation to *ex post* regulatory frameworks. In May 2008, when reviewing the wholesale broadband access markets, Ofcom determined that British Telecom (BT) no longer had significant market power (SMP) in local exchanges where alternative services providers had emerged.2 In response, Ofcom withdrew certain regulatory obligations immediately (e.g., non-discrimination and transparency requirements), but required BT to provide existing customers network access for a 12-month transition period to afford BT's wholesale customers the opportunity to make alternative arrangements. Similarly, when reviewing the wholesale broadband access market in 2009, ICP-ANACOM found that Portugal Telecom (PT) did not have SMP in certain geographic markets and accordingly decided to withdraw *ex ante* regulation in such markets.3 Unlike Ofcom, the Portuguese regulator opted to maintain a 12-month phase-out period for most *ex ante* obligations imposed on PT in these geographic areas, including non-discrimination, transparency, access, cost accounting and financial reporting. The price control, however, was phased-out immediately upon the adoption of the decision.

Relying on *ex post* regulation to address competitive concerns in the ICT market requires the implementation of competition laws and regulations that are effective, enforced and suited to the country's specific conditions. This legal safety net is crucial for competitive forces to take root, but implementing *ex post* regulation may represent a major challenge, particularly for developing countries that lack competition laws and regulations or are affected by weak institutional structures. This challenge may be compounded where economic systems have traditionally relied on strong state intervention, resulting in entire sectors and most dominant firms being state owned, controlled by the government or afforded special protection by government policies.

For over a decade, a series of initiatives have been implemented to create competition law frameworks in various countries around the world. Approximately 100 countries have adopted competition laws, with a quarter of those being developing countries.4 Similarly, a series of regional initiatives have been adopted to establish competition law rules and principles, including in the Association of Southeast Asian Nations (ASEAN), Common Market for Eastern and Southern Africa (COMESA), Economic and Monetary Union of West Africa (UEMOA), Economic and Monetary Community of Central Africa (CEMAC), Caribbean Community and Common Market (CARICOM), Andean Community (CAN), and in the Common Market of the Southern Cone (Mercosur).

Countries without general competition laws, such as the Kingdom of Bahrain, are beginning to develop ICT-specific *ex post* rules. Although there is no general competition law in the Kingdom of Bahrain, the Telecommunications Regulatory Authority (TRA) is tasked with acting as both the regulator and competition authority for the ICT sector. In February 2010, the TRA introduced an ICT competition framework, which builds on the authority vested in the TRA by the Telecommunications Law to protect consumers' interest and promote competition by establishing guidelines "to help market participants understand how TRA will assess competition in the telecommunications sector," including both ex-ante market reviews and ex-post investigations into anti-competitive conduct.5

Evolution of the European Union Model

The EU has followed a coordinated reform strategy which began almost two decades ago with the adoption of a series of directives to guide the transition from monopoly to full liberalization. This first framework, referred to as the "1998 Package" in honor of the year in which full liberalization was achieved, was comprised of a sequence of directives prescribing the progressive removal of market barriers and the encouragement of competition, as well as the harmonization of telecommunications regulation throughout the EU. The liberalization process began with niche market segments (*e.g.*, terminal equipment) and moved gradually towards core market segments (*e.g.*, voice telephony).

In light of the maturity and liberalization achieved, in 2002 the EC issued the a new regulatory framework, the NRF, essentially prescribing that sector-specific regulation (*ex-ante* regulations) be confined to cases where effective competition is absent, *i.e.*, in markets where there are one or more undertakings with significant market power, and where national competition law remedies are not sufficient to address the problem.6 As such, the NRF places greater reliance on generic EU competition law, and seeks a "market-based" approach to regulation, as opposed to a "service-based" approach.

The NRF[7] replaced much of the sector-specific regulation with technologically-neutral, general competition law rules,[8] with the "aim [of reducing] *ex-ante* sector-specific rules progressively as competition in the market develops."[9] The NRF provides new market definitions and its significant market power (SMP) concept has been re-defined to be more closely aligned with the competition policy provisions of the concept of dominance set out in the European Treaty.[10]

Under the Framework Directive, the EC must identify the product and service "markets" that may raise competition issues and may be subject to *ex-ante* regulation.[11] (See Table 3-4 for the list of markets currently identified by the EC.) In making such determinations, the member states rely on EU competition principles and practices. In turn, the NRAs must conduct an analysis of the markets that have been identified as being susceptible to regulation, using the following criteria: (i) determine whether there are entry barriers of a structural, legal or regulatory nature; (ii) examine the state of competition relative to such barriers to determine if effective competition could develop in a relevant period of time; and (iii) determine whether the exclusive application of competition law would properly address market failures.[12] If after conducting its analysis, the NRA determines that regulation is warranted, it may propose a draft measure, which the EC may request be withdrawn if it (i) concerns definition of relevant markets; (ii) would create a barrier to the entry; or (iii) would be incompatible with the EC's laws or policy objectives (*e.g.*, to move from sector-specific regulations to competition laws). Even if the EC identifies a market as being "susceptible" to *ex-ante* regulation as it would be possible for an operator to maintain market power, it does not mean that regulation will always be required.[13] Regulation will only be warranted if there is a finding that effective competition does not exist in the relevant market.

In essence, the NRF sets forth the following three-step process:[14]

- **Definition of Markets**: NRAs are required to identify markets the characteristics of which warrant the application of *ex-ante* regulation based on three criteria: (i) high and non-transitory entry barriers; (ii) the dynamic state of competitiveness behind entry barriers; and (iii) the sufficiency of competition law in the absence of *ex-ante* regulation.
- **Market Analysis**: NRAs are required to assess the level of competition in the markets which it has identified under (i) above.
- **Imposition of Remedies**: If the NRA finds that a particular market lacks effective competition and identifies operators with significant market power, it may impose certain specific obligations (*i.e.*, those in the Universal Service Directive or Access Directive mentioned in Section 3.2.2 above). The NRA may also maintain or amend obligations that may already be in place. The Framework Directive provides a review and consultation process for the approval of any such remedies to ensure that they are consistent with the objectives of the NRF and that they do not further affect competition in the market.

Although the 2002 Framework Directive set out a list of 18 markets—seven at the retail level and 11 at the wholesale level—the European Commission recommended phasing out sector-specific regulation of electronic communications in a 2007 Recommendation (2007/879/EC).15 In the Recommendation, the Commission found that 11 of the 18 markets are no longer regarded as needing to be subject to sector-specific *ex ante* regulation. (See Table 3-3 for the list of markets currently identified by the EC.)

Retail Level		Wholesale Level	
1.	Access to the public telephone network at a fixed location for residential customers.	2.	Call origination in the public telephone network provided at a fixed location.
		3.	Call termination on individual public telephone networks provided a fixed location.
		4.	Wholesale (physical) network infrastructure access (including shared or fully unbundled access) at a fixed location.
		5.	Wholesale broadband access.
		6.	Wholesale terminating segments of leased lines, irrespective of the technology used to provide leased or dedicated capacity.
		7.	Voice call termination on individual mobile networks.
[Note that markets are often referred to by the numbers assigned to them under the EC Recommendation (*e.g.*, the mobile termination market may be referred to as "Market 7").]			

◂ **Table 3-4: Markets Susceptible to ex ante Regulation in the EU, as of Recommendation[17]**

EU Directives are binding rules meant to be implemented on a national level by each member state. Depending on the maturity of the market and the legislation in place at the time of adoption of the Framework Directive, some countries have had to implement modifications in their national legislation and are at varying stages regarding their analyses of the above-mentioned markets.

Although the EU's 2002 telecoms rules have been successful, it has remained a challenge for telecom operators to deliver pan-European or cross-border services, in large part due to the existence of 27 regulatory systems with widely varying rules. Since the NRAs have had different approaches to similar competition problems, new EU telecom rules have been adopted to help streamline and bring greater consistency to competition issues throughout the EU. As such, the EU passed the 2009 Telecoms Reform, which required Member States to transpose into national law by May 21, 2011. The 2009 Telecoms Reform addresses competition on several levels:18

- The Body of European Regulators of Electronic Communications (BEREC) has replaced the European Regulators Group (ERG), a loose cooperation between NRAs. BEREC provides a better-structured, more efficient approach than ERG and will help ensure fair competition and more consistency of regulation on the telecoms markets.
- The 2009 telecoms reform gives the European Commission the power to oversee regulatory remedies proposed by national regulators (e.g. on the conditions of access to the network of a dominant operator; or on fixed or mobile termination rates) in order to avoid

inconsistent regulation that could distort competition in the single telecoms market. When the Commission, in close cooperation with BEREC, considers that a draft remedy notified by an NRA would create a barrier to the single market, the Commission may issue a recommendation that requires the NRA to amend or withdraw its planned remedy.

- The 2009 telecoms reform enables the Commission to adopt further harmonization measures in the form of recommendations or binding decisions if divergences in the regulatory approaches of NRAs, including remedies, persist across the EU in the longer term (e.g. on broadband access conditions or on mobile termination rates).
- NRAs gain an additional tool of imposing functional separation obligations, where warranted. Under the 2009 telecoms reform, NRAs may require telecoms operators to separate communication networks from their service branches, as a last-resort remedy. This new remedy has been advocated since 2007 by the European Commission and by the 27 national regulators. Functional separation can rapidly improve competition in markets while maintaining incentives for investment in new networks.

Transposition of the EU Model

Understanding the EU's regulatory evolution and the state of the EU markets during both phases of regulatory interventions is crucial when considering implementation of a similar model in developing countries. Many developing countries find themselves in a transitional stage similar to the one that existed in the EU during the implementation of the 1998 Package. Therefore caution may be warranted to avoid rushing into its implementation in markets that may not be ready for near-term regulatory dismantling, as they may require some continued regulation to ensure the development of competition.

Additionally, in markets where full liberalization has been achieved, effective application of the EU's competition-based approach may be influenced by a country's lack of experience and resources to dictate and enforce generic competition principles. The principal elements that may pose a challenge to the successful emulation of the EU model in developing countries are the differences in: (i) market composition and development; and (ii) the institutional frameworks.19

With respect to market composition and development, the following differences have been identified as potential challenges in adopting the EU model in developing countries:20

- *Dominance of Mobile Networks*. Large mobile penetration in developing countries, resulting in the preeminence of mobile networks with respect to fixed networks, may require that some elements of price regulation traditionally aimed at dominant fixed-line incumbent be applied to mobile networks. However, some other regulations (*e.g.*, local loop unbundling) may be inapplicable to wireless networks.
- *Universal Service and Rural Access*. Compared with Europe and other developed countries, developing countries tend to have lower levels of teledensity. Where most developed countries (with higher teledensity levels) focus on issues of "content, quality and price of basic services," countries with developing communications markets may be required to focus their regulatory resources on the implementation of access measures.
- *Market Liberalization.* Some developing countries have not achieved full liberalization of all market elements and certain monopoly vestiges still exist (*e.g.*, incumbent telecommunications operator's control over international gateway; preferential access to essential facilities by the incumbent's mobile business). As such, developing countries may require greater regulatory intervention as the market transitions to greater liberalization.

The legal, political and institutional dynamics in developing countries also may contribute to the need for more prescriptive sector regulation. The legal and judicial systems in many developing countries may lack sufficient depth and expertise on matters of competition principles, and courts may lack the technical knowledge to effectively resolve complex matters in a constantly evolving market. Political interference by well-connected or state-owned operators is also a factor that supports maintaining sector-specific regulation in order to avoid arbitrary implementation of regulation.21

Where generic competition principles may not be applied for the reasons mentioned above, countries may consider incorporating competition law principles into their sector-specific framework, as a mechanism to foster the growth of the market and prevent anticompetitive practices that may hinder its development.

While the EU model as a whole may not be transferable to the developing world, certain of its underlying principles can serve as the foundation for an effective regulatory framework:22

- Establishment of an independent regulator;
- Existence of an efficient mechanism to appeal decisions of the regulator;
- Applying regulation with principles of transparency, non-discrimination and objectivity;
- 'Two-tier' regulation, where the activities of operators with significant market power are held to greater regulatory supervision;
- Adoption of technology neutral approach (*i.e.*, recognizing the fast-paced development of convergence and shift regulation from technology/service-based, to technology neutral);
- Reducing market access barriers;
- Avoiding over-regulation and progressive reduction of unnecessary regulation upon the existence of effective competition;
- Engaging in open, transparent and thorough consultation prior to the issuance of any regulation that would impact the market; and
- Reducing bureaucratic processes in an effort to reduce costs and streamline processes where possible.

In 2005, the Info-communications Development Authority (IDA), the telecommunications regulator in Singapore, issued a Code of Practice for Competition in the Provision of Telecommunications Services following adoption of a regulatory policy similar to that of the EU. The Code of Practice specifically recognizes that consumer welfare is best promoted through market forces rather than regulation, and states that the IDA will "place primary reliance on private negotiation and industry self-regulation" subject to its duty of preventing anti-competitive conduct.23 However, the Code of Practice recognizes that *ex ante* regulatory intervention may be required where markets are not sufficiently competitive.24

◂ Box 1 Singapore

6.3.3.2 ANALYSIS OF JURISDICTIONAL DIVISION OF POWER BETWEEN COMPETITION AUTHORITIES AND REGULATORY INSTITUTIONS

The relationship between telecommunications laws and competition policies can be depicted through the jurisdictional division of power between competition authorities and regulatory institutions. When there are separate entities enforcing telecommunications and competition rules, balancing the interplay and jurisdiction between these two entities is a key element in allowing the industry to expand. On the other hand, where a single entity exists (either a telecommunications regulator or a general competition authority), policies applicable to the telecommunications market should encourage growth and competition in the industry. Examples of different models adopted include:

- The most common scenario where countries have both a telecommunications regulator and one or more entities with jurisdiction over economy-wide competition matters (*e.g.*, the United States, Chile, and South Africa); or a telecommunication regulator and a competition authority with a specific mandate over competition in the telecommunications sector (*e.g.*, Australia);
- A model adopted in certain developing countries where there is no competition authority, but a sector-specific regulator with sector-specific competition mandates (*e.g.*, Dominican Republic);
- The least common model adopted in New Zealand, where a sector-specific commissioner is part of the general, economy-wide competition authority.

The structure of competition policy and interplay between institutions is not necessarily pre-determined by the legal system in place. In some cases this may be the result of political and practical considerations such as management of existing human and financial resources, the development and size of the telecommunications market, and the level of competition that exists in the market. (See Table 3-4 for a list of certain countries with both a telecommunications regulatory body and a competition authority.)

Scenario 1 – Existence of Competition and Telecommunications Authorities

United States

In the United States, the Federal Communications Commission (FCC) is the independent regulator in charge of overseeing interstate and international communications, but in matters involving competition issues, it must coordinate with the U.S. Department of Justice (DOJ) or the Federal Trade Commission (FTC) depending on the industries involved and the economic impact.1

The Communications Act of 1934 (as amended by the Telecommunications of 1996) establishes pro-competitive principles that govern the telecommunications industry in the United States and gives the FCC authority to review and approve (*ex-ante*) merger transactions involving licensed telecommunications carriers.2 The Communications Act requires the FCC to consult with DOJ prior to granting certain authorizations to local exchange carriers, and the antitrust law gives the FCC concurrent authority with DOJ to review mergers among telecommunications carriers.3 DOJ's Antitrust Division and the FTC are primarily responsible for overseeing enforcement of U.S. antitrust laws (the Sherman Act and the Clayton Act).4 DOJ's Antitrust Division has authority to prevent anticompetitive conduct (*e.g.*, contracts, combinations and conspiracies in restraint of trade) that is subject to either criminal or civil action under U.S. antitrust laws and to review proposed mergers and acquisitions of telecommunications carriers (*i.e.*, to assess their competitive effect and challenge those that threaten to harm competition).5 As a result, activities performed by telecommunications service providers in the United States are subject to the FCC's regulatory enforcement under the Communications Act, as well as the DOJ's enforcement under the antitrust laws. However, in a recent Supreme Court decision on whether a carrier's breach of certain duties under the Communications Act also generated antitrust liability under the Sherman Act, the Supreme Court determined that such liability arises where a regulatory structure is already in place to prevent anticompetitive injury.

The FTC is responsible for preventing and penalizing unfair and deceptive market practices in restraint of trade.6 While the FTC does not have authority to review mergers involving the FCC-licensed telecommunications common carriers, it does have authority to review mergers of unregulated non-common carriers or mergers involving common carriers that reach a certain monetary threshold.7 Therefore, when a merger does not involve a telecommunications common carrier, in principle it may be reviewed by either the FTC or DOJ, as was the case of the merger of America Online (an Internet service provider) and Time Warner (a cable/media operator). The jurisdictional division among these three entities runs parallel and may often overlap. Rather than multiple agencies reviewing a transaction, the law requires one agency to give the other(s) investigative "clearance" to conduct the review. To avoid the overlap and duplicity of review between the FTC and DOJ, and the extensive delays in obtaining such clearance, in 2002, the two entities entered into a Memorandum of Agreement allocating areas of responsibilities in reviewing mergers and enforcing antitrust laws.8 As a result, the DOJ now is responsible for enforcing antitrust laws on telecommunications matters (See Box 3-8 for a snapshot of this tripartite review).

In reviewing mergers or other antitrust actions, the DOJ and FTC focus purely on competition issues, basing their decisions on whether a particular transaction will result in an accumulation of market power that would reduce competition and affect consumers.9 While the FCC also may engage in a competition analysis, it applies a broader sector-oriented analysis, focusing on whether the transfer would benefit or harm the public interest, convenience, and necessity.10 In some cases, the FCC may approve a merger, but may place conditions on the merger after consultations with the DOJ on competition issues.

Chile

Chile, like the United States, has a sector-specific regulator (SUBTEL) and a competition authority. However, the competition authority can intervene in telecommunications matters and apply competition law not only to private parties, but to the regulator itself.

SUBTEL, created in 1977 under the Ministry of Transportation and Telecommunication, is the entity responsible for overseeing the operations of telecommunications networks, and developing and enforcing technical industry standards.[11] SUBTEL also is required to approve the transfer of any concession, authorization or permit.[12] The Telecommunications Law of 1982 sets forth certain competition-related provisions applicable to the industry[13] and operates in conjunction with Chile's antitrust law (Decree 211), which generally prohibits activities that are a restraint to competition.[14] Pursuant to Decree 211, the Tribunal for the Defense of Open Competition (*Tribunal de Defensa de la Libre Competencia*, the "Tribunal") and the National Economic Prosecutor (*Fiscalía Nacional Económica*, the "NEP") are the entities primarily responsible for the promotion and protection of competition in all markets.[15]

Unlike the United States, Chile's antitrust law does not require the competition authorities to approve mergers and the Tribunal may not initiate antitrust investigations on its own. However, the Tribunal (at the complaint of interested parties) may prevent actions that can potentially harm competition. The NEP or any private party may file a claim with the Tribunal alleging that a party has engaged in actions that restrain competition and affect the public.[16] Despite the lack of a requirement for authorization, in 2005 the Tribunal issued a pre-merger decision in one of the most significant acquisitions in the Latin American telecommunications market: the acquisition by Telefónica Móviles of BellSouth's Latin American mobile business.

In this instance, Telefónica Móviles and BellSouth filed a motion with the Tribunal requesting that it expressly approve the acquisition in order to avoid potential post-merger litigation.[17] After conducting cost and competition analyses, the Tribunal approved the merger with certain conditions (*e.g.*, divestiture of a particular spectrum concession to avoid 100 per cent control of a particular band by the merged entity).[18]

The Tribunal has authority to order Chilean regulators, including the telecommunications regulator, to take certain actions where it identifies competition concerns,[19] such as regulating prices for the telecommunications industry if they find that competitive conditions do not exist.[20] Although SUBTEL and the Tribunal generally work well together, there have been instances where the Tribunal has imposed its authority on the regulator.

For example, in 2000, two mobile operators operating in the 800 MHz band petitioned for, and acquired, from SUBTEL additional spectrum in the 1900 MHz band (PCS). Another mobile operator filed a complaint with the NEP. The NEP, in turn, initiated a proceeding with the Antitrust Commission (currently the Tribunal). The Commission ordered SUBTEL to conduct a public spectrum auction without giving preferential treatment to the two mobile operators that had originally applied for the spectrum. Although a more transparent process was used to grant the right to additional spectrum, some argue that the case merely represents an effort to use the competition institution to delay the allocation of new spectrum. In addition, others believe that the competition authority became too involved in technical matters.[21]

In principle, the jurisdictional division of power between the telecommunications regulator and the competition authority in Chile appears to be clear, where intervention by SUBTEL is forward-looking and the competition authority is generally involved on a retrospective basis. However, the example of Telefónica Moviles and BellSouth above shows that companies may prefer to voluntarily submit themselves to the judgment of competition authorities for specific guidance in order to reduce uncertainty and post-acquisition problems.

European Union

In Europe, competition matters are divided between the respective competition authorities within the EC and the EU member states. There are two separate directorates within the EC that address competition and electronic communications matters: the Competition Directorate General (Competition DG), which has played a significant role in the development of EU telecommunications policy; and the Information Society and Media Directorate-General (DG InfoSoc), responsible for developing Information Society initiatives and harmonization efforts.[22] There is no European-wide telecommunications regulatory authority.

The DG Competition Directorate is responsible for designing and enforcing general competition rules under the EU's Community Treaties, and ensuring "that competition of the EU market is not distorted."[23] Its four main areas of action with respect to competition policy are antitrust and cartels, merger control, liberalization (*i.e.*, introducing competition in monopolistic sectors), and state aid control (to ensure that competition in the Common Market is not distorted). At the EU level, the general competition rules are set forth in the EC Treaties, and pursuant to these, sector-specific competition rules are issued to govern certain sectors of economic relevance. For instance, member states are subject to the Directive on Competition Electronic Communications Markets,[24] which prohibits them from establishing exclusive or special rights for the provision of electronic communications networks. This Directive also establishes the general competition principles applicable to the industry and requires the removal of competitive barriers for: (i) vertically integrated public undertakings; (ii) use of frequencies; (iii) satellites; and (iv) cable television networks. Member states are required to adopt the necessary measures to ensure compliance with this sector-specific competition directive.

Competition Matters – Relationship between the EC and NCAs

The EC has the authority to deal with competition matters on a community level, and national competition authorities (NCAs) are responsible for enforcing national competition laws. In some instances, EC authority may be shared with that of NCAs and in others, the EC may have exclusive authority (*e.g.*, when certain practices may have impact on trade between member states or are deemed to be "Community dimension").

The EC Treaty also established general competition rules that apply to all industries throughout the EU, and are enforced in coordination with the NRAs.[25] Article 81 of the EC Treaty prohibits anticompetitive agreements (*e.g.*, agreement between competitors and vertical agreements) that may have an effect on trade between member states and which prevent, restrict or distort competition in the common market. Exemptions may be granted if there are overriding countervailing benefits (*e.g.* improvement in efficiency or the promotion of research and development).

Article 82 of the EC Treaty prohibits (without the possibility of exception) the abuse of a dominant position to the extent it may affect trade between member states. NCAs must apply articles 81 and 82 of the EU Treaty in individual cases, in cooperation with the EC and the other member states.26 In practice, there have been few cases in the telecommunications sector in which the EC has had to act under the provisions of articles 81 and 82.27 However, the EU's merger control procedures are a useful example to illustrate the allocation of powers between the EC and NCAs.

In 2004, the EU adopted New Merger Control Regulations (NMCR) 28 setting forth a referral system for the allocation of merger decisions between the EC and the NCAs, which complies with the subsidiarity principle set forth in Article 5 of the EU Treaty. According to the subsidiarity principle, unless the EC has exclusive authority to act, EC action is only permissible when the purpose of the proposed action will not be sufficiently achieved by the member states' action (*i.e.*, where the independent action by the member states' institutions will not achieve such purpose effectively).29 Under the NMCR, the EC has exclusive jurisdiction over mergers of "Community dimension", as a result of the transaction exceeding certain turnover thresholds. Mergers that do not meet that turnover should be reviewed by the NCAs, unless referred to the EC through the NMCR's referral process.

EC dimension mergers are those where:

(i) the combined worldwide turnover of the undertakings concerned (*i.e.*, the merging parties) is greater than €5 billion; and each of at least two of the undertakings concerned had a turnover within the EU of more than €250 million; or

(ii) the combined worldwide turnover of the undertakings concerned is greater than €2.5 billion; their combined turnover in each of at least three member states is greater than €100 million; in each of those three member states, the turnover of each of at least two of the undertakings concerned is €25 million; and the EU wide turnover of each of at least two of the undertakings concerned is greater than €100 million;

However if more than two-thirds of each of the merging parties' EU turnover in either case is in *one and the same* EU member state, the merger must be examined by the NCA of that member state. Cases also may be allocated to and from the EC and NCAs through a referral procedure that seeks to allocate the case to the best placed authority in a manner consistent with the subsidiarity principle. Where clearance is required in more than three jurisdictions it may be approved by the EC (provided such competition authorities do not object to such referral), in which case such approval would be valid EU-wide. Pursuant to Article 9 of the NMCR, at the request of a member state, the EC may refer a EC dimension transaction to such member state where the transaction (i) threatens to significantly hamper competition in a distinct market within that member state; or (ii) affects competition on a market within that member state, which presents all the characteristics of a distinct market and which does not constitute a substantial part of the common market.30 Article 22 of the NMCR allows the EC to accept a member state's referral of a non-EC dimension referral where trade among member states may be affected.

The EC also has issued merger guidelines31 to provide companies instructions on when mergers are likely to be challenged or not, and a document on best practices on the conduct of EC merger control proceedings,32 which seeks to enhance the efficiency of investigations and to ensure transparency in the merger review process.

Role of the NRAs

Unlike the United States, in the EU, NRAs generally do not participate in merger reviews, as these are under the competence of the NCAs. However, in the EU, NRAs play an important role in enhancing competition in national telecommunications markets through sector-specific policies, as they are required to "promote competition in the provision of electronic communications networks, electronic communications and associated facilities and services."33 NRAs may participate jointly with NCAs in assessing and ensuring competition in the communications market. As explained in Section 3.3.1 above, NRAs are required to consult with the EC prior to the adoption of measures following a determination of market power and the EC has the authority to require an NRA to withdraw a draft measure.

Given the increasingly competition-oriented regulatory approach of the EU model (see Section 3.3.1, above), there are some areas of overlap between regulatory policy (applied by the NRAs) and competition law (enforced by the NCAs). This has led some to debate over the future role and institutional structure of NRAs within a deregulatory framework in markets where full liberalization and competition exists. Although some have even suggested that NRAs potentially could be absorbed by competition authorities, this view is rejected as unsound regulatory practice.34 The importance of sector-specific regulation and enforcement remains relevant as NRAs are charged with achieving efficiency from a technical and allocation perspective (*i.e.*, use of scarce resources), as well as ensuring competition and meeting universal service goals. Although NRAs apply certain aspects of competition law (as underlying principles of sector regulation), the interaction between the two enforcement authorities are considered an effective regulatory model.35

South Africa

The South African Competition Act expressly recognizes the concurrent jurisdiction that may be exercised by the competition authorities and sector-specific regulators. The Independent Communications Authority of South Africa (ICASA), an independent body responsible for regulating the telecommunications and broadcasting industries, is also responsible for ensuring fair competition among industry players in these industries.36 The Competition Act, which was greatly influenced by developed country experience, establishes three entities responsible for economy-wide competition matters:

a. Competition Commission

   – an independent body responsible for the implementation of the Competition Act, (

   i.e.,

   itinvestigates restrictive business practices and abuse of dominant positions and mergers); 37

b. Competition Tribunal

– an independent tribunal responsible for adjudication in the first-instance of contested competition matters (

i.e.,

it determines whether anti-competitive practices have occurred, and if applicable, imposes sanctions under the Competition Act; it also reviews larger mergers when they have been referred to the consideration of the Tribunal and adjudicates appeals on decisions from the Competition Commission on intermediate mergers and Competition Act exemptions);38 and

c. Competition Appeal Court

– has status equivalent to a high court and considers appeals from decisions rendered by the Competition Tribunal; also confirms orders by the Competition Tribunal on the divestiture of assets by parties who have merged in contravention of the Competition Act (The Competition Commission, the Competition Tribunal and the Competition Appeals Court are, for purposes of this section collectively referred to as the "Competition Authorities").

The Competition Act expressly recognizes the possibility of the Competition Authorities and sector regulators (*i.e.*, ICASA) to exercise concurrent jurisdiction over industry-specific competition matters, which to the "extent possible" should be managed pursuant to an agreement between the Competition Commission and the regulator for purposes of harmonizing their exercise of jurisdiction and ensuring a consistent application of the Competition Act.39 To this end, the Competition Commission and ICASA entered into a Memorandum of Agreement setting forth the manner in which they would operate when both have jurisdiction over the "investigation, evaluation and analysis of mergers and acquisition transactions and complaints involving telecommunications and broadcasting matters."40 Although neither entity waived its respective authorities, they agreed on the establishment of a joint working committee to facilitate cooperation and consultation of matters that require their involvement.41

In the case of mergers that require the approval of the Competition Commission and ICASA, the Memorandum of Agreement recognizes that the entities may consult each other, but requires them to make independent determinations based on their respective legislations. In the event that each reaches different determinations, the Memorandum of Agreements sets forth a procedure by which both entities should try to reach the same decision on the merger. If either the Competition Commission or ICASA fails to approve the transaction, the merger may not go through.42 Decisions may be appealed to the relevant courts (*i.e.*, the Competition Tribunal if appealing a decision of the Competition Commission; or the ordinary courts if appealing ICASA's decision). In some cases however, even after bringing the matter before the court, companies have opted to settle given the court's and the Competition Tribunal's limited understanding of industry-specific matters and the length of time it takes a court to decide on these issues.43

India

India has a telecommunications regulator and an economy-wide competition authority. Enacted in 2003, India's Competition Act is in its initial stages of development, with enforcement entrusted to the Competition Commission of India. The Competition Act generally prohibits anticompetitive agreements (*i.e.*, one that is likely to cause an appreciable adverse effect on competition within India) and abuse of dominant position (*i.e.*, where an enterprise directly or indirectly, imposes unfair or discriminatory conditions in the purchase and pricing conditions), and regulates corporate "combinations" through the acquisition of shares, control and mergers. The Competition Commission has an express mandate over competition issues with respect to a variety of services, including "communication" services.44

The Telecommunications Regulatory Authority of India (TRAI) is an autonomous body responsible for the regulation of telecommunications services in India. TRAI is responsible for "facilitate[ing] competition and enforce[ing] efficiency in the operation of telecommunications services" in order to facilitate growth.45 TRAI is also responsible for adjudicating disputes among service providers and between groups of licensees on matters concerning technical compatibility and interconnection between service providers, revenue sharing arrangements, quality of telecommunications services and interests of consumers. However, the TRAI Act specifically excludes from TRAI's jurisdiction matters concerning "the monopolistic trade practice, restrictive trade practice and unfair trade practice." If a matter is brought before TRAI that raises such competition issues, or any other issue under the jurisdiction of the Competition Act, TRAI is required to refer such issues to the Competition Authority.46

◄ **Table 3-5 below shows certain countries that have both a communications regulator and a competition authority, and the entity with jurisdiction over competition issues in the telecommunications sector.**

Scenario 2 – Lack of Competition Authority, but Enforcement of Sector Specific Competition Rules by Telecommunications Regulator

Bahrain

The Kingdom of Bahrain does not have a general competition law or economy-wide competition authority. Instead, the Telecommunications Law of 2002 tasks the Telecommunications Regulatory Authority (TRA) with promoting effective and fair competition among new and existing licensed ICT operators through the issuance of necessary regulations, orders and determinations.47 TRA's authority under the Telecommunications Law includes review and the imposition of sanctions for any conduct that restricts or distorts competition in the ICT sector, including abuse of dominant position or anti-competitive agreements. Additionally, the Law grants TRA the authority to conduct reviews of proposed mergers or other changes to the market structure that may restrict or distort competition.

In 2010, TRA issued Competition Guidelines that assist market participants to understand how it will assess competition in the telecommunications sector, including both ex ante market reviews and ex post investigations into anti-competitive behavior.48 Although the Competition Guidelines focus mainly on abuse of dominant position, they also address collusion and mergers. Under the Competition Guidelines, the following types of behavior may raise abuse of dominant position concerns that TRA could then investigate:

- Excessive pricing – when prices are set significantly and persistently above the competitive level;
- Predatory pricing – when prices are set anti-competitively below cost;

- Margin squeezing – when a vertically integrated operator sets the price of the retail and/or wholesale product such that the margin between the two does not enable an efficient competitor in the retail market to trade profitably;
- Bundling or tying – when two or more products are sold together in an anticompetitive manner;
- Price or non-price discrimination – when equivalent products are provided to different customers on different terms in an anti-competitive manner;
- On-net/off-net price discrimination – when the prices of on-net and off-net calls diverge in an anti-competitive manner;
- Refusal to supply – when a dominant vertically integrated operator's behavior unreasonably restricts competitors access to its network; and
- Unduly long-term contracts – when retail service contracts are unjustifiably long.

Scenario 3 – The Case of New Zealand - Competition Authority Enforcing General Competition Policies and Sector-Specific Regulations

New Zealand introduced industry specific provisions, such as the regulation of interconnection and number portability, with the adoption of the Telecommunications Act in 2001, but the general competition statutes play an important complementary role, notably the Commerce Act of 1986, as amended, which prohibits anticompetitive practices (*e.g.*, misuse of a dominant position) and business acquisitions that create or strengthen dominance.49

The Ministry of Economic Development (MED) advises the Minister of Communications on "the operation and regulation of specific markets and industries...including telecommunications."50 The general, economy-wide competition authority is the Commerce Commission (Commission), which is an independent agency not subject to government direction.51 The Commission is responsible for enforcing competition legislation including the Telecommunications Act 2001.52 Within the Commission, primary responsibility for making decisions about, and providing advice to the Minister on telecommunications, rests with the Telecommunications Commissioner.

The jurisdictional division of power between these two agencies with respect to telecommunications matters is clearly defined in New Zealand's legislation, and is evidenced in rulemaking proceedings. An interplay between MED and the Commission recently took place in connection with the Commission's proposal regarding the regulation of mobile termination rates. Under the Telecommunications Act, the Commission is responsible for conducting "investigations into the desirability of regulating additional services or amending the regulation of services where considered necessary, and make recommendations to the Minister of Communications."53 In 2004, as a result of complaints of high mobile termination rates and lack of competition in New Zealand's mobile termination market, the Commission initiated an investigation to determine whether to regulate the mobile termination market. In June 2005, the Commission issued a report to the Minister of Communications recommending the regulation of fixed-to-mobile termination rates (excluding 3G networks).54

Under the Telecommunications Act 2001, the Minister of Communications has the ultimate authority to accept or reject the Commission's recommendations, or to require the Commission to reconsider its recommendation "for any reason specified by the Minister."55 However, the Minister of Communications cannot reject the Commission's recommendation and substitute his own preferred outcome – if he rejects the Commission's recommendation, then the regulatory status quo prevails. As a result of this authority and despite supporting a reduction of mobile termination rates, the Minister of Communications required the Commission to reconsider its recommendation, particularly on aspects of implementation and achieving benefits to end-users.56

As of the date of this publication, New Zealand's mobile termination proceeding has not concluded, but it serves to highlight the interplay between the relevant agencies. Worth noting is the broad authority of the Minister of Communications with respect to the recommendations of the Commission, which may be subject to reconsideration for reasons not specifically set forth in the Telecommunications Act or the Commerce Act.

New Zealand's approach has not been emulated in other countries, and there are no indications that this approach would lead to higher levels of competition than that achieved by countries with sector-specific regulation.57 Furthermore, this approach is unlikely to be successful in developing countries that lack expertise in the enforcement of generic competition laws.

Practice Notes

- **Box 3-5: United States Tripartite Review [3.3.2]**
- **Table 3-5: Entity with Jurisdiction over Competition Issues in the Telcommunications Sector in Certain Countries with both a Telecommunications Regulator and Competition Authority [3.3.2]**

6.3.3.3 PRACTICAL LESSONS FOR DEVELOPING COUNTRIES

Regardless of the stage of development of their telecommunications market and regulation, the most significant lesson that developing countries may draw from some developed countries is that the objective of competition policy is to foster the expansion of the market, the availability of new technologies, and the accessibility of low-cost quality services to the public.

The small number of players in a market, and the lack of technical, human and financial resources may not make it feasible for developing countries to engage in dramatic legislative change (*i.e.*, from sector-specific to general competition rules). A report issued by the International Competition Network (ICN)**1** evaluated the effectiveness of competition advocacy in regulated sectors (including telecommunications) and draws several important lessons in this respect:**2**

1. Regulatory agencies should be aware of the importance of competition. To the extent there is both a competition authority and a regulatory agency, the latter should endeavour to consult with the former in developing and proposing new regulations in order to achieve pro-competitive policies.

1. An "open and active dialogue" should be maintained between competition authorities and sector regulators. This may include (i) requiring competition authorities to opine on proposed telecommunications regulations or telecommunications regulators to be consulted prior to the issuance of general competition guidelines that may affect the sector; (ii) participation of competition authorities in meetings with the regulator and the incumbent telecommunications operator in order to "promote competition values;" or (iii) the ability of competition authorities to "advise regulators on market definitions."

1. Having the competition authority adopt "formal procedures," which may include (i) the development of formal memoranda on cooperation between the competition authority and the telecommunications regulator; and (ii) implementation of telecommunications regulation that provides the competition authority with decision-making power on competition matters.

1. Using the media as a means to enable the competition authority to explain "its views and arguments within the framework of advocacy activities to the wider public."

1. Ensuring an adequate level of technical expertise that may include (i) exchanging "high quality of information" between the competition authority and the telecommunications regulation; and (ii) developing "technical know-how" with the competition authority so that competition principles can be effectively transferred to the telecommunications sector.

1. Having a "forward looking" approach, which involves developing sound strategies to "anticipate and address" potential competition problems and deal with them before they negatively impact the market (This is the goal sought by the market analysis under the EU NRF discussed above).

1. Adopting a "legalistic approach," which may include (i) incorporating formal rules governing the relationship between the competition authority and the telecommunications regulator to ensure that the "recommendations and opinions made by the competition agency are provided at the early states of the regulated sector reform" (see Box 3-6 for example of Brazil's legalistic approach); (ii) developing a code of conduct that seeks to improve the relationship among industry participants; and (iii) establishing conditions regarding the protection and exchange of confidential information.

◂ Box 1 Example of Implementation of a Legalistic Approach Memorandum of Understanding – Brazil

The Brazilian System of Defense of Competition (SBDC), comprised of the Administrative Council of Economic Defense (CADE), the Secretariat of Economic Law (SDE), and the Secretariat for Economic Monitoring (SEAE), is responsible for ensuring the protection of competition in Brazil. CADE has entered into several competition promotion agreements with sector-specific regulatory agencies in order to institutionalize cooperation among them in competition and antitrust matters (this would be an example of the "formal procedures" approach).3 However, General Telecommunications Law contains specific provisions governing the interplay between the telecommunications regulator, Anatel, and CADE and establishing the hierarchy of competition law with respect to the telecommunications sector, as follows:

- General competition rules (*i.e.*, "rules for the protection to the economic framework") are applicable to the telecommunications sector, to the extent that they do not conflict with the telecommunications law (Article 7 of the General Telecommunications Law);
- Any act among telecommunications service providers that seeks any form of economic concentration is subject to the controls, procedures and conditions set forth in the general competition law and will be submitted for consideration by CADE.
- Anatel has the ability to supervise, control and prevent activities that harm the economy, unless such activities fall within the purview of CADE.

Under this structure, Anatel's duties are similar to those of the SDE, which initiates administrative proceedings and issues determinations on mergers to be approved by CADE.5

6.3.4 IMPACT OF OTHER LEGISLATION

The effective implementation of telecommunications regulation and the achievement of its objectives may be influenced by other laws that affect the sector. In meeting other government objectives, laws may be passed that directly or indirectly affect the development of the telecommunications sector. These laws may enhance or diminish the effectiveness of the telecommunications legal and regulatory framework in creating an enabling environment for the development of the sector, affecting the degree of investment and competitiveness in the sector, and the ease of accessibility by new entrants to the market.

The breadth of legislation potentially affecting the telecommunications sector is quite expansive. This section focuses on the legislation generally considered to most directly impact the sector – tax laws, foreign ownership laws, consumer protection laws, spam legislation, and property laws. The interaction between competition law and telecommunications law is addressed more fully in Section 3.3.

6.3.4.1 TAX LAW

The regulation of telecommunications services will be affected by the taxation of such services, whether at the federal, state or local level. The taxation of telecommunications services, the amount of taxes, and the determination of any exemptions, will depend on the particular tax laws in each country. Taxes collected from telecommunications operators and service providers are important sources of revenue to many governments, and are used for a variety of purposes, including financing the cost of regulating the sector, and helping fund universal service programs, emergency services, and services for disabled persons. However, excessive taxation of the telecommunications industry can retard competition, and discourage technological development and investment in the sector. Given the importance of the telecommunications sector, the development of adequate telecommunications infrastructure and the costs associated with such development, investment in the sector is critical. One of the main considerations for attracting investment in telecommunications infrastructure and services are the additional costs associated with the taxes levied by individual governments. Many countries, for example, offer incentives to attract foreign direct investment in the form of tax concessions, holidays and credits, export subsidies, import entitlements and accelerated depreciation.1 Some governments have created "tax-free" zones to attract investors in the telecommunications sector. Panama, for example, created a tax-free environment in the Howard Special Economic Area and the "City of Knowledge Tecnopark" as an incentive for companies to establish businesses.2

The effect of taxation on the "digital divide", particularly in developing countries, is evident in a 2010 study released by the GSM Association on the impact of taxation on the development of the mobile broadband sector. This study examined the impacts of various taxation approaches on mobile telephony, including direct taxes (both general and sector-specific), value-added taxes, handset taxes and import duties, finding that for every dollar reduced in taxes, emerging countries may be able to generate between US $1.4 and US $12.6 in additional GDP.3 Further, the foregone tax revenues were expected to be partially or even completely compensated by taxes collected on the larger GDP. The study concluded that although it is important for governments to use tax revenues to fund universal service objectives where private investment is lacking, tax models may not be efficient, particularly where special taxes are applied to the telecommunications sector that "crowd out" private spending. The study also highlighted inconsistent policy goals wherein some regulations seek to develop the ICT sector while other regulations treat ICT services as "cash cows" for tax purposes. Particularly for developing countries, it is necessary that policy makers align taxation approaches for mobile services, particularly mobile broadband, with national ICT objectives to ensure that taxes do not represent an obstacle for diffusion.

The advance of new technologies in the telecommunications sector is also likely to impact the way countries impose telecommunications taxes. For example, as regulators define VoIP services, they must also consider the tax implications of the regulatory classification of VoIP, which could affect whether VoIP services are subject to federal, state or local taxes, whether interconnection fees apply, and whether VoIP providers are subject to universal service contributions.4

6.3.4.2 FOREIGN OWNERSHIP

Given its status as a critical public utility, telecommunications has been regarded as an integral part of a country's sovereignty and thereby subject to **foreign ownership restrictions** under either telecommunications legislation or a country's foreign investment law. However, largely as a result of liberalization, many countries have eased foreign ownership restrictions in order to attract investment, particularly as public sector financing has shrunk since the 1980's and the private sector, both domestic and foreign, has had to assume responsibility for financing development in the ICT sector.1 Foreign investment has facilitated the growth and development of the telecommunications sector in many countries, increasing access to capital for network development and modernization, and allowing for the transfer of technology and know-how. However, despite the benefits of foreign investment, not all countries are initially open to establishing a legal environment that is conducive to overseas ownership in the sector (see Box 3-10 below). Where foreign ownership restrictions continue to exist, governments should balance the reasons for such restrictions with the need for creating a favourable environment that is conducive to competition and development as well as an adequate access to capital.

Under Vietnam's investment law of 1992, as amended in 2000, foreign companies are allowed to provide services to Vietnam's telecommunications market only under a Business Corporation Contract (BCC). A BCC is, in essence, a partnership agreement between a foreign and a Vietnamese party in which private investors provide capital and receive a negotiated return on their investment for a prescribed number of years. Foreign investors are not allowed to own equity stakes in Vietnamese telecommunications companies and the Vietnamese party is the only party permitted to hire and manage a workforce. A foreign company must be present in Vietnam for at least two years before entering into BCC negotiations.

Recognizing that this scheme discouraged foreign investors because they had no operational control over their investments, the Vietnamese Government issued a new Law on Telecommunications and Decree implementing the Law loosening these restrictions. As of June 1, 2011, foreign ownership restrictions on telecommunications services provided under Vietnam's market access commitments in its WTO services schedule apply for other WTO members. For example, for facilities-based basic telecommunications services, foreign capital contribution may be up to 49% of the charter capital of a joint venture.

◂ Box 1 Vietnam's Business Corporation Contracts

Source: Decree Detailing Telecom Law of Vietnam, Vietnam Briefing (Apr. 2011) at **http://www.vietnam-briefing.com/news/decree-detailing-telecom-law-vietnam.html/#more-3531**

The level and nature of foreign investment in a country depends on various factors, such as openness of the market, government policies, infrastructure quality, political and regulatory stability, taxes and tariffs, labor costs, international commitments, and the existing legal framework. In South Africa, for example, foreign ownership restrictions in the telecommunications sector originate from the political history of the region. To address the effects of apartheid, the government's policy of economic reform has been based on economic empowerment, which encourages ownership and significant participation by historically disadvantaged groups.2 In the ICT sector, Sections 35(3) and 35(4) of the Telecommunications Act requires the regulator, ICASA, to promote the empowerment and advancement of disadvantaged groups and women by giving them preference in the award of any licences for up to 30 per cent equity ownership (and sometimes higher).3

Although foreign ownership restrictions have been eased in numerous countries they continue to exist in some countries, even in liberalized economies, chiefly due to concerns regarding national identity and security, economic espionage, damage to law enforcement interception capabilities, and potential for damage to critical infrastructure.4 For example, although India recently raised the foreign direct investment limit in the telecommunications sector from 49 per cent to 74 per cent in order to attract more investment in the sector, it has imposed various conditions on foreign investment to address national concerns which limit the impact of the changes. These conditions state that: (i) the majority of the Board of Directors, including the Chairman, Managing Director and Chief Executive Officer, must be resident Indian citizens; (ii) at least one resident Indian promoter must hold 10 per cent equity in any telecommunications company; (iii) the Chief Technical Officer and Chief Financial Officer must be resident Indian citizens; (iv) no sensitive information relating to subscribers and accounts can be transferred outside India; and (v) the identity of subscribers must be traceable at all times.5

Although a country's telecommunications laws may contain foreign ownership restrictions, it is often the case that other national laws regarding foreign investment in general may impose limitations. **Canada** and the **United States**, for example, not only have foreign ownership restrictions in their telecommunications laws, but have national laws regarding foreign investment such as the Committee on Foreign Investment in the United States (CFIUS) review in the United States and the Investment Canada Act in Canada. In the United States, the Committee on Foreign Investment in the United States (CFIUS) review is applied to all foreign acquisitions of U.S. companies to evaluate the impact on national security. If countries have foreign investment laws which require a review of telecommunications transactions and investment, they should ensure they do not become a hurdle that is non-transparent, timely, resource-intensive, and creates uncertainty. On the other hand, the Investment Canada Act provides for the review by the Minister of Industry of any foreign acquisitions in order to ensure a "net benefit" to Canada.

Practice Notes

- **Foreign Ownership in Canada [3.4.2]**
- **Foreign Ownership in the United States [3.4.2]**
- **Table 3-6: Foreign Telecommunications Ownership Restrictions in Selected Countries [3.4.2]**

6.3.4.3 CONSUMER PROTECTION LAW

It is important that the telecommunications legal and regulatory framework create an environment that promotes public interest, confidence and participation in the sector. Most countries have done so by enacting consumer provisions in telecommunications legislation, such as number portability, quality of service and universal service. Many countries also have general consumer laws to protect consumer interests in the purchase of goods and services, which also affects telecommunications. The popularity of mobile phones has also resulted in the enactment of special legislation in some countries against mobile phone theft. The interaction of different consumer protection laws that affect the telecommunications sector is seen, for example, in Australia,1 where consumer protection legislation is embodied in the Telecommunications Act 1997, the Telecommunications (Consumer Protection and Service Standards) Act 1999, the Privacy Act 1988 and the Spam Act 2003.2 In addition, there are general consumer safeguards under the Trade Practices Amendment (Telecommunications) Act 1997, general unfair trading legislation and customer rights under contract law in Australia.3

Due to the interaction of different consumer protection laws, such as in the case of Australia, a need exists for consistency among the laws in order to lessen confusion, and to ensure that the highest standard of consumer protection prevails. In particular, consumer issues and the degree of regulatory oversight may be influenced by the maturity of the national market and the degree of competition in the sector. For example, in highly competitive markets, such as Australia, Hong Kong SAR, Malaysia and Singapore, more reliance is placed on industry self-regulation through voluntary codes of practice. In Malaysia, the Consumer Forum, comprised of service provides, telecommunications companies, broadcasting stations, non-governmental organizations and public interest groups, is designated by the Malaysian Communications and Multimedia Commission (MCMC) to prepare industry codes on consumer protection issues.4 Generally, however, consumer protection regulations establish the telecommunications operators' obligations regarding their customers. Operators' obligations typically include, but are not limited to, items such as: timely and accurate billing; customer contract policies and procedures, protection of consumer privacy; and terms of reference for suspension of service. These regulations also need to take into account procedures necessary to respond to and resolve users' claims and to ensure that the relationship between telecommunications users and operators are fair and equitable.

Furthermore, given the constantly evolving nature of the telecommunications sector due to new technological developments and convergence, in particular the development of the Internet and the ICT sector, and the large quantity and range of personal information involved, these developments provide certain challenges that may not necessarily be addressed by telecommunications laws or general traditional consumer protection laws. Therefore, many countries are adopting additional laws and regulations that are focused on consumer protection matters in the ICT sector, such as intellectual property rights spam, privacy, fraud, identity theft, cyber crime, and e-commerce transactions. Such legislation protecting consumer activities in the ICT sector, and providing for the security of electronic networks and communications, are necessary to create trust and confidence in the use of digital networks.5 Further discussion of the impact of ICT related legislation in the telecommunications sector is found in Chapter 4, Section 4.4. A more detailed discussion regarding the regulatory responsibility for consumer protection is available in Chapter 6, Section 6.4.1.

Data Privacy Protections

(a) Personal Data

Due to the sensitivity of information involved in communications activities, most telecommunications legislation contains provisions regarding the privacy and confidentiality of user information. However, the ICT environment has greatly facilitated the global transmission of personal information, and it has become much easier to collect and share private information through the Internet. As a result, many countries have enacted data protection legislation to protect individuals' privacy rights by restricting the manner in which personal information is used in the private and public sectors.6 Some countries, such as Australia, have also undertaken efforts to harmonize privacy provisions in telecommunications legislation and in other related legislation to ensure a consistent standard of privacy protection applied to both the public and private sectors, which have been subjected to different privacy policy requirements. In 2005, the Australian Office of the Australian Information Commissioner (OAIC) (formerly the Office of the Privacy Commissioner) conducted a review of the Privacy Act in light of the developments in private sector industries, and issued recommendations to the Parliament on improving the private sector provisions in the Privacy Act.7 With regard to telecommunications, the OAIC recommended that the Telecommunications Act and the Privacy Act be amended to provide consistency and to clarify what constitutes authorized uses and disclosures under each Act, and to ensure that the Privacy Act cannot be used to lower the standard of privacy protection provided by the Telecommunications Act. These recommendations to privacy obligations in the private sector, along with updates to the government's obligations in protection of citizens' privacy, are being considered as part of broad legislative amendments to the Privacy Act in 2011.8

In the EU's 2002 Data Protection Directive9 and Privacy Directive,10 privacy in the processing of personal data and the confidentiality of communications are recognized as fundamental rights that should be protected. The Privacy Directive requires member states to harmonize and ensure an equivalent level of protection of the right to privacy with respect to personal data in the electronic communication sector.11 Pursuant to this, the Data Protection Directive prohibits the transfer of personal information to any country that does not have adequate privacy laws.12 As a result, EU member states have implemented legislation that prohibits the transfer of personal information from the EU to third countries unless such countries have adequate privacy protection in their laws. As part of the 2009 Telecom Reforms package, the EU implemented additional privacy rules protecting against personal data breaches.13 Under the new rules, which Member States were required to transpose by May 25, 2011, telecom operators and ISPs must take stronger security measures to protect the names, email addresses and bank account information of their customers, along with data about every phone call and Internet session they engage in, in order to ensure that data does not accidentally or deliberately end up in the wrong hands.14 Additionally, the new rules require ISPs to provide better information to consumers regarding the data stored or accessed in their devices through “cookies” (i.e., small text files stored by a user's web browser). In the case of data not related to the service currently accessed by the user, the new rules require Member States to ensure users have given their consent before such data is stored or accessed,

To date, a majority of countries around the world have enacted laws relating to data protection. Often, the protection of personal data is not encompassed in a single law but is covered by a variety of laws depending on the type of information that is being protected. In the United States, for example, legislation has passed regarding medical records (The Standards for Privacy of Individually Identifiable Health Information, or “HIPAA Privacy Rule”),15 credit reports (Fair Credit Reporting Act),16 and immigration and citizenship information (USA Patriot Act).17 Similarly, in Argentina, the protection of personal data is regulated by different legal instruments, namely the Argentine Constitution, the Personal Data Protection Act, Decree No. 1558, and the Data Retention Law, Law No. 25.873, which was incorporated into the Telecommunications Law. In New Zealand, data protection legislation is contained in a number of laws, including the Telecommunications Information Privacy Code 200318 and the Privacy Act 1993.19

(b) Data Retention

Another factor that has shaped the policy on the use of communications data with regards to privacy of information is the concern with national security after the events of September 11th, 2001, in the United States, and the recent terrorist attacks in Spain and in England. One example of the current debate surrounding the use of communications data for national security purposes is the initiative on data retention rules. Some laws, such as the EU Data Retention Directive20, require communications service providers to retain all data created by their users for a prescribed period of time, while other countries, such as the United States, require communications service providers to store specific sub-sets of data for a more limited amount of time for specific purposes. The issue of data retention is hotly opposed by operators and service providers because of the resources required to comply. In Argentina, the Data Retention Law was promulgated in February 2004 and mandated a 10 year data retention period.21 However, due to opposition by ISPs, who would bear the burden and costs of retaining the data, and civil liberties groups regarding the long retention period, the government suspended the application of the law in 2005 and has not since been re-enacted or amended.22

Spam Legislation

Often considered in relation to consumer protection legislation is legislation against spam, or the sending of unsolicited, usually commercial, electronic messages. With the growth of Internet usage, spam became more prevalent although it can also be carried out through other electronic means, such as facsimile, telephone, short message service (SMS) and instant messaging services. (See Box 3-11 for the definitions of spam.) With the growth of ICTs, a continually increasing number of countries have implemented legislation against spamming to supplement existing consumer protection laws (see Figure 3-D).**23** The problems associated with spam are magnified in developing countries, where high volumes of incoming and outgoing spam can cause a severe drain on the limited and costly bandwidth that is available for ICTs.24 Notably, efforts aimed at combating spam have waned in the last few years as policy makers focus more on data privacy and cyber security issues.

Some countries, however, such as Dominica, Iran, Jordan, Moldova, Nicaragua, Sri Lanka and Zambia have reported since 2009 that they do not have any legislation countering spam, while others such as Bulgaria, Chile, Costa Rica, **Malaysia**, Mexico, Morocco, Peru, South Korea and Switzerland have developed legislation to counter spam legislation through consumer protection laws, telecommunications law, or data protection law.25 Nonetheless, several countries such as Canada is in the process of enacting specific anti-spam laws, while others such as Argentina, **Australia**, Austria, Belgium, Brazil, **China**, Czech Republic, Hungary, Japan, Lithuania, the Netherlands, Singapore and the **United States** have enacted specific spam legislation.26 In the EU, legislation against spam is codified in the Directive on Privacy and Electronic Communications which requires member states to prohibit unsolicited communications sent via e-mail, SMS, facsimile, or telephone.27 The Directive’s basic principles are that: (a) member states should take an opt-in approach, whereby they ensure under applicable legislation that businesses obtain prior consent before sending unsolicited e-mails for direct marketing; (b) senders must clearly indicate the use of cookies or other tracking devices, including spyware; and (c) the definition of spam is technology neutral.

As part of the 2009 Telecom Reforms, the EU also introduced stronger spam rules.28 In particular, all commercial emails advertising web sites without full information about the company are now illegal. As many spammers operate across borders, cooperation between enforcement authorities will be improved as they have now become part of an EU-wide Consumer Protection Cooperation network. Furthermore, the new rules give internet service providers the right to protect their business and their customers by taking legal action against spammers.

Although national efforts are the main forces in combating spam, due to the “borderless” nature of spam, it is just as important to have international enforcement cooperation. For example, countries such as Australia, Korea, the United Kingdom and the United States have signed bilateral and multilateral memoranda of understanding to coordinate and improve spam enforcement activities. The OECD, to support the development of an inclusive response to spam, has launched an Anti-Spam Toolkit containing resources and information on anti-spam activities at the international level, to help policy-makers, regulators, and industry players formulate policies and find solutions to spam.29

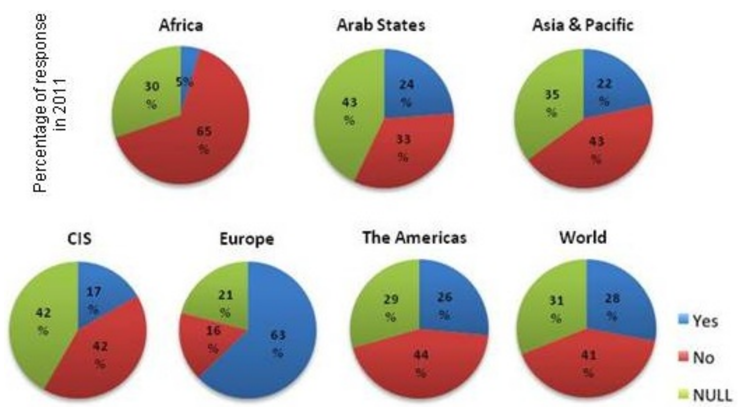


Figure 3- D: Anti-Spam Legislation Worldwide

Source: ITU Global Survey on Anti-Spam Laws and Authorities, 2011.

Box 3-11: What is "Spam"?

There is no internationally agreed definition of what constitutes spam. The following are definitions provided by Australia, the European Union and the United States.

Australia: The Spam Act of 2003 refers to the phrase "unsolicited commercial electronic messages" (the word "spam" is not specifically mentioned in the text of the legislation). There is no reference to bulk messaging; therefore a single unsolicited commercial electronic message could be spam. The judicial provisions are technologically neutral, and therefore apply to any unsolicited commercial messages delivered to the consumer via email, SMS, MMS and instant messaging. Faxes and voice-to-voice telemarketing are excluded.

European Union: The term spam is neither defined nor used. Rather, Article 13(1) of the Privacy and Electronic Communications Directive requires Member States to prohibit the sending of unsolicited commercial communications by fax or e-mail or other electronic messaging systems such as SMS and MMS unless the prior consent of the addressee has been obtained (opt-in system).

United States: In 2003, Congress enacted the Controlling the Assault of Non-Solicited Pornography and Marketing (CAN-SPAM) Act to curb spam, which required the Federal Communications Commission (FCC) to adopt rules that prohibit "sending unwanted commercial e-mail messages" to wireless devices without prior permission. This ban took effect in March 2005. In addition, the Federal Trade Commission (FTC) adopted detailed rules that restrict sending unwanted commercial e-mail messages to computers.

Sources: ITU World Telecommunication Regulatory Database (2010); EU, Unsolicited communications - Fighting Spam at http://ec.europa.eu/information_society/policy/ecomm/todays_framework/privacy_protection/spam/index_en.htm.

Despite the enactment of anti-spam laws that are necessary tools for combating spam, such laws, on their own, have been unsuccessful in abating spam.30 Therefore, in addition to enactment of anti-spam laws, which usually involve the sanctioning of spammers through an "opt-in" or "opt-out" approach (Box 3-12), it is also important to consider alternative legal mechanisms such as the establishment of industry-led enforceable codes of conduct for Internet Service Providers (ISPs). This proposed approach would require ISPs to establish and enforce codes of conduct that prohibit their users from using the ISP as a source of spamming and other prohibited acts such as spoofing and phishing and prohibiting users from entering into peering arrangements with ISPs that do not uphold similar codes of conduct. 31 The ultimate goal of such codes of conduct is to ensure that ISPs assist with the anti-spam efforts by taking adequate action to keep spammers off the Internet.32

Most anti-spam laws involve the "opt-in" versus the "opt-out" approach.

Opt-in: This approach, adopted by the EU Directive, prohibits marketers and senders of commercial electronic messages from sending messages to a recipient unless the recipient has affirmatively asked to receive them. Affirmative requests for messages can be delivered directly by a recipient or they can be constructively construed from an existing business relationship between the recipient and the sender. For example, under opt-in laws, if a person purchases a product from a merchant, that merchant may send that person offers in the future until the merchant receives a request to stop sending such offers.

Opt-out: This approach, adopted by the United States, Japan and South Korea, allows senders to send messages to a recipient even if there is no existing business relationship and the recipient has not specifically opted to receive the messages. However, senders must honor the requests of recipients to remove them from a sender's mailing list.

Box 1 Opt-in or Opt-out

Source: ITU Survey on Anti-Spam Legislation Worldwide 2005.

Reference Documents

- **Nigeria: Memorandum of Understanding between the Consumer Protection Council and the Nigerian Communications Commission**

6.3.4.4 PROPERTY LAW

National laws regarding property transactions can affect the effectiveness of the telecommunications legislation in several ways. Property taxes, for instance, can affect investment in the sector. In addition to taxes, property laws with regard to ownership rights and government confiscation are other factors that investors usually consider when deciding whether to invest in a particular country, and affect the level of public confidence in the stability of the sector. Some countries, such as Jordan, have “investor friendly” property laws. Foreign entities are allowed to own or lease property in Jordan for investment or personal use, provided that their home countries permit reciprocal rights to Jordanians. Investment properties have to be developed within five years from the date of approval, and foreign companies which hold a majority share in a Jordanian company or wholly owned subsidiaries of foreign companies, are automatically given national treatment with respect to ownership of land where the company’s business allows for ownership of land or real estate.1

Property laws also affect the actual application of the rights granted to licensees under the telecommunications legislation with regard to their access to critical networks and infrastructure. The ability of operators to offer telecommunications services often requires the building of infrastructure, such as installation of cable or optical fiber lines, poles, ducts, and construction of towers, which in turn involves the need to access public or private property. Telecommunications operators’ access to rights of way is often reflected in telecommunications legislation, which gives the government the right to appropriate property for such use. Where such appropriation involves private ownership, the landowner is usually compensated for the use of property. However, access to property as provided under the telecommunications law can become complicated in practice, depending on the property laws existing in the particular country. While the federal government has control over federal property, states and municipalities often have jurisdiction over property under their administration.

For example, some countries, such as Brazil, have property laws that are applied at the federal, the state and the municipal level. Rights of way and access of telecommunications operators to property in Brazil are governed in part by the federal Civil Code,2 the Telecommunications Law,3 and the municipal laws of each state. Articles 21 and 22 of the Constitution establish the exclusive authority of the federal government to legislate and exploit telecommunications services in Brazil, which is defined as a public service. The power of the government to regulate telecommunications has been delegated to the regulatory agency, Anatel, which regulates the sector under the provisions of the Telecommunications Law. Article 74 of the Telecommunications Law specifically states that the telecommunications licensee is not exempt from complying with engineering regulations and municipal, state and federal laws regarding construction and cable and equipment installation in public areas. Articles 20 and 30 of the Constitution provide that states and municipalities may be authorized to legislate upon specific matters related to the provision of telecommunications services, such as the rights of municipalities to legislate on urban planning and environmental matters and to charge telecommunications operators for the use and occupation of the land under their jurisdiction. Under Title II, Article 1286 of the Civil Code, the owner of a real property must allow public service providers to install cables, ducts and conduits for the provision of public services, pursuant to the payment of a proper indemnity. Article 1369 of the Civil Code states that property owners may confer to any third party the right to build on its land by means of a public deed, and under Article 1371, the tenant is responsible for payment of fees and taxes applicable to the property.

Practice Notes

- **Spam Legislation in Australia, China, Malaysia, and the United States [3.4.4]**

6.4 IMPACT OF CONVERGENCE

This Chapter addresses the international response of policy-makers and regulators to convergence and its effects on their legal and regulatory frameworks. First, it analyses the different regulatory approaches most commonly used to address convergence (*i.e.*, legislative, regulatory and self-regulation approaches) and describes the advantages and disadvantages of each approach. Second, it outlines the impact that convergence is having on different regulatory processes, namely licensing, spectrum, interconnection, universal service, and numbering. Finally, it analyses and describes the type of legislation and regulatory processes that should be implemented by countries to facilitate a converged environment.

Practice Notes

- **Copyright in the US and Europe**
- **Different Approaches to Facilitate In-Band Migration [4.3.2]**
- **EU Copyright Directive [4.4.3]**
- **Examples of Data Retention Rules in Different Countries [4.4.4]**
- **FCC Rules Regarding Emergency Calls for VoIP Service Providers (E911) [4.3.1]**
- **In-Band Migration [4.3.2]**
- **Licensing broadband wireless access in Switzerland and France**
- **Licensing of Wireless Technology in Different Countries [4.3.2]**
- **Regulating WiFi and WLAN**
- **Regulatory Treatment of WiFi and WLAN [4.3.2]**
- **Table 4-2: Pros and Cons of Legislative Approach in Telecommunications/ICT Regulation [4.2.1]**
- **Table 4-8: Licensing in Malaysia [4.5.3]**
- **UK Office of Communications [4.4.1]**
- **US Copyright Directive [4.4.3]**

Reference Documents

- **Argentina - Decreto No. 764/2000 - Desregulacion de las Telecomunicaciones**

- Australia - Policy and Regulatory Considerations for New and Emerging Services
- Australia Privacy Act report
- Australia Radiocommunications Act 1992
- Broadcasting in Hong Kong
- Canada - News Release on the State of the Canadian Broadcasting System
- Canada - Regulatory Framework for Voice Communication Services using Internet Protocol
- Colombia - Comision de Regulacion de Telecomunicaciones Resolucion No. 575 de 2002
- Council of Europe - Convention on Cybercrime
- EU Directive on the Protection of Individuals with regard to the Processing of Personal Data and on the Free Movement of such Data
- EU 1999 Communications Review
- EU Access Directive
- EU Annex 3 to the European Electronic Communications Regulation and Markets 2004 (10th Report)
- EU Authorisation Directive
- EU Commission - Voice Over Internet Protocol Public Consultation
- EU Commission Communication on Voice Over Internet Protocol 1998
- EU Commission Communication on Voice Over Internet Protocol 2000
- EU Commission Recommendation - Provision of Public Radio Local Area Networks
- EU Directive Concerning the Processing of Personal Data and teh Protection of Privacy in the Telecommunications Sector
- EU Directive on Privacy and Electronic Communications
- EU Directive on the Retention of Data
- EU Electronic Commerce Directive
- EU Framework Directive
- EU Green Paper on Convergence
- EU Guidelines on Market Analysis and Assessment of Significant Market Power
- EU Recommendation on Relevant Product and Service Markets Susceptible to ex ante Regulation
- EU Television Without Frontier Directive
- EU Universal Service Directive
- European Commission Adopts Recommendation to Promote Public Wireless Broadband Services in Europe
- European Regulators Group - Common Statement for Voice Over Internet Protocol Regulatory Approaches
- Federal Communications Commission - Chairman Powell Announces Formation of Internet Policy Working Group
- Federal Communications Commission - IP Enabled Services - Notice of Proposed Rulemaking
- Federal Communications Commission - Voice Over Internet Protocol - Stevens Report
- Forum on Telecommunication Regulation in Africa - ENUM: Country Experiences
- Guide to the Danish Numbering Plan
- Hong Kong - Class License for Public Wireless Local Area Network Services
- Hong Kong - Revision of Regulatory Regimes for Fixed-Mobile Convergence
- Hong Kong China - Regulation of Internet Protocol (IP) Telephony
- Hong Kong Licensing Framework for Broadband Wireless Access
- Intellectual Property Rights in Japan
- Italy - Data Protection Code
- ITU Question 18-2: Mid-Term Guidelines on the Smooth Transition of Existing Mobile Networks to IMT-2000 for Developing Countries
- Japan Telecommunications Business Law
- Malaysia Internet Access Service Provider Sub-Code
- Memo - Regulation of Internet Content in Mexico
- New Zealand Telecommunications Information Privacy Code
- Office of Communications - Information-Convergence and the Never Ending Drizzle of Electric Rain

- Office of Communications - Statement on Spectrum Trading 2004
- Office of Communications - Statement Spectrum Liberalisation
- Office of Communications -Next Generation Networks: Further Consultation
- Organisation for Economic Co-operation and Development - Spam Enforcement
- Organisation for Economic Co-operation and Development - Spam in Developing Countries
- Some Implications for Regulation of ICT and Media Convergence
- Summary - The Digital Millennium Copyright Act of 1998
- Uganda Case Study: Licensing in the Era of Liberalization and Convergence
- US Digital Millennium Copyright Act
- World Intellectual Property Organization - Survey of Issues

6.4.1 WHAT IS CONVERGENCE?

There is no universal definition of convergence, although generally it is understood to mean the ability of different networks to carry similar kinds of services (*e.g.*, voice over Internet Protocol (IP) or over circuit switched networks, video over cable television or Asynchronous Digital Subscriber Line (ADSL) or, alternatively, the ability to provide a range of services over a single network, such as the so-called "triple play." Box 4-1 summarizes some of the issues that regulators should consider with regard to convergence.

- Does the regulatory framework facilitate the provision of different services over different platforms (*e.g.*, technology neutrality)?
- Does the regulatory framework support full competition?
- Does the regulatory framework allow service providers to offer multiple services?
- What are the regulatory policies for these new technologies and services with regard to numbering, spectrum, universal service, and interconnection?
- Does the country's legal framework contain the necessary legislation to support an ICT environment (*e.g.*, intellectual property laws, computer crime, electronic transactions, data privacy and security)?
- How much turn-around time and process is required for the country's legal framework to respond to future changes in the sector?

◂ Box 1Checklist of Issues for Regulators to Consider with Regard to Convergence

Convergence is accelerating as existing networks are modified to offer new services (*e.g.*, upgrade of telephone networks to offer ADSL, alteration of electric power networks to offer broadband services, and the modification of cable networks to offer interactive services). Convergence is also possible with wireless broadband technologies. As a result, different network infrastructures can today provide a plethora of services (Table 4-1). Cable television providers can offer consumers voice, Internet access, and broadcast services over the same network as one bundled package of services, and for one monthly price. Likewise, a mobile service provider may be able to offer a subscriber data and video services, as well as voice services, and digital television (DTV) providers are offering interactive services.

Multiple service provision under different network infrastructures

Infrastructure	Voice	Data	Video
Fiber Optic	VoIP	FTTx	IPTV, Standard and High Definition TV, VOD
Cable	VoIP	Cable modem	Standard and High Definition TV, VOD
Mobile	2G, 3G and 4G	2.5 G, 3G and 4G	DVB and other terrestrial mobile TV
Copper line	PSTN	DSL	IPTV, VOD
Fixed Wireless	Some (VoIP)	3G, WiMAX	DVB and other terrestrial mobile TV

DSL=Digital Subscriber Line, FTTx=Fiber to the “x”, which may be home, curb or building, VoIP=Voice over Internet Protocol, VOD=Video on Demand, IPTV=Internet Protocol TV, DVB=Digital Video Broadcasting, 2G = Second generation mobile service, 3G=Third generation mobile service, 4G= Fourth generationa mobile service, BPL=Broadband over Power Line.

◂ **Table 4-1: Developing viable business models with convergence**

Source: Telecommunications Management Group, Inc.

The combination of services over the same platform is challenging common perceptions about the best means to license and regulate providers in the information and communications technology (ICT) sector. Traditionally, regulatory frameworks were designed for an era when clear functional differences existed between services and infrastructure, but these regulations are increasingly inadequate for dealing with today’s world.

Policy-makers and regulators are responding to the challenges presented by the ICT sector in a variety of ways. First, there has been a shift towards an equal or technology-neutral regulatory treatment of different information and communications infrastructure. For example, the European Union (EU), India, and Kenya[1] have introduced, or are in the process of introducing, legal frameworks and regulations to regulate aspects of convergence through a flexible and a technology neutrality approach.

Second, governments such as Malaysia, Singapore, and the United Kingdom, are modifying the structure of regulatory authorities by providing them with the authority to regulate the telecommunications, broadcasting, and information technology sectors. Finally, governments are drafting and implementing new laws and regulations to create the necessary legal enabling framework to support an ICT sector. These laws and regulations deal with such issues as intellectual property, content, data protection, security, and computer crime.

Another approach to convergence is to accommodate it within the existing legal and regulatory framework. This is possible in countries where there are no barriers to market entry or restrictions on the type of service offering. Although operators can, and do, offer multiple services over multiple platforms in fully competitive markets, it is often a cumbersome process requiring multiple licences and regulatory oversight by different institutions.

6.4.2 DIFFERENT APPROACHES IN IMPLEMENTING ICT REGULATION

There are three approaches taken by countries to address convergence: (i) a legislative approach; (ii) a regulatory approach; and (iii) a self-regulation approach. Although the first two are most commonly used among policy-makers, the self-regulation approach is gaining increasing popularity. Each of the approaches presents advantages and disadvantages as discussed below, but no one approach results in an optimal solution. In general, countries see more effective results when several approaches, especially the legislative and the regulatory ones, are used together. Moreover, the first two approaches are generally more effective when they also incorporate a consultative process (see Box 4-2), such as a public hearing. Additionally, incorporating a self-regulation approach with industry participation allows policy-makers to better understand the consequences of convergence and its trends, as well as to balance the different interests involved in convergence regulation.

The liberalization of telecommunications in the European Union (EU), completed in 1998, is generally considered a marked success. Opening up formerly monopolistic markets led to dramatically lower prices and improved services for consumers and businesses, boosting Europe's communications industry and creating economic growth.

Ongoing technological innovation, however, overtook the telecommunications regulatory regime. Digitalization now allows many kinds of content to be delivered over different networks. The Internet has become a global infrastructure for a range of electronic communications services. Information and communications technologies are converging, opening up myriad possibilities for new industries and services.

To tackle the emerging policy and regulatory issues associated with this new technological environment, the European Commission (EC) published a Green Paper on the convergence of telecommunications (Convergence Green Paper) in December 1997.[1] This was followed by a five-month public consultation period, including a public hearing, to allow the EC to receive feedback from industry, member state regulators, and other interested parties. The EC subsequently published the results of the public consultations in March 1999.[2]

Later that year, the EC launched a review of its telecommunications framework in a consultation document known as "the 1999 Communications Review",[3] which was published in November 1999. The aims of the review were fivefold: (i) to promote more effective competition; (ii) to react to technological and market developments; (iii) to remove unnecessary regulation and simplify associated administrative procedures; (iv) to strengthen the internal market; and (v) to protect consumers.

The review drew on the key messages of a series of consultations, reports and independent studies, in particular, the Communication on the Convergence of the Telecommunications, Media and Information Technology Sectors, the Communication on the Consultation on the Radio Spectrum Green Paper,[4] the Report on the Development of the Market for Digital Television in the European Union,[5] and the Fifth Report on the Implementation of the Telecom Regulatory Package.[6]

A public hearing was held in January 2000 in which interested parties were invited to submit their comments on the 1999 Communications Review. The public consultation period ended in February 2000 and the results of these consultations were published in April 2000.[7] After reviewing the responses of all interested parties, including member states' regulators and industry representatives, the EC issued several "orientations" (*i.e.*, policy documents) in April 2000 and subsequently proposed in July 2000 a package of measures for a new regulatory framework for electronic communications networks and services.[8]

The result of these lengthy consultations is the EU new regulatory framework (NRF), comprised of six specific directives and one decision,[9] which tackles convergence by generally extending and adapting liberalization to electronic communications.[10]

The 2009 Telecom Reforms, which updated the 2002 NRF. In the 2009 Reforms process, the European Commission acknowledged that there have been major developments in the area of convergence since the 2002 framework—in particular, the growth of VoIP and the uptake of television services through broadband lines (i.e., IPTV).11 Rather than impose any new rules to promote converged services, the 2009 Reforms address convergence in terms of potential net neutrality principles in which users should be free to use any type of application or service over their broadband Internet connections.12

◂ **Box 1The public consultative process within the European Union New Regulatory Framework**

6.4.2.1 LEGISLATIVE APPROACH

The legislative approach consists of developing legislation that responds to convergence, either in the immediate term or in anticipation of convergence trends. Legislative solutions define new laws or create new regulatory frameworks to respond to convergence and guide future policy direction. This can be done by developing and implementing a reform of the entire legal framework for telecommunications or by amendments to existing laws.

An advantage of the legislative approach is that it allows the introduction of a new framework to deal with convergence, without constraints imposed by other regulations or by the existing telecommunications law that may contain categories in which converged services do not fit. A new law or an amendment of an existing law aimed at addressing convergence through a technology-neutral approach with a simplified service category can eliminate contradictions and inconsistencies in regulatory classifications. This ultimately makes the regulator more efficient and effective.

Korea (Rep.) overhauled its telecommunications legislation in 2008 in order to accommodate convergence between telecommunications and television. Under the previous legislative framework, the Korean Broadcasting Commission held jurisdiction over television broadcasting while the Ministry of Information and Communication (MIC) held jurisdiction over the ICT sector.1 Since these regulatory authorities could not come to agreement on the provision of real-time IPTV by telecommunications operators, the converged technology was effectively banned in the country. To remedy this issue, the Korean Government passed a new law creating a converged regulator, called the Korea Communications Commission (KCC), which has jurisdiction over both television and telecommunications-related matters. In addition, the Korean Government enacted a new law, entitled "Internet Multimedia Broadcasting Business Act" that specifically addressed the licensing requirements and service obligations of IPTV.2 With extensive build-out of broadband infrastructure, the new law facilitated fast growth of IPTV services in Korea. By the end of 2010, Korea's IPTV market was the fourth largest in the world with about 3.65 million IPTV subscribers and was also the fastest growing IPTV market with an increase of 54% between 2009 and 2010.3 By July 2012, the number of IPTV subscribers in Korea had reached 4.42 million.4

When designing new legislative frameworks to address convergence, flexibility and foresight are critical elements. Given that the market of new services and technologies is extremely dynamic, legislators must be mindful not to develop legislation that may rapidly become outdated. Legislation should allow the regulator sufficient flexibility for interpretation so that solutions can be implemented as needed despite the evolving nature of convergence, and can do so without constricting future applications and technologies that could benefit the economy and consumer welfare.

In addition, the evolution of convergence, combined with the uncertainty about which technologies and services will succeed in the marketplace, requires a continuous review of the applicable legislation. Some jurisdictions, such as the EU and Malaysia, have established a permanent legislative review process to address convergence.5

Legislative approach through amendment of existing laws

Although a legislative approach commonly involves a modification of the entire legal framework, it may also be carried out through a process of amendments. Through an amendment process, policy-makers can obtain the feedback of industry, consumers and other affected parties for each amendment and address external input before carrying out the legal reform. The amendment process can be quite effective to address urgent convergence challenges without the time-consuming process required for an entire legal framework reform, and is useful to prepare industry and consumers for further regulatory changes. For example, in Hong Kong (SAR), the Government introduced numerous reforms by amending existing legislation, such as the Telecommunications Ordinance, as well as introducing new legislation including the Electronic Transactions Ordinance.6

◂ **Table 4-2 summarizes the advantages and disadvantages of the legislative approach.**

Practice Notes

- **Table 4-2: Pros and Cons of Legislative Approach in Telecommunications/ICT Regulation [4.2.1]**

6.4.2.2 REGULATORY APPROACH

Under the regulatory approach, countries do not develop new legislation to address convergence. Instead, they modify existing regulations or institute new regulations to address new technologies. For example, in the United States, the Federal Communications Commission (FCC) introduced regulatory modifications to allow new technologies, such as power line communications (PLC), also referred to as broadband over power lines (BPL).1 (See Box 4-3.)

◂ **Box 4-3: FCC's Rules Regarding Broadband Power Lines**

In October 2004, the U.S. Federal Communications Commission (FCC) modified regulations to support the development of Access Broadband over Power Lines ("Access BPL"), and provide the necessary safeguards against harmful interference to existing services (*e.g.*, licensed radio services). Access BPL technology provides high speed services using the communications capabilities of the electrical power grid.

The FCC's new rules:

- Impose technical requirements on BPL devices (*e.g.*, the capability to avoid the use of any specific frequency and the ability to adjust or shut down a unit remotely);
- Establish frequency bands within which BPL may not operate ("excluded frequency bands") in order to safeguard aeronautical communications;
- Create an Access BPL notice database to identify and resolve harmful interference in an organized manner;
- Require equipment certification for Access BPL systems (replacing the former verification requirement); and
- Establish an improved measurement procedure for all equipment that uses radiation and electromagnetic field safety (RF) energy to communicate over power lines in order to ensure that other licensed uses are protected from harmful interference.

The regulatory approach can be a practical way of addressing convergence provided that existing regulations can be modified or new ones introduced relatively quickly. However, the regulatory approach must be carefully managed to minimize inconsistencies between new and existing rules.

In jurisdictions where the regulator's actions are constrained by the legal framework, a regulatory approach may be extremely limited to the point of being ineffective or unavailable as an option. In addition, since convergence may result in different services and technologies being provided by a single operator, more than one branch of the government, or more than one regulatory agency, may need to be involved. To eliminate inconsistencies, a common policy articulated by the highest level of the government may be required. The involvement of different branches of the government and regulatory agencies slows the process and eliminates one of the main advantages of the regulatory approach, its fast pace.

Most often, the regulatory approach is used by policy-makers in conjunction with the legislative approach. This complementary mix allows governments to establish new legal frameworks to address convergence while dealing with its specific effects through regulation. For this combined approach to work most effectively, the legislation must be sufficiently flexible to allow periodic regulatory adjustments.

For example, this mixed approach was used in Spain. The Government of Spain had already implemented the EU's 2002 NRF and modified its interconnection regulation to allow broader interconnection than traditional switching (*e.g.*, operators were able to interconnect to parts of the infrastructure or have access to wholesale services for subsequent resale (*i.e.*, broadband wholesale service). However, because operators' needs were changing due to increased provision of IP-based systems and services, the regulator implemented a subsequent resolution introducing a capacity-based interconnection system that would serve as an alternative to the traditional time-based system and the access to parts of infrastructure and wholesale services. Table 4-3 summarizes the advantages and disadvantages of the regulatory approach.

PROS	CONS
It allows a faster approach (than legislation) to address convergence and its effects, introducing regulatory measures according to the pace of the technology.	It may cause inconsistencies among existing and new rules.
It allows regulators to make precise rules addressing the effects of convergence.	It may raise asymmetries among existing operators and those that operate technologies that arise from convergence.
When used in conjunction with the legislative approach, it allows for the quick updating or elimination of outdated rules. It also allows flexibility in interpreting existing rules.	In jurisdictions where different branches of the government deal with convergence, it may entail the intervention of a higher level of government to harmonize a common approach.

◂ Table 4-3: Pros and Cons of the Regulatory Approach in Telecommunications/ICT Regulation

6.4.2.3 SELF-REGULATION PROCESS

The self-regulation process consists of developing and designing convergence policy through an ad hoc or existing consultative body. This body is normally composed of several government agencies, industry representatives, and other interested parties.

The role and functions of these consultative bodies varies, but they generally issue recommendations to the government addressing the need for changes in convergence legislation and/or regulation. To the extent that industry representatives are involved, self-regulation and industry guidelines may be an outcome of this approach. These consultative bodies may address specific issues of convergence (*i.e.*, VoIP or Next Generation Networks (NGN)) or may undertake a more comprehensive analysis assessing the consequences of the legislative and regulatory environments. A consultative body is a valuable tool that provides a way to constantly review and monitor the effects of convergence and provide first-hand contact with industry and other parties that deal with convergence directly.

Australia has several consultative forums for the communications sector, with the most important being the Communications Alliance (formed in 2006 from the merger of the Australian Communications Industry Forum (ACIF) and the Service Providers Association Inc (SPAN)).1 The Communications Alliance implements and manages industry self-regulation in the interests of both industry and consumers. For example, as part of its activities, the Communications Alliance has developed a number of VoIP-related industry guidelines including: 1) IP network quality of service for Carriage Service Providers, such as ISPs and 2) VoIP quality of service measurements.2

However, the self-regulation process has certain potential problems. For example, the intervention of industry representatives may pose a risk in those jurisdictions where competition has not developed or where significant asymmetries exist among operators, since the consultative body may be dominated by these operators and its conclusions could reflect narrow interests. In these cases, self-regulation guidelines developed by these consultative bodies may result in rules that benefit existing operators to the detriment of new competitors that operate new technologies providing converged services. Policy-makers must carefully manage these risks in order not to regulate convergence according to the special interests of a few companies and against consumers and the public welfare.

PROS	CONS
It provides first-hand knowledge of the effects of convergence and can provide insight on the effects of proposed regulation.	The establishment of a consultative body, and the development of procedures to ensure its neutrality, may be difficult.
It can be a useful tool to introduce the measures to address convergence with the pace and flexibility requested by the industry.	In those jurisdictions where competition has not developed or where significant asymmetries exist among operators, recommendations may not be neutral and may tend to foreclose effective entry by new convergence technology-based operators.
	It may not result in quick solutions if recommendations to modify existing regulations must be implemented through a subsequent legislative approach.

◂ **Table 4-4 summarizes the advantages and disadvantages of the self-regulation approach.**

Table 4-4: Pros and Cons of the Self-Regulation Approach in Telecommunications/ICT Regulation

6.4.3 MODIFICATIONS TO TELECOMMUNICATIONS LEGISLATION TO ADDRESS CONVERGENCE

Policy-makers are implementing reforms to their legal frameworks in order to address the issues raised by convergence. Most of these reforms are focused on telecommunications legislation and regulation. However, due to convergence, legal reforms of telecommunications legislation are increasingly coordinated with and, in some cases even integrated into legislation affecting broadcasting and information technology. These reforms are resulting in the opening to competition of increasingly more advanced and converged services (see Figure 4-A). Countries where such an approach is not carried out have less effective regulatory tools to handle convergence and therefore may miss the full benefits of its development and the introduction of advanced and converged services for the market and consumers. For instance, reforms may be developed in the telecommunications regulatory framework, but if regulation in other ICT sectors is not also modified to address the challenges of new technologies (

i.e.

, privacy and security issues, e-signature, e-commerce, etc.), the market will not fully develop because consumers will be reluctant or unable to use all ICT capabilities until these challenges are fully addressed.

Reforms due to convergence are following common trends affecting various aspects of telecommunications regulation, particularly in the areas of licensing, spectrum, interconnection, universal service, and numbering. With regard to licensing, modifications to regulations have focused mainly on reducing market-entry requirements for new technologies by introducing a simpler and technology-neutral licensing regime. In the area of spectrum management, the concept of technology and service neutrality is being proposed, as well as spectrum trading and in-band migration, to allow the more flexible introduction of new services and obtain a more efficient use of the spectrum. Interconnection ideas are also shifting and new concepts are being implemented such as “access” and “capacity based interconnection.” For purposes of universal service and numbering, technology-neutrality and inter-modality portability is being introduced.

6.4.3.1 LICENSING

Licensing frameworks traditionally consisted of a large number of different service categories, and applicants applied for separate licences in order to provide each service. In addition, licences were often granted based on the type of technology that was being offered by the applicant (

e.g.,

VSAT licence).

Convergence has had an impact on this categorization and made it complicated for regulators to continue to grant licences in this manner. For example, a cable television operator intending to provide “triple play” services generally would require three different licences, one for each of the bundled services (*i.e.*, broadcasting, voice and data), instead of one single licence. Countries have been modifying their licensing frameworks to address this new situation by simplifying their licensing regimes. This has been primarily implemented by: (i) introducing technology-neutral licences with broader service categories; (ii) establishing a unified and technology-neutral licence that allowsoperators to provide multiple services under one licence using any kind of technology; (iii) “de-licensing” whereby the operator merely needs to submit a notification or registration with the regulator, although specific rights of use may be required when scarce resources such as spectrum or numbering are involved in the provision of a service;or (iv) not requiring any registration or notification on the basis that the services provided fall outside of the regulator’s authority or because the regulator has decided to forbear from regulating a particular service.

However, these modifications may not be sufficient to fully address convergence if they are not accompanied by related measures in the regulatory framework to introduce competition and non-discrimination. For example, in many jurisdictions, cable television operators, which were initially licensed to provide broadcasting services, can provide voice and data services without any specific restriction. On the other hand, traditional telecommunications operators may not be allowed to compete with cable operators if broadcasting service licences are restricted.

In this case, the lack of reform in broadcasting legislation becomes a bottleneck that restricts competition and discriminates against telecommunication operators.

The modification of the licensing regime may not be an easy task for policy-makers and regulators because of the existing legal framework and market structures already in place. However, necessary reforms may be introduced through a transition process in which market and legal structures are smoothly adapted. A regulator willing to follow this transition into a technology-neutral licensing regulation likely will address the following decisions (Box 4-4):

◄ **Box 1Decisions to Undertake in the Transition to a Technological-neutral Licensing Regime1**

- Deciding which model of licensing will be adopted.
- Deciding whether the existing licensing framework will be overhauled in one step or through a gradual, phased in fashion.
- Deciding which entity or entities will be responsible for licensing, authorizations, and notifications.
- Mapping various services licensed under a service or technology-specific regime to a less burdensome licensing regime. This includes deciding which services may still be subject to licensing, which may require only an authorization or notification process and which may become unlicensed as well as eliminating any geographical licensing restrictions and redesigning the application process.
- Ensuring a level playing field under the new licensing regime so that neither existing service providers nor new market players will be at a competitive disadvantage, *i.e.*, whether existing licensees will require any compensation for moving to the new licensing regime or whether the transition can be accomplished in the absence of compensation; how to address issues such as large licence fees paid during a period of limited competition while reduced licence fees apply in the new regime, changes to bank guarantee policies, etc.
- Revising existing universal access/service regulations, including modifications to network rollout, coverage or investment requirements as well any contributions to universal access funds and reviewing which services consumers should be provided under the nation's universal access/service definition.
- Reviewing and updating other regulations such as quality of service, interconnection, spectrum and numbering, both to transfer any such regulations currently included in licence terms and conditions to stand-alone regulation as well as updating such regulations to accommodate convergence.
- Developing a regulatory framework that incorporates recent technological developments, such as WiFi, VoIP and WiMax and anticipating a continuous technical and market evolution.
- Developing regulatory capacity to regulate disputes, enforcement and sanctions.

(a) General Licence Categories and Technology Neutrality

The first trend in licensing reform is to introduce technology-neutral licences that combine converged services or broaden the types of services that fall within one licence.

For example, in Malaysia, the prior licensing framework consisted of 31 service-based licences, whereas its new framework consists of four general and technology-neutral licences: Network Facilities Provider (NFP); Network Services Provider (NSP); Application Services Provider (ASP); and Content Application Services (CSP)(a special subset of application services that includes television and radio broadcast services and Internet content services).2

The Eastern Caribbean Telecommunications Authority (ECTEL), has developed a technology-neutral licensing approach with four categories of licences: Individual Licences (generally for services that are infrastructure-oriented); Class Licences (ISPs or resale, among others); Frequency Authorization Licences (that is an ancillary licence that would be required in addition to an Individual or Class Licence); and Special Licences (that are foreseen for special cases in emergency circumstances). 3 ECTEL classifies licences based on the service that will be provided without regard to the type of technology being used. For instance, whereas previously an operator might obtain a VSAT licence, it now obtains a licence for the service (*i.e.*, a private or a public network service) it will be offering using that VSAT.

(b) Unified Licensing

A second trend is the introduction of a unified licensing regime, in which licences evolve into a single licence covering a wide range of services. This approach has been or is being adopted by various countries, including Kenya and India.

Kenya's licensing regime, announced in September 2004, adopted a unified and technology-neutral licensing framework that permits any form of communications infrastructure to be used to provide any type of communications service.4 This licensing regime differs significantly from the previous service-specific licensing regime consisting of 46 types of licences grouped into nine categories. Kenya's current Unified Licensing Framework (ULF) consists of three main technology-neutral licences: (i) Network Facilities Provider (ii) Application Service Provider (iii) Content Service Provider.5 In addition, investors seeking to land a submarine cable in Kenya require a Submarine Cable Land licence while those interested in building system for the provision of international voice/data services are required to get a licence for international Systems and Services. An operator may be issued multiple commercial licenses, provided that it maintains separate accounts for each licence.

In India, the Department of Telecommunications adopted a more unified licensing framework in which Unified Access Service (UAS) licensees may provide, within their licensed geographic area, any voice and/or non-voice (i.e., data) services over either fixed line or wireless networks via circuit-switched or IP-switched equipment.6 These licensees may also provide specific value-added services of voicemail, video conferencing, audiotex, videotex, email and closed user group services to subscribers. However, all other types of services require a separate licence. As of March 2008, there were 240 UAS licensees in India.

(c) De-licensing

A third trend is the movement in certain countries towards lighter licensing regimes or de-licensing. Traditionally, many countries used three general approaches to authorize telecommunications networks and services -- individual licences, class licences, and open entry. In the initial phase of liberalization in particular, countries leaned towards a higher degree of regulatory control over market entry, thus requiring individual licences in most cases, where: (i) there was a need for access to public property and/or locations of public use and/or third party's properties to roll out the networks (*i.e.*, deploy a base station or a fiber network); (ii) there was a need for scarce resources (*e.g.*, frequencies and/or numbers), and (iii) the government of a particular country determined that the service needed to be provided in a certain way.

Convergence has called this premise into question, with countries realizing that burdensome administrative procedures relating to market entry limit the offer of a greater variety of applications or services. As a result, many countries (including all 27 EU member states) are moving towards a general authorization regime.

De-licensing involves a general authorization or class licence system in which operators are free to provide services subject to regulatory obligations. Typically, the operator must submit to the regulator a notification containing minimal information before, or within a short time after, initiating service. However, operators do not have to wait for approval before commencing service.

A registration regime typically requires minimal information, but involves stricter formalities in that prior acceptance of the registration by the regulator is required for the operator to commence its activities. In addition, unlike a notification, a registration may be rejected by the regulator.

In April 2004, Japan implemented a review of its Telecommunications Business Law and established a registration and notification regime. Operators in Japan that install networks of a certain size and scale must obtain a registration from the Ministry for Internal Affairs and Communications. However, all other operators are only required to submit a notification to the Ministry.7

The EU has moved towards a simple authorization regime using minimal regulatory intervention and requiring individual licences only where strictly necessary (*e.g.*, for the use of resources such as radio frequencies and numbering). The regime covers authorization of all electronic communications networks and services regardless of whether they are provided to the public. The objective of the new framework is to ensure the freedom to provide electronic communications networks and services, subject only to the conditions relating in particular to welfare, public security, and public health. However, one interesting aspect of the new regime is that the definition of "electronic communications networks and services" is so broad that in certain EU jurisdictions various services that were previously unregulated now require a notification and operators are now subject to a variety of related obligations (*e.g.*, fees and taxes) to which they were not previously subject.

(d) Eliminating Licence Requirements on New Converged Services

A fourth trend to address convergence is to eliminate filing requirements with the regulator on the basis that the services fall outside of the regulator's authority or because the regulator has decided to forbear from regulating a particular service.

This approach has been followed in the United States for ISPs and the services they provide (*e.g.*, e-mail, Internet access, and VoIP). To date, services provided by ISPs have been treated as unregulated "information services" in order to promote the continued development of the Internet.8

(e) Adherence to Regulatory Requirements and Obligations

As many regulatory functions were based on a license regime at inception, the move to forbear from licensing is viewed by some, as eroding the regulator's authority in relation to the new entrant, leading to a license being issued even when regulatory oversight is no longer required. Although a regulator may decide that certain categories of service or network providers will not be subject to licensing requirements, this does not exclude the possibility of the regulator imposing certain regulatory obligations on such providers, such as contributions towards universal service funds or compliance with emergency service requirements. For example, although the FCC has not implemented licensing, notification or registration requirements for ISPs, it has determined that certain VoIP providers must comply with emergency number (**E911**) requirements. This determination is part of a rule-making proceeding that was initiated by the FCC to determine whether VoIP services should be regulated and whether providers of such services should be subject to certain regulatory requirements.9

Practice Notes

- **FCC Rules Regarding Emergency Calls for VoIP Service Providers (E911) [4.3.1]**

6.4.3.2 SPECTRUM

Most countries allocate spectrum on a national basis in accordance with the ITU frequency allocation table, and then assign specific frequencies for use by particular radio services. Traditionally, spectrum licences have been subject to stricter government controls than other types of licences because they involve the use of a scarce resource and can be hampered by interference.

However, to promote competition, convergence and efficient use of spectrum resources, policy makers and regulators have begun introducing changes to spectrum regulations. First, regulators are starting to grant the right to use spectrum without regard to the type of technology being used (*i.e.*, technology-neutral approach). For example, in India, the government has reformed the licensing and spectrum authorization regime from a service-specific to a technology-neutral unified access service licence (UASL) framework.1 Under the previous spectrum authorization framework, the government issued Cellular Mobile Telephone Service (CMTS), which only permitted licensees to provide mobile voice and data services. However, under the UASL, licensees are permitted to offer both mobile and fixed telecommunications services. Additionally, CMTS licensees are able to migrate to the new licensing framework. In May 2010, the Telecom Regulatory Authority of India (TRAI) released to the government its Recommendations on the Spectrum Management and Licensing Framework, which includes a recommendation to create a specific fund for spectrum refarming.2

The United States has similar rules to Australia and generally takes a technology-neutral approach. Congress authorized the FCC to allocate spectrum for flexible use when it: (i) will be in the public interest; (ii) will not deter investment in communication services, systems and technology developments; (iii) will not result in harmful interference; and (iv) is consistent with international agreements.3

Second, regulators are allowing spectrum trading or in-band migration. In Australia, spectrum licences are tradable and technology neutral.4 Spectrum licences authorize the use of spectrum and licensees are free to use any device and technology within their spectrum, provided that such devices comply with the conditions of the licences and the advisory guidelines established for the corresponding bands. To avoid interference, the Australian Communications Authority (ACA) creates a document called "interference management framework" for each auction in which it sets forth the rules for spectrum use.5 In addition, in Guatemala, the 1996 Telecommunications Law**5** introduced private spectrum rights that are granted in frequency usage portions (Títulos de Uso de Frecuencias – TUC), which have technical limitations to protect against interference (*e.g.*, maximum power transmission and emission). These private rights are limited for a period of time (15 years plus an additional 15 year extension if requested), but they can be traded without limitation other than the technical condition related to each TUC to protect against interference.

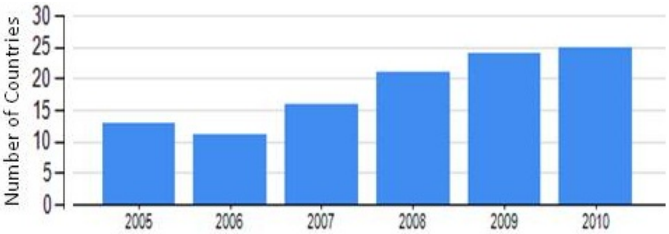
(a) Introduction of Technology Neutrality in Spectrum Regulation

The introduction of technology neutrality in spectrum regulation brings with it certain limitations. The premise of a technology-neutral approach is that any service should be provided through any kind of technology in any frequency band, and the use of spectrum can be altered at any time. However, in practical terms, this is not feasible for various reasons:7

1.
   - **Interference**. Traditionally, regulators have addressed interference problems by mapping the services and allocating them in a national table of frequencies. Only those services allowed in a frequency band could be licensed therein. However, now that countries have introduced a technology-neutral approach in spectrum regulation, interference issues may be dealt with in a different manner. One option followed by certain regulators is to issue specific technical rules associated with the specific spectrum granted. These technical rules introduce some limitations to the spectrum use, and thus in the strictest sense full technology neutrality is not possible, but it does resolve the problem of interference. Another option, and one that has been used in the past, is to establish "guard bands" or small blocks of 1 or 2 MHz between different types of allocations.
   - **Economies of scale**. The implementation of new technologies is more effective and economically viable when efficient economies of scale (*e.g.*, decreases in the cost of equipment and technology development) are achieved by industry coordinating in the development of a standard and the identification of specific spectrum bands. In certain instances, countries and regions with industrial interests tend to develop their own standards (*e.g.*, GSM in Europe). A technology-neutral approach in spectrum regulation challenges this coordination as different technologies and standards could be deployed in the same spectrum bands. However, although the costs related to deploying different technologies and standards are potentially higher in the short term because the economies of scale of each standard are lower than if a unified standard is adopted, a standard competition policy could have its benefits in the medium term because standards are enhanced and improved in a competition environment, providing consumers with better options and reducing technology costs.
   - **International coordination**. The ITU Radio Regulations, which are binding on the signatories of the ITU Constitution and Convention, are the international regulations used by the member nations to allocate and manage spectrum within their jurisdictions. The Radio Regulations affect the extent to which technology neutrality can be implemented; however, the ITU Radio Regulations are broad enough to allow development of different radiocommunications services within the designated spectrum bands, so countries still have a wide degree of discretion to introduce technology neutrality.

(b) Spectrum Trading

A second response to convergence has been the introduction of spectrum trading and in-band migration. Spectrum trading refers to the ability of licensees to sell or trade their spectrum rights. Countries may decide to limit spectrum trading for specific uses or technologies or to allow unlimited trading except for requiring adherence to rules regarding interference. As of 2010, only 25 of 156 countries responding to the ITU's survey question on secondary spectrum trading indicated that secondary trading is permissible while only six of these countries stated that there may be a change in spectrum use permitted on transfer. However, as Table 4-5 shows, the number of countries allowing spectrum licensees to trade spectrum on the secondary market has been steadily rising since 2005, showing that this is an area with great potential for further flexibility and liberalization.



◂ Table 4-5: Number of Countries Permitting Secondary Spectrum Trading, 2005-2010

Source: ITU World Telecommunication Regulatory Database (2010).

Within the EU, the NRF allows spectrum trading.8 In 2004, certain member states and the European Commission commissioned an independent study regarding the conditions and options of introducing spectrum trading. The report recommended the implementation of spectrum trading and further liberalization of spectrum use.9 The United Kingdom has already allowed spectrum trading for certain types of licensed transmissions, and is expected to expand to more types of licences.10 Furthermore, the United Kingdom has introduced measures to liberalize spectrum by, among other things, reducing obligations of current licences and allowing them to modify their spectrum use provided they do not cause interference.11 The 2009 Telecom Reforms continue to permit spectrum authorization holders to trade spectrum in the secondary market.

(c) In-band Migration

Various countries are introducing **in-band migration** which refers to the policy of allowing operators to use existing licensed spectrum to provide new services. Jurisdictions in the Americas and Asia have used this policy with the introduction of IMT-2000 systems,12 allowing existing mobile operators to provide third generation (3G) networks in their assigned frequencies. This policy has permitted operators to decide when to deploy 3G networks and has been effective in reducing implementation costs because it has allowed operators to use their existing spectrum without incurring the cost of new licences. As a result, 3G mobile networks have proliferated throughout these two regions. In 2009, the EU amended the GSM Directive of 1987, which reserved part of the 900 MHz band for GSM access technologies only.13 The updated Directive allows licensees in the 900 MHz to also offer 3G (UMTS) technologies. Although the 2009 reforms are not entirely technology-neutral, the EU has stated that it will review other mobile technologies, particularly upcoming 4G systems, to ensure compatibility with GSM and UMTS systems.

(d) Unlicensed or Licence-Exempt Use

Regulators are also facing the introduction of Wireless Local Area Networks (WLAN and WiFi), technologies that operate in the Industrial, Scientific and Medical (ISM) bands. The ISM bands are generally unlicensed because they operate on a non-interference basis. Regulators have generally allowed WiFi networks to operate unlicensed, provided thattheir transmitting characteristics fall into those designed for that band. In practice, this has resulted in the implementation of a technology-neutrality approach for the ISM band. For example, of the 67 countries that responded to the ITU's annual regulatory survey,,**12** only two prohibit WLANs in the 2.4 GHz band and four in the 5 GHz band. Thirty-nine countries allow WLANs without any prior notification or registration in the 2.4 GHz band, and 25 in the 5 GHz band. Finally, 27 countries allow WLANs with a simple registration or notification in the 2.4 GHz band and 28 in the 5 GHz band. In line with the "hands-off" policy approach, the European Commission has issued a recommendation **13** calling on EU member states to facilitate WLANs without imposing any specific regulatory conditions. In Singapore, the band in which WLAN operates was already being used. To facilitate the introduction of WLANs, the regulator migrated existing systems out of the band to allow WLANs to operate.

(d) Unlicensed or Licence-Exempt Use

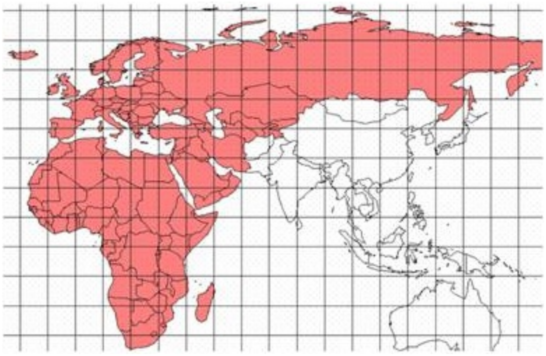
Regulators have also begun introducing unlicensed (also called licence-exempt) use of spectrum, particularly with the rise of Wi-Fi and other Wireless Local Area Networks (WLANs technologies that operate in the Industrial, Scientific and Medical (ISM) bands. Many regulators have allowed Wi-Fi networks to operate in existing unlicensed spectrum bands, provided that their transmitting characteristics fall into those designed for that band. In practice, this has resulted in the implementation of a technology-neutral approach for the ISM band. For example, of the 67 countries that responded to the ITU's annual regulatory survey,14 only two prohibit WLANs in the 2.4 GHz band and four in the 5 GHz band. Thirty-nine countries allow WLANs without any prior notification or registration in the 2.4 GHz band, and 25 in the 5 GHz band. Finally, 27 countries allow WLANs with a simple registration or notification in the 2.4 GHz band and 28 in the 5 GHz band. In Singapore, the band in which WLAN operates was already being used. To facilitate the introduction of WLANs, the regulator migrated existing systems out of the band to allow WLANs to operate.

(e) Digital Terrestrial Television and the Digital Dividend

In order to better to provide higher quality terrestrial broadcast television programming, as well as allow for refarming of spectrum in the television broadcast bands, digital terrestrial television (DTT) has increasingly garnered the attention of regulators and policy makers around the world over the last several years. DTT is more spectrally efficient than analogue terrestrial television, and therefore requires less spectrum per channel. As a result, it potentially makes available a considerable amount of spectrum in bands that new and existing technologies are demanding. However, in order to receive DTT, consumers must acquire a new television set or a set-top box (STB), introducing a disruptive effect for consumers that must be carefully managed.

Regulators and policy makers are facing the challenges arising from these two factors by establishing policies to: (i) recapturing spectrum from analogue broadcasters that is no longer required in order to operate in an all-digital format; (ii) assign the newly available spectrum to new uses; and (iii) pursue a smooth transition for consumers that minimizes the disruptive effect of requiring a new television or STB.

Countries are increasingly implementing policies establishing long parallel emissions periods allowing broadcasters and consumers to smoothly transition, which includes designating a specific date whereby broadcasters must switchover from analogue television to DTT, often referred to as the analogue switch-off or switchover (ASO). Many countries have already completed the ASO, including Austria, Denmark, Finland, Germany, the Netherlands, Norway, Spain, Sweden, Switzerland and the United States. Other countries are planning to complete the ASO by 2012, including Canada, Australia, Japan, Korea (Rep.) and New Zealand, as well as most of the remaining EU Member States in order to meet the proposed deadline set out by the European Commission.15 Additionally, the signatories of the ITU's Geneva 2006 (GE06) Agreement, all Region 1 countries, as shown in Figure 4-A below, have agreed to complete the DTT transition by June 17, 2015.16 Although not all African countries have set out an ASO date, Kenya, Nigeria and South Africa have each established hard deadlines for the ASO of July 1, 2012; June 17, 2012; and December 2013, respectively.



◂ **Figure 4- A: Region 1 Countries**

Source: ITU GE06

In addition to higher quality television broadcasting services, the DTT transition allows governments to reclaim broadcast spectrum and assign the spectrum for new uses. This reclaimed spectrum, often referred to as the digital dividend, is ideal for commercial wireless services, such as mobile broadband, due to its excellent propagation characteristics. Digital dividend spectrum allows for wide coverage in rural areas, as well as good in-building and non-line-of-sight coverage, while requiring installation of fewer base stations than in higher frequency bands.17 As such, the digital dividend enables a more cost-effective network roll-out.

The digital dividend spectrum, located n the 698-862 MHz band, was identified by WRC-07 for use by IMT systems. (Note that WRC-07 identified the 862-960 MHz band for IMT as well, but this is not generally considered "digital dividend" since it has not been part of television broadcast spectrum.) As shown in Figure 4-B, the digital dividend for Region 1 (R1) countries (i.e., in Europe, Africa, Russia and parts of the Middle East) is generally the 790-862 MHz band and is referred to as the "800 MHz band". However, the digital dividend covers the 698-806 MHz band (called the "700 MHz band") for Region 2 (R2) countries in North and South America and Region 3 (R3) countries in Asia-Pacific and parts of the Middle East.18 Within these harmonized bands, countries may then select their own specific band plans for mobile services.

Since harmonization and the resulting economies of scale are considered beneficial, most countries are expected to try to adopt the same or similar band plans as other countries in their respective regions. So far, APT and the EU have been at the forefront of regional harmonization, but ATU, CITEL and other intergovernmental organizations are expected to play a key role in regional harmonization as well.

- **European Union**: The European Commission (EC) has issued multiple consultations, recommendations and decisions on the harmonization and release of digital dividend spectrum, which resulted in a May 2010 decision on the harmonized technical conditions in the 790-862 MHz band.19 This decision provides that "Member States may decide individually whether and at what point in time they designate or make available the 800 MHz band for networks other than high-power broadcasting networks, and this Decision is without prejudice to the use of the 800 MHz band for public order and public security purposes and defence in some Member States." In addition, the EC will not set a deadline for allowing mobile services in the 800 MHz, but this may be decided by the Parliament and Council at some future date, upon a proposal from the Commission. The general conditions of the 800 MHz Decision are as follows:

o Where the 800 MHz band is made available for networks other than high-power broadcasting, it must be on a non-exclusive basis for terrestrial systems capable of providing electronic communications services.

o There must be appropriate protections provided to systems in adjacent bands.

o Member States must facilitate cross-border coordination, particularly where neighboring countries are releasing digital dividend spectrum at different times or are third countries (i.e., non-EU Member States) using these bands for different services. As such, Member States are not bound by the 800 MHz Decision in geographic areas where spectrum coordination with third countries requires a deviation.

o As shown in Figure 4-C, within the 790-862 MHz band, the frequency arrangement will include 5 MHz blocks and FDD duplex spacing of 41 MHz with base station transmission (downlink) located in the lower part of the band (791-821 MHz) and terminal station transmission (uplink) located in the upper part of the band (832-862 MHz).

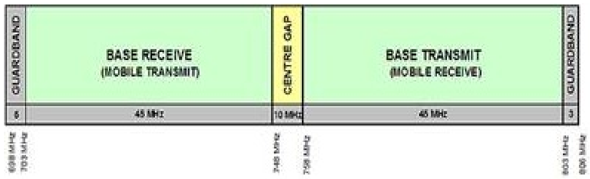
790-791	791-796	796-801	801-806	806-811	811-816	816-821	821-832	832-837	837-842	842-847	847-852	852-857	857-862
Guard band	Downlink						Duplex gap	Uplink					
1 MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

◂ **Figure 4- C: EC Proposed Frequency Arrangements for Digital Dividend**

- · Asia-Pacific Telecommunity **(APT)**: One of the APT's key work programs is the APT Wireless Group (AWG), formerly known as the APT Wireless Forum (AWF). The AWG addresses various aspects of emerging wireless systems, including IMT/IMT-Advanced. At the ninth meeting of the APT Wireless Forum in September 2010, an agreement was reached on two harmonized frequency arrangements for IMT in the 698-806 MHz frequency band in the Asia-Pacific region. The AWF-9 agreed that a harmonized frequency arrangement for the band 698-806 MHz is appropriate to assist Region 3 countries wishing to use the entire band for IMT as well as those administrations considering use of a portion of this band.20 Recognizing the need to provide sufficient protection for the services in adjacent bands and based on studies of the various interference mechanisms that may impact services in adjacent bands, it was decided that digital television spectrum would be allocated below 694 MHz. Spectrum for mobile services is to be allocated in one of the following ways:

o **For FDD frequency arrangements**: 703-748 MHz uplink paired with 758-803 MHz downlink, including a lower guardband of 5 MHz at 698-703 MHz and an upper guardband of 3 MHz at 803-806 MHz for a total of 90 MHz of FDD spectrum (2x45 MHz). (See Figure 4-D)

o **For TDD frequency arrangements**: A single 108 MHz band from 698-806 MHz.



◂ **Figure 4-D: APT Digital Dividend Band Plan for FDD Frequency Arrangement**

Despite efforts at regional harmonization, final decisions on the allocation and assignment of digital dividend spectrum will be made on a country-by-country basis. Given the various stages of the DTT transition around the world, the release of this spectrum is likely to be on-going for the next decade with some general trends emerging, including:

- **DTT transition timelines vary, but ASO will likely be completed worldwide by 2020** . Many developed and developing countries have adopted ASO dates, or have at least set a goal for completing the transition by a certain year. While the United States and many European countries have already completed the ASO or will complete it in the next two years, other countries appear to be focusing on 2015-2020 to complete their transitions.
- **International and regional harmonization is well underway**. At the international and regional level, there have been efforts to harmonize the digital dividend spectrum and develop common band plans. The 2007 World Radiocommunication Conference (WRC-07) identified spectrum in the 698-960 MHz band for International Mobile Telecommunications (IMT).
- **Consideration of the award of digital dividend on a national basis is still developing** . There has generally been less progress made towards developing rules and timeframes for the award of digital dividend spectrum. While there are several digital dividend proceedings to be completed and issued over the next two years, including Chile, Ireland and the United Kingdom, most countries around the world have yet to establish technical and service rules or award processes for the digital dividend spectrum, particularly in developing countries.
- **Countries are waiting to assign digital dividend spectrum until after the ASO**. It appears that generally countries are waiting to award the digital dividend spectrum until after the ASO is completed and the spectrum is unencumbered by broadcasting services. For example, Finland's ASO in the 800 MHz band was completed in 2007, but digital dividend licenses still have not been awarded.

Practice Notes

- **Different Approaches to Facilitate In-Band Migration [4.3.2]**
- **In-Band Migration [4.3.2]**
- **Licensing of Wireless Technology in Different Countries [4.3.2]**
- **Regulatory Treatment of WiFi and WLAN [4.3.2]**

6.4.3.3 INTERCONNECTION

The technological innovations that have resulted in the convergence of telecommunications, information and broadcasting have raised numerous regulatory issues regarding interconnection. Until recently, interconnection policies were mainly used to facilitate competition by requiring incumbent telecommunications operators (or dominant suppliers) to provide interconnection to competing operators. Today, effective interconnection arrangements are considered an essential element to foster the development of integrated ICT markets. Convergence has forced a reassessment of this policy in order to take into account the interconnection of different types of networks and service providers (*e.g.*, cable television/content providers and IP networks/ISPs).

Traditional interconnection regulation was established for telecommunications operators with interconnection rates generally based on time (*i.e.*, per minute). Services based on IP protocol, however, do not fit within the traditional schemes of switched voice interconnection and requires different kinds of access (*e.g.*, interconnection at an IP level or the higher frequencies of the local loop necessary to provide ADSL data services over the existing copper wiring) and different kinds of charges. This is necessary to permit, in a converged environment, the fundamental principle that any network operator is able to interconnect with any other operator regardless of the network (*i.e.*, "any-to-any" interconnection). Countries are addressing these needs by introducing: (i) a symmetrical interconnection regime, (ii) new kinds of "access" through interconnection regulation and (iii) a technology-neutral interconnection charging system based on capacity, instead of time and distance.

(a) Introduction of a Symmetrical Interconnection Regime

Traditionally, only public switched network operators (fixed or mobile) were subject to interconnection obligations. However, there has been some ambiguity regarding other operators, such as cable networks or ISPs. As convergence blurs the traditional difference between networks, regulators are introducing a symmetrical interconnection regime in which any operator, regardless of the type of network it has, is obliged to interconnect with any other operator. For instance, in Denmark, communications network providers offering service to the general public (including traditional telephone network operators as well as broadcasters and Internet service providers) have the obligation of, and the right to, interconnection. In Argentina, new legislation implemented a symmetrical interconnection regime where all operators are obliged to interconnect upon request.1

However, some jurisdictions have maintained asymmetrical interconnection. For instance, the EU NRF requires regulators throughout the EU to carry out a market analysis to determine which operators have significant market power. Interconnection has been separated into three different markets (*i.e.*, call origination, call termination and transit). Regulators will decide after this analysis which markets are deemed to have significant market power. In each such market, an operator is obliged to provide interconnection. By way of example, the EC has determined that all mobile operators are dominant in the provision of termination on their networks as there is no realistic possibility of substitution.2

(b) "Access" Interconnection

To address the different needs of IP network and service operators for interconnection, the EU NRF introduced the concept of “access”,[3] principally for origination, which allows ad hoc interconnection to network infrastructure via direct access or resale (such as local shared access[4] or bitstreamaccess).[5] Within the EU, member states have implemented “access” interconnection and granted this right to operators other than traditional voice providers. Member states, such as Denmark, Finland, and Greece, have determined that all operators have a right to bitstream access, and Austria has allowed ISPs to request unbundled infrastructure.The United Kingdom has proposed implementing an “equivalence of inputs” (EoI) for NGN[6] that obliges the incumbent telecommunications operator to make available the same products[7] and services to other operators as it makes available to itself, at a wholesale price (which is the same ‘transfer’ price that a network division may provide to a retail division), and using the same system and processes. EoI implements a further step within the “access” concept, as it allows operators to request directly, on a wholesale basis, services which have a retail counterpart instead of regulating a physical connection. In September 2005, the operator agreed to support the proposals in the consultation, including commitments to provide unbundled network access on an EoI basis, and not to make design decisions that would foreclose specific product options without adequate consultation.8 See Table 4-6 for a comparative summary of the EU concept of access and the U.K. concept of EoI.

◂ Table 4-6: The EU Concept of Access and the U.K. Concept of Equivalence of Inputs

Access 9	OFCOM Proposal of Equivalence of Input 10
Making facilities and services available to another operator for the purpose of providing electronic communications services under defined conditions. It includes, among other things ▪ ▪ physical interconnection, ▪ access to network elements and associated facilities (*i.e.*, local loop), ▪ access to physical infrastructure, including buildings, ducts, and masts, ▪ access to software systems, including operational support systems, ▪ access to numbering translation, ▪ access to fixed and mobile networks, ▪ access to conditional access systems, and, ▪ access to virtual network systems.	Making available to competitors the same products and services that an operator with significant market power makes available to itself, which includes: ▪ ▪ a wholesale price, and ▪ the same systems and processes. No retail service may be launched by an operator with significant market power without a corresponding wholesale product offered to other operators as EoI.

(c) Capacity-based Interconnection

A relatively new measure being implemented to address convergence needs for interconnection is a flat charge representing the cost of the capacity, rather than a per-minute rate. Some jurisdictions, such as Spain and Colombia, have implemented a capacity-based interconnection (CBI) modality that allows operators to request a specific capacity for interconnection and pay a flat rate charge that reflects the fixed cost nature of the interconnection capacity. As interconnection capacity is dimensioned to peak-hour traffic, CBI rates reflect true economic costs and do not require artificially spreading such fixed costs over projected traffic minutes to arrive at a per-minute charge.

In Spain, CBI was introduced in the incumbent’s Reference Interconnection Offer (RIO),11 and allows operators to request interconnection through three different models: (i) on a capacity basis; (ii) a time-based model; or (iii) or a mix of both. Capacity-based interconnection may be requested in two capacity units (64kbps and 320kbps) and the RIO allows for the reselling of excess capacity. Similarly, in Colombia, the regulator issued a resolution12 allowing operators the option of choosing time-based interconnection or capacity interconnection on a per-city basis. However, there is only a single 2 Mbps capacity unit and reselling is not allowed. The table below compares the capacity interconnection models of Spain and Colombia.

◂ Table 4-7: Comparison of Capacity Interconnection Models of Spain and Colombia

Issue	Spain	Colombia
Is use of both models (time and capacity) by an operator permitted?	Yes, but the operator must select at each interconnection point (POI) the model it is going to be used.	Yes, but only for national operators that interconnect in more than one city. Capacity-based interconnection cannot be used simultaneously with time-based interconnection in the same city.
What is the minimum Capacity Unit (MCU)	There are two MCUs: 1. ▪ For those POIs that have interconnection links equal or less than four 2 Mbps (120 channels of 64 kbps) the MCU is 64 kbps. ▪ For those POIs having interconnection links more than four 2 Mbps (120 channels of 64 kbps); the MCU is 5x64kbps.	Capacity interconnection charges are established according to a 2 Mbps (E1) link, but the regulation expressly states that a different unit may be agreed upon by the parties.Currently, there has not been any interconnection agreement signed by any operator with an MCU lower than 2 Mbps.
What types of traffic are allowed?	There are two types: 1. ▪ Internet traffic only ▪ Voice + Internet traffic	Not expressly defined. Any type of traffic is allowed.
Is resale possible?	Yes	No
Is overflow possible?	Yes. Operators may opt for capacity links without or with an overflow possibility	Yes. Overflow routes must be established by both parties in order to guarantee the minimum quality parameters established in the regulation.

(d) *Wholesale Open Access Models*

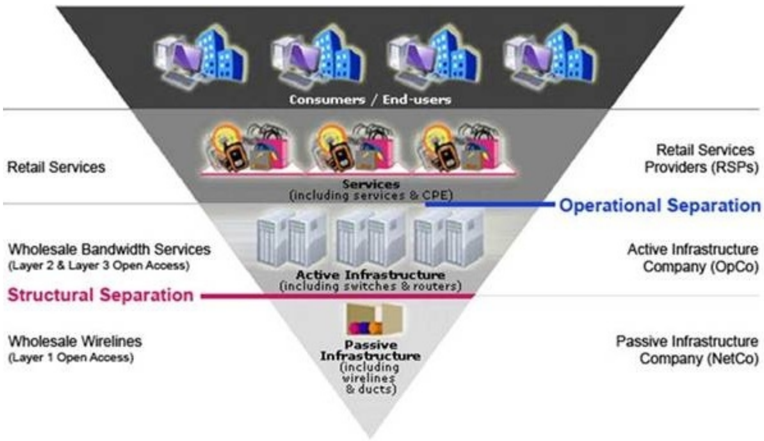
Some countries, including Singapore and Australia, are rolling out fiber network infrastructure based entirely on a wholesale open access model. In Singapore, the government has established a three-layer industry structure for the country's Next Generation National Broadband Network ("Next Gen NBN") with different responsibilities and roles to ensure that there is no conflict of interests among the various layers.13 Each of the layers is to be provided by a single company or group of companies, but these companies are prohibited from providing any other layer. The layers are comprised of:

1. The Network Company (NetCo), which operates at the first layer, is responsible for the design, build-out and operation of the passive infrastructure, which includes the dark-fiber network and ducts. OpenNet was appointed as the Next Gen NBN's NetCo.

2. The Operating Company (OpCo), which operates at the second layer, provides wholesale network services over the active infrastructure, comprising switches and transmission equipment. Nucleus Connect was selected as the OpCo for the Next Gen NBN.

3. The Retail Service Providers (RSPs), which form the third layer, offer services over the Next Gen NBN to end-users, including businesses and consumers. RSPs are able to purchase bandwidth connectivity at non-discriminatory and non-exclusive prices, and compete on a level playing field to provide competitive and innovative services to end-users.

The following figure illustrates the various layers and the responsibilities of each company or set of companies:



◄ **E: Industry Structure for NBN Open Access in Singapore**

Similarly, Australia is establishing the National Broadband Network (NBN) with the objective of providing 93 percent of Australian homes, schools and businesses with a fiber-to-the-premises connection capable of providing broadband speeds of up to 100 Mbit/s, with capability to provide speeds of up to one gigabit per second. For the remaining premises, the NBN will be a combination of next-generation wireless and satellite technologies will provide peak speeds of at least 12 Mbit/s. In order to build out the largest single infrastructure project in Australian history, the government established the National Broadband Network Company ("NBN Co.") to both construct the NBN infrastructure, as well as resell capacity on a wholesale basis.14 The NBN Co is required to provide access to the network infrastructure on a wholesale, transparent and non-discriminatory basis to retail service providers.

(e) Networks that Require Interconnection

The types of networks and services to be considered in interconnection policies vary with the development of new technologies. Examples of services that have required a reshaping of such policies are mobile data, cable television, and Internet.

When first introduced, Short Messaging Service ("SMS") provided mobile users the ability to transmit text between mobile terminal devices. Today, SMS may be transmitted from call centers and websites, and may even be received by fixed line users. This has pushed the boundaries of voice-focused interconnection policies and has forced regulators to consider whether traditional interconnection policies should be applicable to SMS traffic between mobile operators, content providers and fixed line operators. In Bahrain, Venezuela, and Mexico, regulators ordered interconnection for SMS providers.15

Another challenge regarding interconnection with mobile networks is the emergence of multimedia applications, prompting questions as to whether mobile network operators can operate as ISPs and whether there should be any limitations on the ability of users to access mobile portals. Whether a mobile network operator can operate as an ISP is generally based on the scope of the mobile provider's licence or whether a special licence is required to provide Internet access. Where the provision of Internet access does not require a licence, mobile operators generally do not encounter problems in deploying mobile Internet services. Consumers should be allowed to use alternative access and content providers, but this is not possible when mobile operators lock users in their portals. Mobile operators should be required to open their networks to other Internet service providers, content providers and other portals.

Regulators have also taken different decisions regarding Internet access via cable television modem networks. Some countries such as the United States, have ruled that Internet access is unregulated and, therefore, cable operators have no obligation to open their networks to alternative ISPs.16 Other countries, such as Canada, have ruled that cable television companies are obliged to make their Internet access network available for resale to other operators.17

6.4.3.4 NUMBERING AND INTERNET PROTOCOL ADDRESSING

ITU-T Recommendation E.164 defines the international public telecommunications numbering plan while countries implement their own national numbering policies and regulations based on the E.164 recommendation. Countries have typically implemented numbering plans that establish different numbering ranges for fixed line and mobile voice telephony, often divided into geographic areas. This differentiation had a twofold function of informing end users of the charges of the calls and maintaining the interconnection cost structure based on services (*i.e.*, mobile voice service vis-à-vis fixed voice service) and distance. Since this allowed subscribers to be reached by a unique combination of digits, numbering became an essential resource for telecommunications networks operators. However, with the advent of convergence, regulators are finding that modifications to such policies and regulations are necessary. Just as telephone numbers are required to identify the calling and called parties, an addressing system—known as the Domain Name System (DNS)—is necessary in order to identify and allow communications among Internet-enabled devices, websites and other Internet applications and services. The worldwide growth of the Internet has required substantial reforms to the management of IP addresses, as outlined below.

(a) Assignment of Numbering Resources to New Technologies Service Operators

One of the significant impacts on numbering regulation relates to the proliferation of VoIP services. This has raised questions among regulators as to whether numbering resources should be assigned for VoIP and whether traditional telephone service operator obligations should be imposed on VoIP providers. Regulators have adopted a variety of solutions. For example, in some jurisdictions, providers are allowed to use geographic numbers provided they offer service under the traditional voice service regime, which imposes various obligations (*e.g.*, quality of service, access to emergency services, and lawful interception). In addition, countries such as Singapore, Japan, South Korea and some EU Member states (*e.g.*, Ireland, France, Germany, and Austria), have created a specific numbering range for VoIP services, due to the special characteristics of the service, most notably its nomadic use.

Some countries, such as Japan, Spain, and the United Kingdom, have combined both measures, and grant geographic numbers to VoIP providers if they operate under the voice service regime (*i.e.*, voice quality of service, lawful interception obligations, access to emergency services), and specific number ranges if VoIP providers operate under the "information service" regime. The implementation of this differentiation has the additional intention of highlighting to consumers that these services are not equal and that VoIP specific range service providers do not necessarily provide the same set of features commonly associated with public voice service.

(b) Inter-modal Portability

A second modification on numbering regulation has been the introduction of inter-modality number portability. Number portability is the ability of a consumer to maintain the same telephone number when changing service providers. Number portability may be inter-modal (*e.g.*, porting a number from a fixed line to a mobile network or vice versa) or restricted to one type of network (*e.g.*, mobile number portability). The United States has included a geographically restricted inter-modal portability, meaning that a consumer may port among different types of networks within a limited geographical area. In Argentina, although the regulator issued a decree in 2000 (Article 30 of Decree 764/2000) recognizing a consumer right to inter-modal number portability, implementation has been slow due to challenges from incumbents. Final adoption of rules is expected by the end of 2011.1 Hong Kong (SAR) has also introduced inter-modality number portability to address fixed to mobile convergence in conformance with the Unified Carrier Licensing Regime.2 However, there are signs that number portability could potentially be expanded to other services, such as VoIP. In Denmark, the regulator has implemented a non-geographic numbering plan (*i.e.*, a consumer may be reached at a telephone number that does not correspond to its geographical location) where numbers are not attached to a specific service, and consequently, there are no portability restrictions among services.3

However, the implementation of inter-modal portability is currently limited to few jurisdictions. Geographical restrictions on inter-modal portability often respond to the potential effects on traditional numbering plans that are based on distance, services, and interconnection cost structures and for this reason, inter-modality portability may require a numbering policy restructure to be implemented.

(c) ENUM

E.164 NUmber Mapping (ENUM) is a protocol that is the result of work of ITU-T's Internet Engineering Task Force's (IETF's) Telephone Number Mapping Working Group.4 The charter of this working group was to define a DNS-based architecture and protocols for mapping a telephone number to a Uniform Resource Identifier (URI) that can be used to contact a resource associated with that number. The ENUM protocol enables resolution of E.164 telephone numbers into other resources or services on the internet.

The ENUM protocol has allowed the introduction of a fully neutral approach to numbering, simplifying numbering regulations and addressing complexities resulting from convergence. Essentially, by translating a PSTN number to an IP address, ENUM makes it easier to contact people through electronic means (*e.g.*, linking users' email, telephone number, fax and instant messenger address allowing them to be reached by any of these means through a single number). ENUM developments are helping to define the future direction of numbering policies. In addition, ENUM can help to address some of the transparency concerns with VoIP, due to the mapping of PSTN numbers to "uniform resource locators" (URLs). The Internet Architecture Board (IAB) and ITU-T Study Group 2 are discussing collaboration on the operational, administration and delegation issues related to deployment of ENUM protocol-based services. This requires extensive consultation with administrators of resources derived from the international E.164 numbering plan, including national and integrated numbering plan administrators. ENUM trials are being conducted in several countries including Austria, China, Finland, France, Japan, the Netherlands, Republic of Korea, Sweden, the United Kingdom and the United States.5

(d) Domain Names

The DNS translates domain names, which are meaningful to humans (e.g., **www.itu.int**) into unique IP addresses (i.e., the numerical identifiers associated with networking equipment for the purpose of locating and addressing these devices worldwide). The DNS can be thought of as the "telephone directory" for the Internet by translating user-friendly device and application identifiers into IP addresses. The Internet Corporation for Assigned Names and Numbers (ICANN) is the administrator of IP addresses and helps to coordinate how IP addresses are supplied to avoid repetition or clashes.6 In addition, ICANN is the central repository for IP addresses, from which ranges are supplied to regional registries who in turn distribute them to network providers. ICANN and the Internet Assigned Numbers Authority (IANA) work together to manage top level domain (TLD) names, such as ".com", ".org", ".net", as well as country code TLDs (ccTLDs), such as ".uk" for the United Kingdom and ".bh" for the Kingdom of Bahrain.

As numbering policies continue to be influenced by the development of IP networks, the management of ccTLDs on a national level has become another regulatory issue. Several countries have given their telecommunications regulators the responsibility to manage ccTLDs,7 yet some regulators may not have the necessary resources to take on this task. Although regulators maintain the control and legal responsibilities, they may rely on others for the domain names management including other government agencies, private companies, academic institutions and non-profit organizations.8 Furthermore, some governments have even commercialized the ccTLDs that correspond to their jurisdictions in order to obtain an additional source of revenues.9

On an international level, one of the biggest issues facing the Internet relates to guaranteeing that ample IP addresses continue to be available. The current IP address system, IPv4, provides for approximately 4.3 billion addresses. Due to the growing number of Internet-enabled devices, IPv4 is to be completely exhausted by the end of 2011.10 In order to ensure that the billions of existing and new devices expected to go online in the near future can be accommodated, ICANN has introduced IPv6, which allows for many trillions of IP addresses—enough to last for the foreseeable future. Despite the need for more addresses, many governments, as well as the private sector, have been slow to migrate to IPv6 due to the costs of upgrading equipment that are not IPv6-capable. Some countries are implementing regulations to ensure that network operators and device manufacturers are IPv6 compliant. For example, India has required all telecom operators and ISPs to be IPv6 compliant by the end of 2011 and to offer IPv6 services beginning March 2012, which is also the date when all public sector agencies and companies must also switch to IPv6.11 Other countries are taking an industry-led approach. In New Zealand, for example, following a 2008 workshop held by the Ministry of Economic Development, New Zealand's major ICT industry and stakeholder organizations formed the IPv6 Task Force to develop a transition plan from IPv4 to IPv6.12 In March 2011, the IPv6 Task Force launched an online service directory containing a list of New Zealand-based vendors, trainers, consultants, service providers and IT integrators who have expertise in IPv6 in order to promote a smoother migration.13

Practice Notes

- **ENUM**
- **ICANN**
- **VoIP Numbering schemes**

Reference Documents

- **India -- Telecommunications Mobile Number Portability Regulations, 2009**
- **Looking Forward: Mobile Number Portability in South Africa (Tracy Cohen)**
- **Nigeria: Numbering Regulations 2007**
- **OECD: ENUM: CONVERGING TELEPHONE NUMBERS AND ADDRESSES IN NEXT GENERATION NETWORKS**
- **Pakistan: MNP Code of Practices v. 9**
- **South Africa: Making MNP Work**

6.4.3.5 UNIVERSAL SERVICE

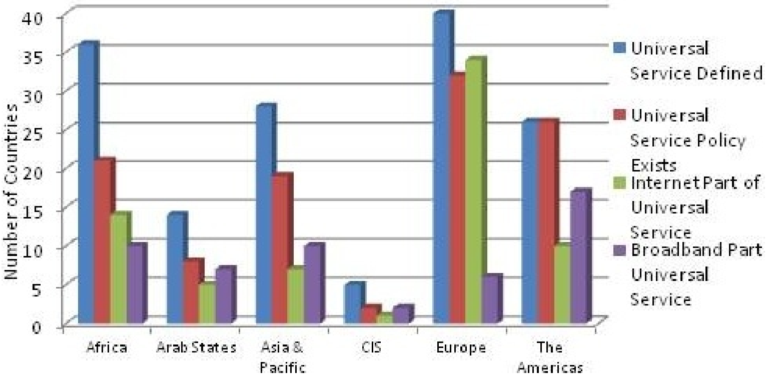
Convergence is challenging traditional universal service policies and the means by which universal service objectives are currently met. Universal service was initially an obligation imposed on the monopoly operator that concentrated on the provision of voice telephony, requiring operators to expand coverage to provide services in remote and underserved areas. Incumbent operators typically cross-subsidized the cost of their universal service obligations with revenues derived from other services. With the introduction of competition and new technologies, regulators substituted this implicit cross-subsidization with a requirement that all or some operators contribute a percentage of their revenues to a universal service fund.

The primary question confronting regulators in jurisdictions where a universal service contribution system exists, is whether operators offering VoIP services should have universal service obligations, and whether they should contribute on the same basis as traditionally established operators. Many countries have not imposed universal service obligations on service operators using new technologies due to concerns that such obligations would inhibit their development and the development of new technologies and new market players. However, this trend seems to be shifting as more traffic shifts from public switched telephone networks to IP-protocol networks. In Canada, for example, universal service requirements have been imposed on all service providers, including VoIP providers that enable one-way or two-way interconnection with the PSTN (therefore, excluding PC-to-PC VoIP). Canada's approach is consistent with its technology-neutral policy to VoIP, equating such providers to traditional voice operators, provided the service is offered through access to the public switched telephone network.1

In addition, as IP technologies are gaining importance, regulators are modifying the Universal Service Obligations (USOs) to include narrowband and broadband Internet access. For example, of the 125 countries that responded to the ITU's annual regulatory survey in 2011, 73 included narrowband Internet service in the universal service definition and 52 included broadband access. In 2000, no countries had established a mandate to make broadband a part of a universal service policy; by 2010, at least 25 countries had expanded their universal service policies to include broadband access.2 In September 2006 (effective January 2008), Switzerland was among the first countries to expand USOs beyond voice telephony to include broadband.3 Under the new regime, universal service includes the obligation to provide a broadband connection with a transmission speed of at least 600 kbit/s download and 100 kbit/s upload speeds, with a price ceiling of CHF 69 excluding VAT.4 In October 2009, the Finnish government announced that, as of July 1, 2010, a 1 Mbit/s Internet connection is defined as a universal service, which means that all telecom operators defined as universal service providers are required to provide every permanent residence and business office with access to a reasonably priced and high-quality connection with a downstream rate of at least 1 Mbit/s.5 With this decision, the Finnish Ministry found that access to affordable broadband services is a basic right for every consumer and business in Finland.6

Other countries are also considering the expansion of USOs to broadband, particularly as traditional fixed line voice telephony wanes and new IP-based technologies are playing a more important role in the economy. For example, Brazil's Bill 1481/07 proposes to use resources from the countries Fund for Universal Telecommunications (FUST) for the expansion of broadband and would require all primary schools and higher education institutions to have Internet access, particularly in rural areas.7

Regulators are also looking beyond USOs in seeking to ensure that those living in rural and unserved areas have universal service and access to broadband services. Instead of mandates on universal access, regulators can implement more flexible licensing regimes to take advantage of technological development and convergence. For example, reasonable rural coverage obligations can be included in licenses or regulators may set specific rural UAS targets for operators in exchange for relief from universal service fund contributions. The Hungarian government has implemented a variation of this policy by reducing the taxes on telecommunications operators by 50%, provided they have invested at least HUF 100 million (USD 500,000) in broadband infrastructure in unserved areas and expect to have profits exceeding HUF 50 million (USD 275,000).



◂ F: Universal Service Worldwide

6.4.4 MODIFICATION TO BROADCASTING AND ICT LEGISLATION TO ADDRESS CONVERGENCE

In order to facilitate the development of new technologies, which brings telecommunications, broadcasting, and the Internet closer together, the regulatory frameworks governing these industries are being coordinated, and correspondingly modified, so that they are all focused on the same objectives.1 Today, the ICT sector requires governments to undertake a broader perspective of law and regulation and assess the impact and interaction of telecommunications legislation with ICT related legislation, such as media/broadcasting legislation, content laws, intellectual property laws, and privacy laws. As shown in Table 4-8, several countries (

e.g.,

Hong Kong SAR and India) have adopted or are in the process of adopting ICT-related legislation.

◂ Table 4-8: Snapshot of ICT Legislation in Hong Kong SAR and India2

Hong Kong SAR	India
The Telecommunications Ordinance, (Chapter 106), 2000	The Indian Telegraph Act, 1885
The Broadcasting Ordinance (Chapter 562)	The Indian Wireless Telegraphy Act, 1933
The Personal Data (Privacy) Ordinance (Chapter 486), 1995	Telegraph Wire Unlawful Possession Act, 1950
The Electronic Transactions Ordinance (Chapter 553), 2000	The Cable Television Networks (Regulation) Act, 1995
The Telecommunications Regulations, 2000	The Telecom Regulatory Authority of India Act, 1997
The Copyright Ordinance, 1997	The Information Technology Act, 2000
The Patents Ordinance, 1997	The Information Technology (Certifying Authority) Rules, 2000
The Trade Marks Ordinance (not yet in operation)	The Cyber Regulations Appellate Tribunal (procedure) Rules, 2000
The Intellectual Property Ordinance, 1998	The Information Communications and Entertainment Bill, 2000
The Control of Obscene and Indecent Articles Ordinance, 1998	The Convergence Bill, 2002

However, to achieve the benefits of the information society requires the adaptation of legal frameworks and in-depth coordination with the relevant sectors to develop integrated solutions to the regulatory challenges arising from convergence and the introduction of new technologies.

6.4.4.1 MEDIA AND BROADCASTING LEGISLATION

While the driving force behind telecommunications regulation has been primarily the liberalization of the sector and promotion of competition, the regulation of broadcasting and media has been mostly influenced by the social and cultural impact of the industry.1 Broadcasting is defined by the ITU as a radiocommunication service in which the transmissions are intended for direct reception by the general public. This service may include sound, television, or other types of transmission.2 Broadcasting often has substantial content regulation because it is perceived as playing a special role in the cultural life of a country and in developing a national identity. For example, in order to promote social objectives, the majority of OECD countries have regulations regarding broadcasting content and media ownership.3

Telecommunications and broadcasting services traditionally have been regulated separately, whether by the same regulatory entity or a different regulatory entity.4 In a majority of countries, broadcasting is regulated by a separate entity or responsibility over broadcasting is shared by the telecommunications regulator with other government entities responsible for broadcasting. In other countries, such as Australia, Bulgaria, Canada, Croatia, Ghana, India, Italy, Japan, Malaysia, Norway, South Africa, Switzerland, Tanzania, the United Kingdom and the United States, the telecommunications regulator also fully responsible for broadcasting.5

Convergence has resulted in new technologies and services that often are not encompassed in existing service definitions and regulation. This has challenged the adequacy of the current industry-based regulatory framework. For instance, should audiovisual content offered through the Internet or a mobile telephone be defined as telecommunications or broadcasting?6 As broadcast content and telecommunications network carriage become more integrated, a need exists to review telecommunications and broadcast media regulation to accommodate the regulation of new services and ensure consistency in policy and regulation. Convergence from a broadcasting perspective is primarily manifested in the joint offerings of video and high-speed Internet service (and often voice service), mostly via cable television networks.7

In order to address the challenges of convergence, some jurisdictions such as Australia, Malaysia, Hong Kong (SAR), and the United Kingdom have established a common regulator with responsibilities over the telecommunications and broadcasting sector. Regulators such as the Office of Communications (**OFCOM**) in the United Kingdom and the Malaysian Communications and Multimedia Commission (MCMC) have undertaken regulatory reforms to enact new converged regulatory frameworks that apply to all electronic communications networks and services. In Hong Kong SAR, the Office of the Telecommunications Authority (OFTA) is currently reviewing its broadcasting regulatory regime, and considering the benefits of establishing a unified regulator, merging the Broadcasting Authority (BA) and OFTA into one regulator to oversee the electronic communications sector. In Korea (Rep.), a new converged regulator with authority over telecommunications and television broadcasting—the Korea Communications Commission (KCC)—was largely created in 2008 from the merger of the Korean Broadcasting and the Ministry of Information and Communication (MIC)in order to facilitate a regulatory framework for IPTV services.8

Practice Notes

- **UK Office of Communications [4.4.1]**

6.4.4.2 CONTENT

Historically, content has been delivered by different service providers using distinct networks (

e.g.

, television from terrestrial and satellite broadcasting, and telephone through telephone networks).1 With digitalization, content formerly dedicated to specific networks now can be conveyed on different infrastructures and delivery platforms. This poses a potential conflict in regulation as different standards of content regulation are applied to telephony, sound and television broadcasting, print media and the Internet. With convergence, policies may need to be changed to achieve the common social objectives of promoting and protecting cultural traditions, public service, and protecting citizens from harmful material across all types of networks and delivery platforms.

While convergence poses challenges to the regulatory framework, it is recognized that differences in the expectations, context and intrusiveness of different services exist, and could justify the differentiation in regulatory approaches.2 Therefore, while Internet content remains mostly unregulated, regulation requiring a minimum level of domestic content on television is still a feature of broadcasting regulation and licensing in many countries. For instance, the 2002 National Trade Estimate Report on Foreign Trade Barriers by the U.S. Trade Representative states that approximately 30 trade partners have local content restrictions in the audio-visual sector.3

Additionally, an ITU survey regarding broadcasting and Internet content demonstrates that broadcasting content is more highly regulated than Internet content in the majority of countries. Of the approximately 125 countries surveyed by the ITU, almost all of the countries had some form of regulatory entity responsible for broadcasting content, except for Bahrain, Nicaragua, Paraguay, Peru, St. Vincent and the Grenadines, and Spain. On the other hand, the majority of the countries surveyed had no regulatory entity responsible for Internet content. Of the regions surveyed, Internet content seems to be more heavily regulated in the Asia Pacific region and Europe and least regulated in the Americas and Africa.4

Some of the issues regulators face regarding content regulation are:5

- Applicability of public service provisions;
- Cross media ownership, cross sector ownership and restriction on the size of individual broadcasters;
- Cultural diversity, local content quotas and local production of content;
- Programming standards associated with accuracy and impartiality in the reporting of new and current affairs;
- Intellectual property rights;
- Role and means of supporting public broadcasting; and
- Programming standards associated with decency, censorship and freedom of speech.

(a) Broadcasting Content

Due to the role of broadcast media in defining the cultural identity of a country, one of the main issues in regulating broadcasting is the quota on national content. Two EU directives, the Framework Directive6 and the Television Without Frontiers Directive7 have redefined broadcasting in the region. In particular, the Directives separate regulation of content from the regulation of transmission, place specific limits on the regulation of transmission and permit EU member countries to regulate content in order to achieve social objectives.8 The Television Without Frontiers Directive stipulates that where practicable and by appropriate means, broadcasters should reserve a majority of their transmission time for European content (excluding time appointed to news, sports, games, advertising and teletext services).9 In addition, broadcasters should reserve at least 10% of their transmission time or program budget for European works created by producers who are independent broadcasters.10

In Australia, the Australian Content Standard requires all commercial free-to-air television licensees to broadcast an annual minimum transmission quota of 55 per cent Australian programming between 6 a.m. and midnight. There are also specific minimum annual sub-quotas for Australian adult drama, documentaries and children's programs.11

(b) Internet Content

In many countries, ISPs and Internet data centers are not required to review, monitor or classify the content that they host, and are therefore not held liable for the transmission of prohibited content unless they have specific knowledge of the illegal content or fail to report and take corrective action. This policy results from the rationale that, like traditional telecommunications carriers, ISPs are merely a conduit that passively transmit data and therefore are not responsible for the nature, or character of that data. Thus, it would be unjust, unreasonable and impractical to expect an ISP to monitor content in order to safeguard against illegal use or criminal activity.

The EU Directive on Electronic Commerce follows this approach. ISPs have no liability when the service provided is a mere transmission or access to a communication network, to the extent that the ISP cannot select or modify the content of the transmission, or select the receiver of the transmission. There is no liability on the ISP when the service is an automatic, intermediate or temporary storage of data (caching) so long as the provider does not modify the information, complies with conditions on access, and acts promptly to remove or disable access to the information when required. Furthermore, the ISP is not liable when the service offered consists merely of the storage of information, provided that the ISP does not have knowledge of illegal activities or information, or upon being aware, acts promptly to remove or disable access to the information.12

Japan's ISP Liability Law13 follows an approach similar to the EU, but imposes a stricter standard on ISPs. In Japan, ISPs are not generally liable for damages caused by infringement of laws as a result of the transmission of information via the Internet. They may be held liable, however, if they were either aware of the infringement or were aware of the information and should have known of the infringement, and could technically prevent the transmission of the information. Any person whose right is allegedly infringed by transmission of the information via the Internet can request that the ISP disclose the person who transmitted the information, and the ISP may disclose such information if the right of the requesting person has been obviously infringed and the requesting person has legitimate reason to be entitled to such disclosure.

Because an ISP provides access to the Internet, some argue that it is in the best position to take action against illegal activity conducted over the Internet. As a result, in some countries ISPs have been given a degree of responsibility over content regulation under certain circumstances. Although a country may not have specific legislation regarding Internet content, this does not mean that ISPs are immune from liability for content handled under their networks under other laws. For example, in Mexico, ISPs may be held responsible under the Federal Criminal Code which provides that any person who publishes, by any means, exposes or distributes obscene books, writings, images or objects commits a crime against public morality and good custom, and can be sanctioned with imprisonment and/or fines. ISPs are not deemed responsible for the distribution of the prohibited material under the Federal Criminal Code based on the provision of Internet access or for providing shared, dedicated, or co-located hosting because they are not obliged to know the content of the web sites that they host. However, ISPs may be responsible for distribution of prohibited content when providing hosting services, where they collaborate in the production and development of the content with the author of the website and consciously host the website with specific knowledge of its contents. 14

6.4.4.3 INTELLECTUAL PROPERTY LAWS

Part of content legislation is the issue of protection of intellectual property rights associated with the growth of ICT use. In an era of electronic commerce, the sale and exchange of copyrighted material in digital format must be protected in order to ensure the continued investment and development of the ICT sector. Digitalization of information results in new risks for holders of copyright and related rights in their works, but also makes it potentially easier to administer and control acts of exploitation by means of access control, identification and anti-copying devices.1 The EU has adopted a **Copyright Directive** and jurisdictions such as the **United States** and Hong Kong (SAR) have also passed legislation enforcing intellectual property laws in the ICT sector. In May 2011, the European Commission expanded on the Copyright Directive in the release a new Intellectual Property Rights (IPR) Strategy aimed at reforming the legal framework of IPRs in order to strike the right balance between promoting creation and innovation and promoting the widest possible access to goods and services protected by IPR.2 The EC's IPR Strategy sets out a series of key policy actions in copyright licensing and violations (e.g., piracy), as well as other IPR areas such as patents and trademarks.

The need for copyright reforms are due to technological developments that enable works of literature, film, music and art, as well as computer programs, to be created or transferred into digital format that allows for easy and inexpensive copying. With high-speed broadband access that allows users to download a feature length movie in a matter of minutes, the unauthorized transmission of copyrighted materials has become a major concern of those seeking to protect copyrights. One of the most basic rights granted under copyright is the right to control reproduction under the Berne Convention, which covers reproduction in "any manner or form."3 This right is critical to determining reproduction rights in e-commerce, as the transmission of a work presupposes the uploading of that work into the memory of a computer or digital device, and when the work is transmitted over networks, multiple copies are made in the memories of the network computers.

Some of the most significant issues arising from the extension of copyright protection in the digital environment are: (i) scope of copyright protection in the digital environment; (ii) responsibility of online providers; (iii) rights of performers in the digital environment; (iv) rights of digital broadcasters, such as webcasting and digital film and television online; (v) linking of copyright information online, including deep-linking and framing; (vi) protection of databases; and (vii) peer-to-peer (P2P) file sharing systems and video or audio streaming of copyrighted materials.4 Measures to address illegal P2P file sharing and online streaming of copyrighted video (e.g., movies) and audio (e.g., music) have been at the forefront of countries' amendments to IPR regulatory frameworks.

In many cases, countries have opted to involve ISPs in protecting copyrights online. For example, France passed a "three-strike" law in 2009, which requires ISPs to help the government identify copyright violators (i.e., online users who illegally download copyrighted material). Under the law, users receive two warnings of violations and ISPs are required to terminate the service of users who are found to engage in copyright infringement a third time within 12 months of the first violation.5 Like France, countries around the world are requiring Internet intermediaries, such as ISPs, to play a more active role in preventing and enforcing copyright laws.6 For example, the New Zealand government passed the *Copyright (New Technologies) Amendment Act* in 2008, which includes an obligation for ISPs to have, and reasonably implement, a policy for termination of accounts of repeat copyright infringers through a "notice-and-takedown" regime.7 In Korea, the government amended the country's Copyright Act in 2009 to involve ISPs in the "notice-and-takedown" regime.8 Under Article 133bis of the amended Copyright Act, once the government has sent notice to an ISP that a user has engaged in copyright infringement, it is the ISP's responsibility to warn the user of infringement. After the third such notice, the ISP may be required by the Ministry of Culture, Sports and Tourism to suspend the infringing user's account for up to six months as part of the country's "three-strike" regime.9 Although such "three-strike" laws are supported by the music and film industries and several national governments, others criticize such measures as leading to violations of users' rights to access and share information. In particular, the United Nations expressed in May 2011 its concern that "three-strike" and other "graduated response" measures that terminate or suspend users' Internet connection for copyright infringement can violate users' basic human rights, including access to Internet infrastructure.10

In the trademark field, commercial branding, advertising and marketing, including the use of domain names to identify one's presence on the Internet are heightened by the online environment and can result in unfair competition. The general international consensus is that trademark protection under international and national laws should extend to the Internet, and the protection should be neither more nor less extensive than that granted in the physical world.11 Some of the issues regarding the protection of trademarks in the digital environment are:

- use of trademarks as meta tags - which are HTML codes inserted into the header of a webpage that allows search engines to identify the contents of the page and index it;
- sale of trademarks as keywords;
- pop-up advertisements;
- mousetrapping – an aggressive marketing technique that forces users to remain on a specific website, by disabling a user's browser functions; and
- linking and framing.

In general, patents protect inventions. In the patent field, with the growth of e-commerce, the scope of patentable subject matter has increased, resulting in issues with respect to:12

- Scope of patentable subject matter, including online business method patents and software protection;
- Prior art effect – as applied to prior art in electronic form "cyber art," and
- Enforcement of patent rights.

Practice Notes

- **EU Copyright Directive [4.4.3]**
- **US Copyright Directive [4.4.3]**

6.4.4.4 DATA PROTECTION/PRIVACY LAWS

As a result of the growing international concern for cybercrimes, such as computer-related fraud, child pornography and hacking, 47 EU and non-EU Member States have signed the Convention on Cybercrime, the first international treaty seeking to address computer and Internet crimes through harmonization of national laws that improve investigative techniques and increase cooperation among nations.1 The convention is designed to: (1) harmonize domestic criminal law in the area of cyber-crime; (2) provide for domestic criminal procedural law powers necessary for the investigation and prosecution of such offenses as well as other offenses committed by means of a computer system or evidence in relation to which is in electronic form; and (3) establish a fast and effective regime of international cooperation. In addition to streamlining definitions and civil and criminal penalties for cybercrimes, the Convention also gives signatory countries common powers to search and intercept the Internet communications of suspected terrorists.

"The fast developments in the field of information technology have a direct bearing on all sections of modern society. The integration of telecommunication and information systems, enabling storage and transmission, regardless of distance, of all kinds of communication opens a whole range of new possibilities. These developments were boosted by the emergence of information super-highways and networks, including the Internet, through which virtually anybody will be able to have access to any electronic information service irrespective of where in the world he is located. By connecting to communication and information services users create a kind of common space, called "cyber-space," which is used for legitimate purposes but may also be the subject of misuse. These "cyber-space offenses" are either committed against the integrity, availability, and confidentiality of computer systems and telecommunication networks or they consist of the use of such networks or their services to commit traditional offense. The transborder character of such offenses, *e.g.*, when committed through the Internet, is in conflict with the territoriality of national law enforcement authorities."

◂ Box 1Need for Regulation of Cyber-crimes

Source: Council of Europe, Convention on Cyber-crime, Explanatory Report.

Due to convergence and the rapid development and deployment of ICTs around the world, ICT regulators are increasingly taking on a new role of assisting law enforcement and national security agencies in protecting users' data and privacy online. One of the main challenges in addressing cybercrime is keeping pace with the fast-paced adaptation of cybercriminals, which requires a flexible and forward-looking regulatory framework that also clearly defines cybercrime offenses and remedies.2

An analysis of country practices in various countries suggests that the ICT regulator's mandate can potentially be usefully extended or strengthened in the following areas:3

- Implementing cybercrime rules as part of the regulator's consumer protection responsibilities, such as related to fighting spam, malware or spyware. In the Netherlands, the Independent Post and Telecommunication Authority (OPTA) enforces prohibitions on spam, malware and spyware by imposing fines on wrongdoers.
- Expanding the ICT regulator's responsibility for information security or network security, which may include establishing a department within the regulator focused on consumer outreach and education efforts on network security practices and enables cooperation with law enforcement agencies. For example, the Malaysian Communications and Multimedia Commission (MCMC) has an Information and Network Security (INS) department to ensure information security and network reliability within the communications and multimedia industry.
- Establishing a new regulator with the operational mandate for Internet safety. In Korea, for example, among the responsibilities of the new, converged regulator—the Korea Communications Commission— is the protection of Internet users from harmful or illegal content.

Practice Notes

- **Examples of Data Retention Rules in Different Countries [4.4.4]**
- **Privacy and data retention policies in selected countries**

6.4.5 CASE STUDIES OF CONVERGED LEGISLATION

This section contains case studies on converged legislation in the EU, Hong Kong, and Malaysia.

6.4.5.1 EUROPEAN UNION NEW REGULATORY FRAMEWORK (NRF)

The EU's 2002 NRF represented the paradigm legislation aimed at addressing convergence and its challenges. Although the 2009 EU Telecom Reforms included new provisions to promote competition, innovation and adoption of ICT services,1 the 2002 NRF remains the backbone of the EU's electronic communications regulatory framework. It is composed of six Directives2 that address the convergence of telecommunications, media, and information technology. The 2002 NRF did not address content.3

The 2002 NRF established a unified, technology-neutral system of authorization that covers all comparable services, with the objective of addressing convergence between different electronic communications and services, and stimulating their further development. The authorization system has only a procedural notification requirement.

The general authorizations issued by national regulatory authorities (NRAs) must, at a minimum, provide the following rights:

1. The right to provide electronic communications networks or services or both.

2. The right to request interconnection or access to facilities of other providers. However, only providers of public services and networks have the right to be supported by the regulator in case negotiations with a significant market power operator fails.

3. The right to apply for rights of way.

4. The right to be considered for designation as a universal service provider (only for providers of public services and networks).

NRAs may not attach conditions to an authorization other than the ones set forth in the 2002. 4 Member states may impose different requirements on services and networks to grant numbering, but NRAs may not discriminate among providers of comparable services. Member states may establish the requirement to obtain a separate licence for spectrum rights, although the 2002 NRF introduces the possibility of spectrum trading.

The 2002 NRF requires NRAs to conduct a market analysis on certain markets susceptible to *ex ante* regulation. The NRAs may propose draft measures if they find that effective competition does not exist in the relevant market. The 2002 NRF notes that newly emerging markets, such as VoIP, should not be subjected to inappropriate obligations, and while it cautions against the imposition of premature obligations, it also notes the need to prevent full control of the market by the dominant player.

The 2002 NRF also created several Committees to assist the Commission in the implementation of the NRF. One of these is the European Regulatory Group (ERG), an advisory body to encourage cooperation and coordination among the NRAs of member states. Although the ERG was replaced with BEREC with the passage of the 2009 Telecoms Reform, the ERG was actively involved in the implementation and harmonization of the 2002 NRF, including playing an influential role in the EU VoIP debate where the ERG helped to issue a common position that has been followed by various member states.5

How has the 2002 NRF dealt with VoIP?

As a result of the growing significance of VoIP, the European Commission opened a public consultation proceeding to develop a VoIP harmonized regulation (the "EC Consultation Document").6 This process occurred at the same time the 2002 NRF was being implemented.

The EC Consultation Document opened a comment process on the challenges brought by VoIP, proposing preliminary guidelines for VoIP regulations. Under such recommended preliminary guidelines, service providers have the commercial freedom to offer services that qualify the provider as an electronic communications service (ECS) provider or as a publicly available telephone service (PATS) provider.

Each category of service provider has different rights and obligations:

§ Only PATS providers have PATS number portability; ECS providers do not.

§ Only PATS subscribers have a right to request carrier selection and pre-selection.

§ Only PATS subscribers have the right to be listed in the public telephone directory.

§ Only PATS providers have the obligation to provide access to emergency services.

§ Quality of service standards only applies to PATS providers.

From a customer perspective, a VoIP service provided as ECS and PATS have a similar look and feel. Therefore, the EC Consultation Document suggested that to avoid consumer disinformation, member states could require ECS providers to give precise information to customers on how they differ from PATS and the impact that their services have on power line terminals, access to emergency services, and caller location.

So as not to hinder the development of VoIP services, the EC Consultation Document encouraged VoIP providers to rapidly devise and implement technical requirements and solutions such as how to handle emergency services, lawful call interception, and caller ID.

With respect to numbering, the EC Consultation Document provided the following possibilities for Member states under the 2002 NRF:

1. Allocation of geographic numbers to ECS providers, allowing mobility in limited area (*e.g.*, a city or a telephone district)

2. Allocation of geographic numbers to ECS providers, allowing countrywide mobility

3. Allocation of geographic numbers to ECS providers, without mobility

4. Establishment of a new range of numbers specific for ECS VoIP services

Within the 2002 NRF and taking into account this Consultation Document and the ERG common statement, EU Member States have been adopting and implementing decisions on VoIP services.7

Some jurisdictions, such as Spain and the United Kingdom, allow the service provider to freely decide which rights and obligation regime (the ECS or PATS) will be applicable when offering the service. Others, such as Austria and Finland, established specific parameters for the service, limiting the freedom of the providers to choose the applicable regime.

There have also been different approaches on numbering. Some jurisdictions such as Spain and the United Kingdom, have established a specific range for ECS VoIP providers, while allowing non-geographic numbering for VoIP PATS providers. Spain permits nomadic use within a particular telephone district while the United Kingdom does not have any nomadic restriction. Other jurisdictions, such as Germany, France or Austria, have recently established a specific range of numbers for ECS VoIP service.

Portability within a particular numbering range (*i.e.*, geographic to geographic or special ECS VoIP range to special ECS VoIP) has been allowed in some jurisdictions, such as Spain and Ireland, while others, such as United Kingdom, only allow portability for PATS service providers.

How has the NRF dealt with WLANs?

The EC adopted a Recommendation in March 2003 urging EU Member states to facilitate the use of public WLANs (e.g., Wi-Fi "hotspots").8 The EC recognized the importance of WLANs as an alternative platform for broadband access to information society services and suggested that the desirability of promoting a harmonized approach for the provision of public WLAN access throughout the EC. To that end, the EC Recommendation advised that the provision of WLAN access on a commercial basis should be allowed under the least onerous system, *i.e.*, to the extent possible without any specific conditions. The 2002 NRF principle of technologically-neutral regulation helped to ensure that there is no discrimination between the various WLANs and other technologies. As an example of how the Recommendation has been applied, France does not require any licence for the implementation of WLANs. The use or provision of a private WLAN by an already licensed public operator is allowed without any regulatory notification. Furthermore, a simple declaration will suffice for those providing public WLAN access who do not have a public network licence.9

The EU legislation approach to address convergence

The purpose of the 2002 NRF is to address convergence by a comprehensive transformation of the applicable legal framework by means of a technology-neutral and flexible approach.

The 2002 NRF was the result of several consultative processes involving interested parties (*e.g.*, member states, consumers and industry representatives), which gave the EC a broader perspective of convergence regulation, its effects, and its challenges. In addition, from a convergence standpoint, the practical implementation of the 2002 NRF was supported by consultation proceedings, harmonization processes, and ultimately, member states regulations. An example of this approach is the VoIP EC Consultation Document cited above. NRAs have a choice of: (i) establishing their own consultative processes at a national level; (ii) waiting for the results of the EC consultative proceeding; or (iii) adopting regulations on the subject directly.

The EU's legislative approach to convergence involves an additional element of regional harmonization, which is achieved through EC guidelines (as in the case of VoIP) and the common position of the ERG. ICT-related regulation in the EU is addressed separately from the NRF, but takes into account the existing links between them.

6.4.5.2 HONG KONG (SAR)

Hong Kong (SAR) has adopted various regulatory measures to address convergence, focusing on fixed/mobile convergence. In 2008, the unified carrier license (UCL) regime was introduced as a single licensing vehicle for both fixed and mobile telecommunications services.1 The UCL replaced two previous types of carrier licenses, namely the fixed carrier license (FCL) and mobile carrier license (MCL), which are no longer issued by the Office of the Telecommunications Authority (OFTA). However, any existing FCLs and MCLs are effective until their expiry dates.

VoIP

Prior to the issuance of a statement by OFTA in June 2005, VoIP was not expressly regulated in Hong Kong (SAR).2 Instead, VoIP was treated as a technology that could be operated under any service or network license, and the license under which VoIP was provided determined the operators' rights and obligations.

In June 2005, the Government issued a statement that set forth two specific class licenses to operate VoIP services that differentiate between VoIP services that are marketed with characteristics equal to voice services (Class 1) and those that are not (Class 2).

Class 1 licenses provide numbering rights equal to voice services and their users will have portability; however, Class 1 licensees must provide emergency access service and comply with a minimum set of quality of service standards.

Class 2 licenses do not have numbering rights, and to the extent that numbers are not assigned, operators are not required to provide access to emergency services.

To protect consumers, operators will be required to clearly declare in their marketing materials the type of licence under which they operate (Class 1 or Class 2).

WLANs

Since January 2003, OFTA has required a class license for commercial use of WLANs (i.e., offering WLAN to the public through Wi-Fi "hotspots" or Internet cafes). The license, which does not require approval, is automatically granted upon registration of the name, contact details, location of the service, and identification of the frequency band being used.3

ICT-Related Regulation

Currently, broadcasting and telecommunications are regulated by separate entities and are subject to different regulations. OFTA is the regulatory authority responsible for regulating the telecommunications industry and ensuring compliance with the Telecommunications Ordinance. Broadcasting in Hong Kong (SAR) is regulated by the Broadcasting Authority (BA) pursuant to the Broadcasting Ordinance, which divides broadcasting into four categories of television program services: (a) domestic free television program service; (b) domestic pay television program service; (c) non-domestic television program service; and (d) other licensable television program services. In addition, Hong Kong (SAR) has separate regulatory frameworks for the provision of media content or television program services and for the transmission of these services. Transmission networks are licensed and regulated by OFTA pursuant to the Telecommunications Ordinance, whereas television programming and content (regardless of the transmission mode) is regulated by the BA under the Broadcasting Ordinance.

In response to convergence, the Hong Kong (SAR) Government reviewed the broadcasting regulatory regime, covering convergence strategy, media ownership and the merits of establishing a unified regulator (merging the BA and OFTA into one regulator) to oversee the electronic communications sector. A public consultation document on the Government's proposal for a unified regulator named Communications Authority was published in March 2006.4 As stated by the Secretary for Commerce, Industry & Technology John Tsang, "convergence at the infrastructure level means that cable and satellite broadcasters are facing increasing competition not only from their peers, but also from telecommunications providers and new media firms that are branching out into the broadcasting business. The increase in broadband penetration also means the increase of converged services on broadband networks (such as PCCW's launch of broadband television service via ADSL in addition to video services on the Internet portal and Hong Kong SAR Broadband Network's telephony, broadband Internet access and video triple-play service via its communications network). These developments have required the Government to review its definition of broadcasting and the relevance of considerations such as spectrum scarcity, as well as current regulatory measures that many no longer be justified on public interest grounds in view of the convergence trend."5 The Communications Authority was established under the Communications Authority Ordinance (Cap. 616) in April 2012 as a converged regulator combining OFTA and the BA was still planned and under consideration by the Hong Kong legislature.6

6 Hong Kong Legislative Council, Bills Committee on Communications Authority Bill at . Also see Legislative Council Brief, Communications Authority Bill at .

Reference Documents

- **Broadcasting in Hong Kong**

6.4.5.3 MALAYSIA

The Communications and Multimedia Act 1998 (CMA)**1** came into effect on 1 April 1999, providing a regulatory framework to accommodate the convergence of the telecommunications, broadcasting, and computing industries.

The basic principles underlying the CMA are transparency, technology neutrality, flexibility, and transparency. Regulation is reduced by the establishment of generic provisions, and self-regulation is promoted.

In addition, the Malaysian Communications and Multimedia Commission (MCMC) was established on 1 November 1998, as the sole regulatory authority of the new framework, thereby restructuring the different branches of the government that previously had jurisdiction over the telecommunications, broadcasting, and computing industries.

The CMA encourages industry self-regulation and establishes an industry forum as a dynamic tool for the industry to formulate and implement voluntary codes of rules. These industry codes of self-regulation may be prepared at the industry's own initiative or by request of the MCMC.

Finally, the CMA establishes a permanent review process, which must be conducted every three years by the MCMC, to examine rules and regulations under the CMA and adapt them to the dynamics and evolution of convergence. Pursuant to this review process, the MCMC must provide written recommendations to the Minister to modify or to repeal any rules or regulation under the CMA.

Licensing

The Malaysian licensing framework separates the network from the service, and places emphasis on the activity rather than on the technology. The following are licensable activities:

§ *Network Facilities Providers* ("NFP") are considered "the fundamental building block of the convergence model upon which network, applications and content services are provided."[2] NFPs own facilities and equipment (*i.e.*, satellite earth stations, broadband fiber optic cables, telecommunications lines and exchanges, radio communications transmission equipment, mobile communications base stations, and broadcasting transmission towers);

§ *Network Services Providers* provide basic connectivity and bandwidth that supports a variety of applications, and enables transport between different networks;

§ *Applications Service Providers* provide specific services to end-users (*e.g.*, voice services, data services, content-based services, electronic commerce, and other transmission services); and

§ *Content Applications Service Providers* provide traditional broadcast services, online publishing and information services.[3]

The above services fall under one of the two categories of licenses created by the MCMC: individual and class. Individual licenses are for situations where a high degree of regulatory control is deemed necessary. This is the case of infrastructure (*i.e.*, NFP) when there may be reasons to limit the number of licenses because of technical constraints (*e.g.*, scarce radio spectrum), to avoid duplication, to protect major investments or for national security considerations. See **Table 4-8** for a summary and comparison of the licensing framework in Malaysia under the old and new regimes.

VoIP

The MCMC set forth VoIP policy principle, which recognizes two ways to provide VoIP service:4

1. PC-to-PC based VoIP, which the MCMC also refers to as Internet telephony; and

2. Phone-to-phone through the Public Switched Telephone Network (PSTN), which involves multistage access dialing known as VoIP.

The Ministry of Energy Communications and Multimedia had issued a policy position that the provision of PC-to-PC based Internet telephony is not subject to licensing. However, the provision of phone-to-phone VoIP requires an Applications Service Provider (ASP) individual licence as stipulated in the Communications and Multimedia (Licensing) Regulations 2000.

WLANs

Given the technology-neutral approach of the CMA, the provision of WLAN activities do not require registration or application to the MCMC provided that the business (or the service provided) does not involve any of the following categories as defined by the Law:[5]

(a) Network Facilities Provider (NFP) activities (b) Network Services Provider (NSP) activities (c) Applications Services Provide (ASP) activities

Prospective providers of wireless hotspot Internet services which contract with a licensed Internet Access Service Provider (IASP) for access to the Internet do not require licensing under the CMA 1998. However, as this is not an Internet ASP (IASP) service, consumers would not be protected by any quality of service determinations as these providers would have to compete to provide the best service possible.

Practice Notes

- **Table 4-8: Licensing in Malaysia [4.5.3]**

6.5 ELEMENTS FOR AN EFFECTIVE REGULATOR

Fundamental elements must be addressed to create a successful regulatory authority. In particular, countries must establish a framework that creates an effective regulator, as well as determine the appropriate legal status of the regulator and the impact, if any, that the organization's legal standing has on its operations and functions. The legal status of the regulatory authority will depend on the country's political and legal systems.

Once the regulator's mandate and competencies have been established, it is important to determine the regulator's institutional design, as well as its relationship with the government, industry, and the public. The institutional design of the regulator will affect the structure of the regulator, including its leadership and management organization and its organizational and administrative structures. Additionally, the successful management of a regulator and the effective exercise of its functions will be affected by the administrative structure of the regulator, such as its staffing process and the ethical conduct of its staff. Overall, it is important that the organizational and institutional framework provides for some measure of regulator independence, transparency and accountability.

Practice Notes

- **Table 5-1: Aspects of Effectiveness [5.1]**

Reference Documents

- **Bahrain Telecommunications Law**

- Benchmarking Postal Regulator Effectiveness
- Botswana - Telecommunications Act 1996
- Estonian National Communications Board Annual Report, 2003
- Federal Communications Commission - Traits of an Independent Communications Regulator
- Honduras - Ley Marco del Sector de Telecomunicaciones
- Impending Growth of Indonesia's Market for ICT and its Regulatory Constraints
- Independent Communications Authority of South Africa Act 2000
- Leadership and the Independent Regulator
- Mexico - Reglamento Interior de la Secretaria de Comunicaciones y Transportes
- Organisation for Economic Co-operation and Development - Telecommunications Regulatory Institutional Structures and Responsibilities
- Tanzania - Communications Regulatory Authority Act 2003
- Uganda - Communications Act 1997
- Utility Regulators - The Independence Debate
- World Trade Organization - Reference Paper

6.5.1 ESTABLISHING AN EFFECTIVE REGULATOR

Independence is a critical attribute for a regulator to be effective. However, effectiveness has additional dimensions (see Figure 5-A). In a broad sense, an effective regulator is structurally and financially independent, but the real effectiveness of the regulator will lie in how it achieves successful functionality, ideally in an independent and autonomous manner.

On the one hand, in a structural sense, independence means guaranteeing that the regulator maintains an arms-length relationship with private industry and the other branches of the government.[1] On the other hand, successful functionality is achieved when the regulator establishes clear rules that will govern such matters as its mandate and functions, its funding, and the implementation of its authorities, and then is able to execute those rules fairly and in a timely fashion.

***Summary of aspects of an effective Regulator as discussed in this Chapter*:**

- Providing the regulator with a distinct legal mandate, free of ministerial control.
- Prescribing professional criteria for appointment.
- Involving both the executive and the legislative branches in the appointment process.
- Appointing regulators for fixed terms and protecting them from arbitrary removal.
- For a board or commission, staggering the terms of the members to ensure continuity within the top ranks of the agency.
- Exempting the agency from civil service salary and employment rules that make it difficult to attract and retain well-qualified staff, as well as to terminate poorly performing staff, as necessary where the civil service system and salaries do not seem to work.
- Providing the agency with a reliable and adequate source of funding.

Practice Notes

- Table 5-1: Aspects of Effectiveness [5.1]

6.5.1.1 STRUCTURAL INDEPENDENCE

A regulator can function in an effective manner in a given market within a range of organizational structures. As discussed more fully in Section 5.2, there are various institutional options for structuring a regulator. In some cases, although increasingly rare, the ministry may be responsible for regulating the sector. Alternatively, there may be a unit inside the ministry that acts in the capacity of a regulator. There may be a formal office outside a government ministry that serves as the regulator. Lastly, a regulator can be legally independent; that is, separate from the central governmental structure.

Pursuant to the World Trade Organization (WTO) Reference Paper that requires countries to establish a regulator separate from the operator, in recent years many countries have established a structurally independent regulator, which separates the function of regulating the telecommunication market from that of supplying services.[1] Governments have identified the need to clarify and separate the various functions of the state, as it often acts as: (i) owner/shareholder of enterprises (*i.e.*, incumbent providers of basic services); (ii) regulator (*e.g.*, enacting and enforcing the general rules); (iii) overseer of competition in the market; and (iv) protector of consumer interests.

Providing a regulator with structural independence will reduce the possibility of political or industry capture. When a regulatory body bows to external pressure from operators or other government entities, it often lacks independence and its decisions are neither objective nor transparent. For example, regulators with ties to state-owned incumbents may bar or delay the introduction of new technologies and services or fail to resolve interconnection disputes in order to protect the interests of incumbent operators. However, governments must also ensure that they do not create a situation whereby the regulator itself is effectively “captured” (meaning undue influence by politicians and/or dominant players) because a statute or regulation provides that the regulator is responsible for ensuring the health of the industry (including the incumbents), and as a result, the regulator is of the view that it must take actions protective of the incumbent operators. In addition, regulators are often forced to take certain “protective” actions because of exclusivity provisions imposed on them by government policy (*e.g.*, that the incumbent operator is granted exclusivity over part of the market for a certain number of years in order to prohibit the introduction of new entrants and/or new technologies that may threaten the incumbent’s market share – *e.g.*, VoIP).

These decisions can be detrimental in that they often limit competition that would benefit consumers and erode confidence in the regulator since the regulator is perceived as “captured” by the incumbent or other government entities. Ultimately, the mandate of the regulator should not be to ensure the viability of certain industry participants, but to protect consumer interests.

Although structural independence is an important element of an effective regulatory environment, it alone is not sufficient to ensure successful development of the sector. In order to be fully effective, a regulator also requires financial independence and functionality, as further discussed below.

6.5.1.2 FINANCIAL INDEPENDENCE

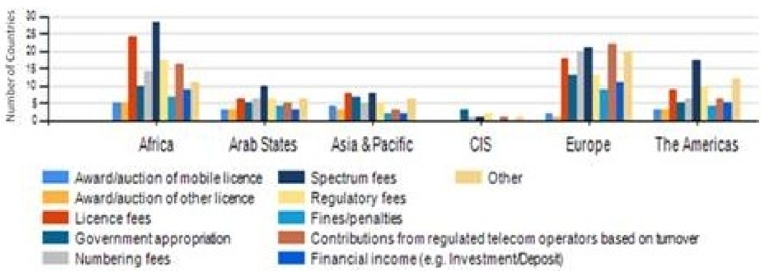
The funding sources and budgeting processes of regulatory authorities can have an important impact on their independence, efficiency and cost of regulation. The source of a regulatory authority's funds and the process by which these funds become part of the authority's actual budget can directly impact the degree of a regulator's autonomy and competence when carrying out its responsibilities.

The funding mechanism is critical to ensuring effectiveness of the regulatory function. While a regulator's budget may come from the government or from the telecommunications sector itself through licensing fees, spectrum fees, fines and other administrative charges, the key is that funding should be free from political and private interest influence.[1]

There are two primary vehicles used by countries to fund a regulator's budget. Although a country may use one or the other, funding for the regulator generally comes from some combination of the two sources. One source of funding is a formal allocation from the government's budget. The benefits of this approach can include promoting a greater role of the elected government in directing regulation, as well as establishing policies to support the overall economic goals of a country.[2]

A second approach is to allow the regulator to collect monies from the industry through fees and contributions.[3] Regulators may receive payments from operators for spectrum or licensing fees[4], penalties resulting from enforcement, or charges associated with administrative tasks such as providing numbering resources. Some countries assess special taxes on telecommunication operator revenues (in addition to income taxes imposed by the treasury), of which a portion is often earmarked for universal service purposes.[5]

The ITU's World Telecommunication Regulatory Database 2010 reveals that, for the most part, telecommunications regulatory authorities are funded through general government budget appropriations, licensing (usually one-time) fees, spectrum fees, regulatory fees (usually annual fees that can be based on a percentage of operator's turnover or revenues), or a combination of these sources. (See Figure 5-B.) Of the 192 countries that provided information on the breakdown of their regulatory authority's financing sources, only 28 indicated that the regulator relies on a single source of funding—over 85 per cent rely on some combination of funding sources.[6]



◀ **B: Sources of Funding for Regulators**

Source: ITU World Telecommunication Regulatory Database 2010

(i) Reliance on government appropriations

In certain countries, the regulator’s budget is part of the government appropriations allocated to the ministry under whose authority it resides. In Mexico, the Comisión Federal de Telecomunicaciones (COFETEL) is considered a “decentralized” division of Mexico’s Secretaría de Comunicaciones y Transportes (Communications and Transportation Secretariat - SCT) and even though it can make regulatory decisions independently of the SCT, it must do so within the budget assigned to it by the Secretariat.[7] Similarly, the Comisión Nacional de Telecomunicaciones (CONATEL) in Honduras – a “decentralized” division of the country's Ministry of Finance – proposes its annual budget to the Ministry of Finance, and the Ministry incorporates the proposal budget into its government appropriation proposal, which must be approved by the national congress.[8] In South Africa, the Independent Communications Authority of South Africa (ICASA) Act of 2000 specifies that the regulatory authority will be funded by a parliamentary appropriation. The same act also indicates that any revenues received by the regulatory authority – other than through the government appropriation – must be paid into the National Revenue Fund within 30 days of receipt.[9]

In these cases, the government's authority to determine the budget gives it a degree of direct influence and intervention, or at least the appearance of such, over the policies and regulations the agency may wish to implement, possibly reducing the agency's effectiveness in regulating its telecommunications sector. The regulator may also face uncertainty as it must rely on the commitment of the government toward the telecommunications sector in order to have the resources necessary to implement its policies and regulations. Lastly, governmental budget limitations may make relying on the government as the only source of funding problematic as the funding level may be inadequate or not released timely in order to meet increasing regulatory needs.

(ii) Use of multiple funding sources, but with little or no control of their budgets

Relying on multiple sources of funding rather than solely on government appropriations allows regulators to have more financial independence and can make them less subject to outside influences. However, having to surrender revenues to the government and having its budget approved by the government can act as a system of checks and balances that prevents a regulatory authority from over-spending and perhaps even over-charging the regulated entities, although this control may be seen as diminishing the regulator's ability to determine the funds it will require to implement the policies and programs needed by the telecommunications sectors.

The National Communications Board (SIDEAMET) of Estonia, which is supervised by the Ministry of Economic Affairs and Communications,**10** relies on a number of sources of funding (*e.g.* , licensing, numbering), but all revenues collected are deposited in a bank account under the name of the Ministry of Finance of the Republic of Estonia. The revenues are deposited into the state budget and it is the government that determines the appropriation to be received by SIDEAMET each year.**11**

(iii) Use of multiple funding sources and control of their budgets

The majority of telecommunications regulatory authorities have diverse sources of funding which provide some level of financial independence from the government. Although government budget appropriations are a staple in most regulatory budgets, increasingly regulators have developed other funding sources such as: administrative and service fees; numbering fees; authorization fees; fine and penalty fees; and revenues earned from auctions. A few regulators also look to generate funds by investing in property, leasing facilities, earning interest on local bank certificates and fixed deposit accounts, and obtaining loans and grants from multilateral organizations. Financial independence, coupled with the authority to manage and administer their own funds gives regulatory agencies more regulatory certainty so that they can assert more independence in regulating the telecommunications sector. Nonetheless, there should be rules that ensure such charges are not arbitrary, excessive or discriminatory.

In Brazil, the Agência Nacional de Telecomunicações (Anatel) has the Fundo de Fiscalização das Telecomunicações as its only financial resource . All revenues collected by Anatel must be deposited in this fund and it is from this fund that Anatel obtains its expenditures each year. Anatel receives revenues from several income sources, including: government appropriations; credit operations; concessions, permits, authorizations, and spectrum fees; fines and penalties; operating and inspection fees; donations, legacies, subventions and other resources assigned to the Agency; and fees, prices or fines from the sale or leasing of assets as well as publications, technical data and information.**12** The situation is similar in Nigeria as the Communications Act of 2003 requires that the Nigerian Communications Commission (NCC) “establish and maintain a fund from which all expenditures incurred by the Commission shall be defrayed.” The NCC receives its funds from government appropriations, licensing fees, spectrum fees, grants, loans, gifts, and aid.**13** The Uganda Communications Act of 1997 establishes that the Uganda Communications Commission (UCC) “shall operate its own bank account.”**14** However, the Commission must declare any surplus from its operations to the Minister of Finance.

The Telecommunications Regulatory Authority (TRA) in Bahrain, which has an independent budget, also has to declare and relinquish any surplus to the country's public treasury within one month after the accounts have been audited. It is only allowed to keep the surplus (or part of it) for future development projects after coordinating with the Ministry of Finance and National Economy and upon approval by the Council of Ministers.**15** The Tanzania Communications Regulatory Authority (TCRA) submits an estimated budget to the Minister responsible for Communications for approval. At the end of the fiscal year, the TCRA deposits “to a special account all surplus funds of the Authority”**16** and can use the funds from this special account only for “one or more of the following purposes: (a) consumer education or information projects; (b) special non-recurring projects; (c) budgeted capital expenditure; (d) major rate regulating inquiries; and (e) training, research and development.”**17**

Another example of a regulatory authority with financial independence is Botswana. The Botswana Telecommunications Authority (BTA) revenues derive mainly from the following sources: government appropriations; licensing fees; service fees; and contributions or endowments from any source. As the BTA has the authority to manage its own budget and can determine what to do with any surplus, the regulator has invested its monies in Bank of Botswana certificates, fixed deposit accounts, as well as in purchasing and leasing properties, thus diversifying its sources of funding to an even greater extent. Presently, BTA has a surplus that allows it to cover operating expenditures for the year, as well as the flexibility to evaluate its capital expenditure options in order to prioritize projects for the next two years.**18**

In the United States, the Federal Communications Commission (FCC) operates through a government allocation of funds. However, the FCC is required by Congress to collect regulatory fees to offset a portion of the annual allocation. In recent years, regulatory fees have represented about 90 per cent of the total annual budget. As such, the FCC’s operating budget relies very little on government allocation.

Reference Documents

- **Canada: New Telecommunications Fee Regulations**

6.5.1.3 FUNCTIONALITY

The mandate and competences of the regulatory authority as well as its relationship with government and other market players depend on the delegation of powers by the state. The degree of delegation of such powers is determined by the political tradition of the country and on the political will to create an independent and competent regulatory authority. These factors influence the specific responsibilities, authority, and accountability for the performance of the regulator’s specific activities.

Although complete “independence” is nearly impossible to attain, the regulator should have sufficient independence to implement regulations and policies without undue interference from interested parties such as politicians or other government agencies (functional independence). The institutional regulations put in place by laws and regulations as well as the administrative structure of the regulatory authority are critical to ensure such independence. The degree of independence differs considerably from country to country.

Checks and Balances/Balance of Power/Separation of Power

Independence does not mean that regulators should function in a vacuum, particularly in countries where the legal and judiciary infrastructure is weak. Independence must be balanced with clearly identified requirements for accountability, including strict procedural requirements, reporting mechanisms, public consultation, and substantive judicial review. Accountability involves establishing: (i) detailed policies and laws that set forth explicit objectives governing the regulator; (ii) specific requirements for reporting to the government or Parliament; (iii) procedural requirements; and (iv) the possibility of judicial review.

It is clear that even if independent, a regulator is still an administrative body of the government. Accordingly, its actions should be monitored so that it is accountable for its actions, and administrative measures must be in place to oversee the activities of the regulator.

When regulators are first established, there are inevitably strained relations between the regulator and the ministry that formerly performed the regulatory functions.[1] Relations between the regulator and the incumbent may also be strained as the incumbent experiences a policy change (normally associated with the formation of a formal regulator and the inception of its activities). In addition, when appeals are made to the court, the court is often examining new issues arising from new legislation about the powers of a new type of government agency. Thus, there is a learning process for all parties.

One mechanism for this oversight relates to the financing of the regulator. In many cases, the independent regulator's budget must be approved or endorsed by the government before the finalization of the national budget by the legislative body.

A related issue is the reporting mechanisms for independent regulators. There are three types of reporting mechanisms for independent regulators. As stated in the 2000 OECD Working Party Report,[2] the most popular mechanism requires the regulator to report to the ministry responsible for telecommunications policy. In some countries, such as Austria, Germany, and the United States, the independent regulator must report to the legislative body. The third model is exemplified in Canada, where the CRTC reports to Parliament through the Minister of Canadian Heritage.[3] There are a few countries, such as Belgium and France, which do not impose any statutory reporting obligation on the telecommunications regulator except for the publication of an annual report.

In most of these cases,[4] the reporting obligation is not very specific. Reporting in many OECD member countries occurs through a publication of an annual report that describes the regulator's activities. Some countries, however, impose very specific reporting obligations on the regulator. For example, in Australia, ACMA reports each year to the Minister of **Communications, Information Technology and the Arts** on significant matters relating to the "performance" of carriers and carriage service providers.[5]

As noted in Section 5.3, another key oversight relationship that influences the independence of the regulator relates to the way in which the head of the regulatory body is appointed and under what conditions he or she can be replaced.

In some cases, the decision-making body of the regulator is composed of commissioners who are appointed by different branches of the government (for instance, some of the commissioners are appointed by the head of the administrative body and the others by the legislative body).

In most OECD member countries, the head of the independent regulator is appointed by the minister responsible for the sector or the president based on the recommendation of the Cabinet or the minister. For example, in Germany, the president and two vice-presidents of the Federal Network Agency[6] are nominated by the federal government upon the proposal of the Advisory Council to the Federal Network Agency. Then, they are appointed by the President of Germany. The responsibilities of the president of the Federal Network Agency are stipulated in a contract between the Ministry of Economics and Technology and the president of Federal Network Agency. This contract is subject to approval by the federal government.[7]

Another important element relates to the enforcement of regulatory decisions. In the majority of countries, the independent regulator's decision cannot be overruled except through a court decision. In addition, in many countries, while the court can nullify the decisions of the independent regulator it cannot impose a new decision on the issue. However, there are countries, such as Canada, Hungary, and Mexico, which give the minister or the Cabinet power to make changes to the decisions of the independent regulator either based on appeals or on their own discretion. In Canada, nevertheless, appeals to the Cabinet must be conducted in a public manner and the power of Cabinet is generally limited to requiring the CRTC to reconsider the decision – this is the case with broadcasting. With regard to telecommunications matters, the Cabinet can directly change the decision, although this occurs rarely.

Relationships with Other Entities

The most common institutional structure used today is the establishment of an independent regulatory authority with responsibility for implementing and administering the regulatory framework, but policy-making responsibility resides with a particular ministry. (See Table 5-2.)

◂ Table 5-2: Regulatory Institutional Structure

Function	Responsible Organization
Policy development	Government, ministry or executive branch
Regulation	Separate regulatory authority
Network operation/service provision	Privately and/or commercially operated telecommunications operators

Within this structure, the division of regulatory tasks differs greatly. Currently, a highly fragmented and inconsistent pattern of regulatory responsibilities exist among countries for telecommunications, postal services, and broadcasting and media matters. In addition, telecommunications regulators can have sector-specific or multi-sectoral regulatory functions (for more detail on the institutional design of regulators, see Section 5.2). This can lead to an inconsistent pattern of the division of regulatory functions (*e.g.*, licensing, numbering, and spectrum management) between policy-makers and regulators around the world.

As stated in the 2000 OECD Working Party Paper on Institutional Structures and Responsibilities,[8] the ultimate objective of the administrative structure of regulation is not to have an independent regulatory body, but rather an effective regulatory framework. This framework and its implementation determine the ability of a country to achieve policy objectives such as making the market more competitive, stimulating technological diffusion and enhancing efficiency, and ensuring that consumers benefit from these developments.

The regulator is, in fact, a stakeholder in this process of market development. This makes transparent, practical cooperation and communication between the regulator and the policy-maker (as well as with other stakeholders) essential to ensuring that regulation is responsive to government policy decisions and the realities of the market.

Although functionally independent, the regulatory authority must maintain relationships with various other entities in order to ensure that each organization's duties and jurisdiction are clearly delineated, as well as to clarify how the organizations will cooperate where responsibilities overlap.

(a) Coordination with the Ministry in Charge of Communications and Other Ministries

Some countries require that the regulatory authority coordinate most closely with the ministry responsible for telecommunications.[9] Often the regulatory authority is required to support the minister and other relevant government bodies by preparing technical and strategic documents on its country's international positions for submission to various international fora. The regulatory authority can also propose the general policy for the telecommunications sector to ensure the expansion of telecommunications service offerings and the achievement of universal service objectives. In some cases, the regulator is required to prepare legal texts for the minister to submit to the Cabinet. Other countries require that the minister issue resolutions and regulations regarding, for example, interconnection, pricing and licensing. In some cases the regulator is even required to obtain approval from the minister for licences to be issued.

In addition to the ministry in charge of telecommunications, many regulatory authorities are required to coordinate and interact, from time to time, with various other entities and bodies, such as:

§ The prime minister

§ The ministry responsible for finance or economic affairs

§ The ministry responsible for commerce and industry

§ The ministry responsible for defense and other security entities

§ The ministry responsible for internal administration

§ The ministries responsible for information and broadcasting, media and content

§ The ministry responsible for transportation

§ The ministry responsible for justice

§ The ministry responsible for research and development

§ The ministry responsible for science and technology

§ The competition authority

§ The spectrum administrator

§ Municipalities

Many regulatory authorities are financially and administratively independent. However, in some cases, the annual budget and final accounts must be submitted to the ministry of finance for approval. In addition, some countries require an independent auditor to express an opinion on the final accounts of the regulatory authority to the Cabinet.

While the regulator generally is responsible for overseeing tariff policies, sometimes the basis for determining the service tariffs must be approved by the Cabinet after being evaluated by the ministry of telecommunications and the ministry of finance.

To issue radio licences for the purpose of the radio or television services, some regulatory authorities must obtain the approval of the minister of information or the ministry in charge of broadcasting, media, or content.

(b) Coordination with the Competition Authority

A key relationship within this context is the relationship between the telecommunications regulator and the competition authority. As the telecommunications market shifts from monopoly to competition-based, there has been increasing involvement of the competition authority in the telecommunications sector. In most countries, the telecommunications regulator is responsible for technical regulation (*e.g.*,spectrum allocation, number allocation, type approval, and standard setting) as well as telecommunications-specific economic and social regulation (*e.g.*,licensing, universal service, price regulation, the interconnection regime, and rights-of-way), whereas the competition authority is responsible for anti-competitive behaviour and mergers. In practice, however, there is some overlap between the telecommunications regulatory authority and the competition authorities and within that context, it is important to ensure concurrent jurisdiction and coordination (see Section 3.3) for more detail regarding the role of the competition authority).

(c) Coordination with the Broadcasting and Media/Content Authorities

In countries where telecommunications, broadcasting and/or media (i.e., content) are regulated by different entities, it is critical for clear channels of coordination to be established between the various authorities, particularly as the trend towards greater technological and service convergence continues. In particular, close coordination is necessary to enable the growth of IPTV, which may be hampered if there is conflict between the telecommunications and broadcasting regulatory authorities. In India, for example, the Ministry of Communications and Information Technology (MCIT) is tasked with telecommunications policy while the Ministry of Information and Broadcasting (MIB) monitors content related to television and radio broadcasting and film.10 In order to clarify the ministries' roles in licensing IPTV services, in August 2008, India's Union Council of Ministers of India approved IPTV guidelines that formally permit telecommunications operators to provide IPTV.11 Under the guidelines, the MIB allows any operator to offer IPTV, without further registration with the MIB, provided that the operator:

- Holds a unified access service and/or commercial mobile telecommunications service license duly licensed by Department of Telecommunications (DOT), which is a housed within the MCIT; no further registration with the MIB is necessary;
- Is an ISP with net worth of more than Rs. 100 Crores (USD 22 million) and having permission from the DOT to provide IPTV.

Although IPTV licensing of telecommunications operators and ISPs is under the purview of the MCIT, the MIB is responsible for licensing of cable TV operators. Under the guidelines, any licensed cable TV operator is permitted to provide IPTV services without any further permission. All IPTV providers—whether telecommunications operators, ISPs or cable TV operators—must submit a declaration prior to beginning IPTV services to the MIB, MCIT and TRAI that provides details regarding the proposed service areas, start date and network infrastructure information. Once operators begin providing IPTV services, the MIB has the authority to monitor and inspect the facilities, as well as to address content-related issues.

As India exemplifies, where various authorities are hold jurisdiction over telecommunications and broadcasting matters, high-level coordination (e.g., the Council of Ministers) and rules that set out each ministry's responsibilities are important—if not necessary—to ensuring that such converged services are available in the country in a timely and orderly fashion.

(d) Coordination with Non-government Entities

In addition to the various government entities that the regulator must coordinate with, the regulatory authority also is required to interact with users, consumer groups, telecommunications operators and service providers, and investors.

In addition, regulators frequently meet with other regulators either on a bilateral basis or in regional and other international fora (*e.g.*, CITEL, Regulatel, IRG, ERG, CEPT, APT, WATRA, TRASA, COMESA, ETSI, and ITU).

Best Practices in Building Effective Regulatory Institutions

As stated in the 2000 OECD Working Party Paper on Institutional Structures and Responsibilities, 12 the ultimate objective of the administrative structure of regulation is not to have an independent regulatory body, but rather an effective regulatory framework. This framework and its implementation determine the ability of a country to achieve policy objectives such as making the market more competitive, stimulating technological diffusion and enhancing efficiency, and ensuring that consumers benefit from these developments.

The regulator is, in fact, a stakeholder in this process of market development. This makes transparent, practical cooperation and communication between the regulator and the policy-maker (as well as with other stakeholders) essential to ensuring that regulation is responsive to government policy decisions and the realities of the market. At the 2009 Global Symposium of Regulators (GSR-09), the participating regulators established *Best Practices Guidelines for innovative regulatory approaches in a converged world to strengthen the foundation of a global Information Society*.13 A key part of these guidelines, related to building effective regulatory institutions, provides for the following best practices:

1. Regulatory authorities should be able to carry out their mandate efficiently, while ensuring consistency and transparency of regulation, equal treatment of market players and accountability of regulatory decisions.

2. Regulator authorities should be empowered with suitable tools to ensure enforcement of the various laws, by-laws, regulations and procedures.

3. The creation of a converged regulator in charge of ICTs and broadcasting could be an effective step towards enabling market integration in a converged environment. Should this not be feasible, closer coordination and collaboration between the sector-specific regulatory authorities in charge of telecom, broadcasting and electronic media, as well as authorities in charge of competition is essential.

4. A converged regulator will require skilled human resources and adequate financial resources in order to perform its extended mandate successfully.

5. Strategic and policy activities to build the information society and to play an inter-sectoral coordinating role should be integrated into the converged regulator's mandate.

6. Close collaboration with other concerned agencies is needed to ensure that appropriate measures and tools are put in place to safeguard Intellectual Property Rights (IPR), Internet safety covering such issues as the protection of the children online and fraudulent activities.

7. Monitoring and examination of the evolution of regulatory institutions should continue in order to develop effective, efficient regulation for the development of domestic markets and consumer welfare, as well as to share best practices

8. International cooperation is necessary between national and regional regulatory authorities in building a harmonized and coordinated approach to oversee the evolution of the converged markets.

6.5.2 INSITUTIONAL DESIGN OPTIONS

Governments have a range of options for regulating the telecommunications sector. When establishing a regulatory authority, governments must take into consideration the level of development and liberalization of the ICT sector, resources available within the country, as well as the historical context and the administrative and legal frameworks available for regulating the sector.

As competition increases, new regulatory priorities *(e.g.*, market entry regulation) emerge, and issues of regulatory autonomy gain prominence (with the separation of regulation and operation) and can affect the choice of structure for the telecommunications regulator.**1** The main issues relate to ensuring separation between regulation and operation (especially in the case where the historical operator was still under public ownership), guaranteeing an independent and long-term strategy for regulation and competition in the market and ensuring protection of regulation from short-term and sometimes personal political and economic pressures. The regulator also has to be insulated from undue influence by politicians, industry, legacy operators, and consumers. As a result, much emphasis has been placed on the need to create independent regulatory authorities for the telecommunications sector.

Today, a majority of countries have a national regulatory authority for telecommunications -- the ITU T-Reg website lists 131 countries with a "separate regulatory authority."**2** Although some of the agencies fall into what are generally called "converged"**3** regulatory authorities, the majority can still be described as focusing primarily on the telecommunications sector. Initial consensus often led to the establishment of a specific sector regulator, but the growing force of convergence has prompted a new and growing trend towards creating converged regulators. The justification is that a converged regulator is better suited to respond to new technologies and the interdependency of different communications services. Some countries have taken a different approach by including the regulation of the telecommunications sector in the mandate of a multi-sector utilities regulator, or by opting for an approach that veers away from sector-specific regulation and relies on the application of competition and antitrust rules to the communications sector.

In selecting the appropriate institutional structure, countries have various design options available from which to select, including economy-wide, infrastructure-wide, communication-wide or purely telecommunications-focused institutions. The choice depends in part on the extent to which the telecommunications sector is similar to (or different from) other sectors of the economy in a particular country and on the availability of suitably qualified staff. The greater the degree of openness and liberalization in the telecommunications sector, if matched by the other components of the utilities sector (*e.g.*, electricity, water), and the greater the similarity in developments among the sectors, the larger is the scope for the application of cross-sector rules that are applicable to competitive activities in general. A key question that ultimately drives the choice of institutional format is whether the regulatory framework strikes the right balance between recognizing the specificity of the telecommunications sector and promoting the coherence of regulatory decisions across sectors.**4**

As the telecommunications market becomes liberalized and more competitive, disputes among operators, and between users and operators, generally increase. The regulator needs to have the authority to effectively resolve disputes and establish procedures to adjudicate them, and sufficient manpower to oversee enforcement (for further details on dispute resolution, see Section 6.2). These factors impact government decisions regarding the mission statement and mandate of the regulator and in some cases influence the choice of institutional design, including internal administration and staffing.

Flexibility is also a key issue that must be considered in choosing among the institutional design options. Appropriate regulatory structures change over time as sectors evolve. The change depends on the nature of the issues at stake – in transport and telecommunications, for example, where monopolies previously considered "natural" are eroding, the mandate of regulators is likely to change more rapidly.

The choice of institutional design *per se* will not guarantee success of the regulator. Whatever the institutional design option chosen, several important principles should be kept in mind, including:

§ Regulators must be perceived by industry to be independent – thus the importance of transparency and accountability of the regulator;

§ Regulators should have the expertise to assess and make sound judgments on both technical and industry-specific issues – thus the importance of appropriate appointment and staffing mechanisms;

§ The regulator must take into account various viewpoints and interests, including economic, social and political objectives. This balance should be reflected in the institutional structure and in the system of checks and balances;

§ The institutional design, internal structure, and administration must be flexible enough to allow the regulator to adapt to market realities.

6.5.2.1 OVERVIEW AND COMPARISON OF DIFFERENT INSTITUTIONAL DESIGNS

There are four main institutional designs for telecommunications regulatory entities. First is the single-sector regulator whose sole function is to oversee the telecommunications sector (designated as Model 1 in this Section). The term "single-sector" is somewhat misleading as these entities, which in most cases originated from the separation of the operational and regulatory activities of state-owned post and telecommunications companies (PTTs), often include the postal and telecommunications industry as well as radiocommunications. The second design is known as the "converged" regulator, meaning those regulatory entities that oversee a broader range of services which, in addition to telecommunications, also include information and communications technologies and broadcasting (designated as Model 2 in this Section). The multi-sector regulatory authority (Model 3) usually encompasses various industry sectors that are considered public utilities, *e.g.*, telecommunications, water, electricity, and transportation. The fourth category is not a regulatory authority per se, but an approach in which general competition policy is the main method of overseeing the telecommunications sector (designated as Model 4 in this Section).

Characteristics of these models of institutional entities for telecommunications regulatory agencies are as follows.

Model 1 – Single sector regulators

This organizational structure focuses mainly on the telecommunications (and sometimes postal or information technology) sector, with other government entities responsible for broadcasting and content-related media issues. Many countries around the world still use the single-sector regulatory authority approach,**1** including Algeria (Regulatory Authority for Post and Telecommunications), the Comoros (National Society of Postal Services and Telecommunications), Jordan (Telecommunications Regulatory Commission, which includes postal oversight), Egypt (National Telecommunications Regulatory Authority), and Oman (Telecommunications Regulatory Authority).**2** The single-sector regulator also includes organizational structures where the ministry is a regulator, such as the Ministry of Internal Affairs and Communications in Japan.

Prior to liberalization it was common for a state-owned operator to be responsible for regulating the post and telecommunications industries as well as for radiocommunications issues, and in some cases, even serving as international representatives of their respective countries with regard to their operations. After liberalization, this structure was no longer possible under most countries' legislation.**3** Thus, the operation and regulation functions were separated and independent regulators were established. In many countries, when telecommunications regulators were initially established, they simply took over the "regulatory function" from government-owned PTTs and therefore their mandate almost automatically included the administration of radiocommunications and postal services in addition to telecommunications.

In Europe, once the PTTs were separated and privatized, the regulation of telecommunications, radio and the postal sector often was assigned to one agency.**4** Telecommunications regulators in Europe were established by combining certain units within the public administration (or from the state-owned operator) or by transferring employees or units from the ministry to the new organization. The units that were transferred often remained the same and were integrated into the structure of the new organization, which was based on fields of activity and communications technologies. Within this context, regulators in Europe were generally organized in a technology/field-oriented regulatory structure and emphasis was placed on the recruitment of technologically-oriented staff (*e.g.*, engineers).

A key advantage of a single-sector regulatory authority is that it can be focused on the complex technical challenges of the telecommunications sector, including network and service development. The telecommunications sector tends to be more dynamic than other utilities and a single-sector regulator can often adapt to this more easily. One disadvantage of sector-specific regulators is that sufficient resources may not be available to staff the different regulator agencies and there may be duplication for regulatory activities that are common to different industries.

A justification for a single-sector regulator is based on the perception that the telecommunications sector includes specific technical issues, such as numbering, that are unique to the telecommunications sector and exhibits specific characteristics that differentiate it from other industries. Decision-making within communications policy is based on the expertise of the regulators. As experts, they participate in drafting laws and act as advisors to the appropriate ministry or other authorities when necessary. Regulators require not only need expertise in the technical, financial, and legal aspects of communications, they also need to systematically analyse present and future developments, and be able to cooperate with other countries on sector issues at the international level. Therefore, it is vital that staff is sufficient in number and suitably qualified to be able to face such a task. The perceived need for a specialized skill-set led the Cape Verde Government to establish a separate ICT specific regulator in 2004 (Institute of Communications and Information Technology – ICTI) in parallel with and despite the existence of a multi-sector (economic) regulator (Autoridade de Regulamentação Economica – ARE) which also has a mandate to regulate telecommunications. Since becoming operational, ICTI has in practice undertaken both the technical and economic tasks in the ICT sector, with ARE focusing on the other sectors. This has been in part because ICTI has the staff and desire to review a wide range of telecommunications issues, including tariffs, that would normally be within the purview of ARE, and because the two institutions have come to an agreement allowing ICTI to take the lead role on telecommunications issues.**5**

Another advantage of single-sector regulators relates to the origin of their staffing. In many cases, single-sector regulators tend to inherit staff from the former PTT and therefore have a core of specialized professionals from the start with a thorough understanding of the technical issues and strong engineering skills, a key advantage when dealing with complex network issues. Opponents of the single-sector regulatory structure argue that the origin of this specific skill set is, in fact, one of the key disadvantages of establishing a single-sector regulator. These critics argue that staff could be biased in favour of the incumbent, and thus more subject to capture by dominant forces. While this is an issue to be considered, it is not unique to the single-sector regulator. Whatever the option chosen, there must be a series of "checks and balances" to ensure that the regulator can perform its mandate independently.

One major concern within the single-sector model is the possibility of institutional rigidity. Since a single-sector regulator is restricted to telecommunications, this type of structure can limit the effectiveness of the agency and its staff members as it faces the issues raised by convergence. Given that regulatory authority has historically focused on a narrow sector, the regulatory authority may become nearly frozen in time in terms of defining the sector it is regulating. As a consequence, it may not necessarily draw the appropriate staff from across the broader communications sector necessary to be flexible and, therefore, is unable to adapt to the continuous changes in the communications sector. A practical example of such difficulties has been the case of single-sector telecommunications regulators having difficulties when incorporating next generation technologies and services into the regulatory framework.

In recent years, and especially with convergence in the communications sector blurring the boundaries between industries, overlapping responsibilities between sectoral regulators has also become an issue, leading sometimes to duplication of regulations and required authorizations for what are essentially similar services being offered to the public. This can cause conflicting decisions across sectors, or indeed lack of decisions where overlap between mandates cannot be resolved on a political level. The challenges of convergence have led several countries, including South Africa and the United Kingdom, to move away from single-sector regulators and evolve towards a converged regulator, thus merging agencies in charge of the various aspects of the communications sector.

Model 2 – Converged regulator With a **converged institutional design**, all communications services (*i.e.*, telecommunications), including radiocommunications, broadcasting and media (and in some instances postal services), are under the umbrella of one agency.

Several countries have followed the route of converging their institutions dealing with the communications sector, typically combining formerly discrete agencies responsible for telecommunications, broadcasting or information technology into one entity:

§ In December 1999, the Info-Communications Development Authority of Singapore Act of 1999 disbanded the former telecommunications regulator (Telecommunications Authority of Singapore, TAS) and the information technology agency (National Computer Board, NCB), to create one new statutory board, the Infocomm Development Authority (IDA).6

§ The Independent Communications Authority of South Africa (ICASA) is the regulator of telecommunications and the broadcasting sectors. It was established in July 2000 as a result of the Independent Communications Authority of South Africa Act No.13 of 2000. It took over the functions of two previous regulators, the South African Telecommunications Regulatory Authority (SATRA) and the Independent Broadcasting Authority (IBA).

§ In 2001, the Saudi Arabian Council of Ministers issued a decision changing the name of the Saudi Communications Commission to the Communications and Information Technology Commission in light of new tasks it assumed in information technology.

§ Finland established a converged regulator, the Finnish Communications Regulatory Authority (FICORA) in 2001, which took over the responsibilities of the Telecommunications Administration Centre. In addition to telecommunications-related issues, FICORA is tasked with collecting television and license fees, issuing licenses for short-term television and radio broadcasting, monitoring the content of TV and radio programs and advertisements, as well as monitoring the level and quality of general postal services.7 FICORA also centrally administers radio frequencies.

§ In 1997, Italy created a single regulatory body—Communications Regulatory Authority (Agcom)—with responsibility for all telecommunications and broadcasting matters. Austria also established such a regulatory authority in 2001.

§ A similar approach was also taken by the United Kingdom. The Office of Communications (Ofcom) was established in the United Kingdom in December 2003 as a result of the Communications Act 20008 and became the regulator for television, radio, and telecommunications. Ofcom combines five former agencies: the Broadcasting Standards Commission (BSC), the Independent Television Commission (ITC), the Office of Telecommunications (Oftel), the Radiocommunications Agency (RA), and the Radio Authority.

§ In February 2008, the Korean Government merged the Ministry of Information and Communication (MIC) and the Korean Broadcasting Commission (KBC) to create the converged Korea Communications Commission (KCC), which has jurisdiction over both television and telecommunications-related matters.

§ Even the European Commission's Information Society Directorate was granted new responsibilities for audiovisual and media policies. The new Information Society and Media Directorate General brings together all three aspects of modern day electronic communications: broadcasting; computer networks; and electronic communication services.9

Like the single-sector telecommunications regulator, the converged communications regulator tends to be strong in specialized engineering skills in the communications sector, which is an important core expertise in dealing with complex network issues. In addition, the converged communications regulator also meets the challenges posed by service convergence by bringing in related skills, and therefore overcomes what is generally viewed as being one of the main disadvantages of a single-sector regulator (*e.g.*, a telecommunications regulator overly focused on the telecommunications sector).

This model also better meets the need for flexibility in terms of its internal administration's ability to meet market realities. It gives the regulatory authority and its staff the flexibility to better handle the continuous technological and regulatory changes and developments within the ICT sector. By having all services – which are increasingly provided over a single network – under one regulator, the staff responsible for specific services can work with other parts of the regulator that are dealing with related issues, and therefore the regulator can take a more consistent approach when considering changing technologies and their effect on legacy regulations.

In addition, the converged model tends to resolve some of the overlap between telecommunications and broadcasting that has tended to become one of the regulatory issues regarding convergence. As was clearly shown in the EU's 1997 Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors,10and in its "99 Review,"11 convergence in communications has called into question the service-based vertical regulatory system, with industry increasingly demanding a reorganization of the regulatory institutions in order to address the challenges posed by convergence.

As further stated by David Currie: 12

Ofcom believes that convergence is a reality and that a converged regulator is best placed to nurse that convergence. When the Internet can deliver what looks to all intents and purposes like television broadcasting in a few years' time, then Ofcom and the Government will face awkward choices. Should, in the interests of fairness, the content regulation of terrestrial, cable and satellite broadcasting be rolled out to Internet broadcasters? Or should the content regulation of terrestrial, cable and satellite broadcasters be significantly rolled back, passing the baton to smart navigational devices that allow people to find the content that they want (subject to the law) and avoid the content that they do not want to see or hear? A converged regulator like Ofcom will I hope be able to bring wisdom to that debate.

Model 3 – Multi-sector regulator

Multi-sector regulators oversee not only the telecommunications sector, but other industry sectors with common economic and legal characteristics (*e.g.*, telecommunications, water, energy, and transportation). Costa Rica, the Gambia, Jamaica, Latvia, Luxembourg, Niger and Panama, as well as state public utility commissions in individual states in the United States, have chosen this type of organizational structure.13

The advantages and disadvantages of multi-sector regulators have been discussed in various fora, and opinions vary. One of the main arguments generally raised in favour of a multi-sector regulator is based on the perceived lack of resources and the need for economies of scale to effectively regulate the different infrastructure industries and sectors. It is often argued that with this type of structural organization, one set of staff can be used to oversee a variety of industries. The rationale is that telecommunications is considered to form part of the overall infrastructure sector along with other utilities, such as electricity and water, and that infrastructure services share certain aspects: they are aimed at providing basic needs to the public; they often use similar rights-of-way; and they typically involve the economic regulation of large monopolies with network economic characteristics (*i.e.*, high sunk and fixed costs). However, experience in some countries, such as Latvia, has shown that existing multi-sector regulators are performing poorly.

The answer to the staffing question is straightforward on the one hand and more complex on the other. Looking at the question in the strictest sense, single-sector regulators will look for highly technical staff focused on the telecommunications sector and generally organize their staff in industry-based units (*e.g.*, post, telecommunications, radiocommunications). Converged regulators will look for staff that can bring in the expertise and know-how from the different sectors they are regulating. Generally these regulators are organized in functional units or indeed in horizontal, project-based units. Multi-sector regulators will recruit staff specialized in the different sectors, and are generally organized in terms of the sectors within their mandate although some pool legal and economic resources to deal with, for example, tariffing issues that may be common across the different sectors.

An important question within this context, however, is to what extent staff can actually be used across the sectors. Often, staff members within this model are generally recruited in terms of the sector they are regulating and only legal and occasionally economic staff is pooled to deal with specific issues that occur across the sectors. Luxembourg, for example, has organized its agency according to industries/services: telecommunications, electricity, gas, postal and spectrum management issues – these are then divided into smaller issue-specific units.**14** This can also be seen in Belize and Niger. An interesting discussion of this issue vis-à-vis state-level PUCs in the United States is presented in the WDR Discussion Paper # 0204 of March 2002, which claims that:

*Examination of the actual organization of U.S. state-level multi-sector regulatory agencies, the Public Utility Commissions (PUCs), does not provide much evidence of economies of regulation, except at the level of the decision-makers, or Commissioners. Generally, staff members specialize in a particular sector such as telecommunications or water and work within distinct divisions that are devoted to sector-specific regulation. Resources are shared at the levels of commissioners, who hear cases pertaining to all sectors, the senior staff who manage the agency as a whole, and the legal staff responsible for hearings and related procedural matters. Generally, the different divisions are located in common facilities and use common amenities such as libraries, which may yield certain savings. … It must also be noted that U.S. PUCs do not have jurisdiction over frequency management, cable and broadcasting. … The U.S. PUC experience shows that there may be significant economies in areas such as use of buildings, libraries, and training facilities in common. This does not, however, justify multi-sector regulation as such, only close collaboration among sectoral regulatory agencies.***15**

It is also often the case that a multi-sector regulatory authority is not created from scratch, but is the result of merging several existing agencies. In most countries it is not possible to dismiss employees in the course of such a merger, negating the realization of the hoped-for economies of regulation. In addition, a merger of two going concerns often creates significant morale problems and results in increased expenditures.**16**

Another disadvantage of this model is that often the telecommunications sector is the most liberalized sector under the auspices of the multi-sector regulator and therefore can be negatively affected if the telecommunications regulator is merged with other more highly regulated and less agile industries. Indeed, it may make matters worse by having telecommunications regulated in an environment with utilities that are progressing at a different pace where the needs and priorities are different, or where resources are practically non-existent. Moreover, by adding sectors, such as electricity and gas, that do not always produce revenues for the regulator, the telecommunications sector may bear a disproportionate share of the costs of regulation, potentially driving up regulatory costs for telecommunications providers.

Supporters of this model argue that having a multi-sector regulator can reduce political and other influences regarding the decision-making process as opposed to, for example, the single-sector regulator. Despite such claims concerning "capture" (meaning undue influence by politicians and/or dominant players), this does not necessarily seem linked to the institutional design option *per se* but is more a product of whether a clear set of "checks and balances" is incorporated in the design of the regulator. Indeed, a risk of the multi-sector regulator could even be that "capture" by a dominant ministry or entity not only affects a single sector but all sectors regulated by the multi-sector regulator. In addition, there may be greater complexity in establishing the legal framework for the multi-sector regulator, including the level of independence and allocation of functions as between the minister and the regulator.**17** Furthermore, potential delays in instituting necessary reforms may result due to the disadvantages mentioned above.

Some argue that using cross-sector institutions to regulate telecommunications is justified in light of the growing convergence between telecommunications and other sectors. Ensuring that cross-sector rules and institutions are used to regulate telecommunications as well as other similar (utility) sectors may bring benefits, such as greater regulatory certainty (as operators may better forecast what to expect by observing how the regulatory framework is applied in other sectors) and lower risks of distortion between different activities. A counterargument is that the rationale behind establishing a multi-sector regulator is more a question of regulatory efficiency than of dealing with convergence in the communications sector. Even within this model it really depends on the mandate of the multi-sector regulator (*i.e.*, whether it deals with just telecommunications or with communications as well as water, electricity, and transport) to determine whether a utilities-based regulator has the staff and internal administration that allows it to effectively cope with the challenges posed by ICT convergence.

As the market develops, and convergence affects the way in which communications is offered to the people, regulators not only are expected to possess high technical expertise, but to have an understanding of the structure and development trends of the communications market. Furthermore, regulators should be able to anticipate potential situations that could threaten or interfere with the development of the electronic communications industry. The concern that staff in a single-sector telecommunications regulator may face difficulties when incorporating next generation technologies and services into the regulatory framework is heightened with a multi-sector regulator since the staff of a multi-sector regulator would not necessarily be as technically focused on the communications sector. Obviously, a multi-sector regulator could recruit staff suited to the task of regulating the communications market, but the risk, especially where economists and legal experts are shared across the utilities sector, is that the pool of expertise becomes more diluted, thus compromising the capability and ultimately the credibility of the regulator.

A clear discussion of the advantages and disadvantages of multi-sector regulators is presented by Schwartz and Satola in the Table 5-3.**18**

Table 5-3: Model 3 – Multi-Sector Regulator

Advantages	Disadvantages
▪ May reduce risk of "industry capture" because the creation of a regulator with responsibility for more than one sector can help avoid the rule-making process being captured by industry-specific interest groups ▪ May reduce risk of “political capture” because a regulator with responsibility for more than one sector will necessarily be more independent of the relevant line Ministries, and, in addition, the broader range of entities regulated by such a regulator will be more likely to resist political interference in a decision on, say, price regulation in one sector since that could set a precedent for other sectors ▪ May create more precedents, and therefore less uncertainty for investors because a decision by an MSR in relation to one sector on a regulatory issue common to other sectors will set a precedent that is valuable to potential investors in those other sectors ▪ May achieve economies of scale in the use of one set of high caliber professionals	▪ May increase risk of “industry capture” by a dominant industry player not only of the single sector regulator but of the entire MSR body ▪ May increase “political capture” by a dominant ministry of not only the single sector regulator but of the entire MSR body ▪ May increase risk that a precedent set in relation to one sector could be applied inappropriately in another sector (although this can also be mitigated by creating strong sector-specific departments underneath a central cross-sectoral decision-making body) ▪ May have a dilution of sector-specific technical expertise required where, for example, the skills of a tariff expert for one sector are not transferrable to similar tariffing issues in another sector

Model 4 – No specific telecommunications regulatory authority

An alternative approach is to rely on the application of competition and antitrust rules rather than on detailed sector-specific rules and institutional designs. Until the passage of the Telecommunications Act of 2001, New Zealand, for example, had chosen to entrust antitrust authorities with the task of administering all rules controlling market power in telecommunications.[19] There was no sector-specific regulatory requirement except for special obligations on Telecom New Zealand, called the Kiwi Share Obligations, which effectively regulated the price and availability of residential telephone service. Instead of sector-specific regulation, the regulatory regime for telecommunications in New Zealand relied primarily upon general competition law, the Commerce Act 1986, to prevent anticompetitive behaviour. Thus, the primary constraint on the conduct of telecommunications firms in New Zealand was the same competition law that applied to all economic enterprises in New Zealand.[20]

However, in late 2000, the Minister of Communications determined that New Zealand’s reliance on the Commerce Act and general competition authority was inadequate in some respects to regulate the telecommunications sector.[21] As a result, the Telecommunications Act 2001, which contained sector-specific provisions, was passed in December 2001 to complement the generic competition provisions of the Commerce Act. Furthermore, the position of a Telecommunications Commissioner, a specialist stand-alone commissioner within the Commerce Commission, was established, *inter alia*, to regulate the telecommunications sector, and in particular to resolve disputes over regulated services, to report to the Minister on further designations or specifications of additional services, and to monitor and enforce the Kiwi Share obligations.[22] Additionally, the Telecommunications Commissioner has statutory responsibility for decisions made under the Telecommunications Act.

Advantages	Disadvantages
▪ Simple to implement. ▪ Inexpensive. ▪ Reliance on economy-wide rules and institutions to regulate the sector promotes a coherent treatment between telecommunications and other sectors. ▪ Less risk of political capture where the judges are ultimately in charge of enforcing economic regulation in the telecommunications. Judges are seen to enjoy a clearer and more straight-forward protection against undue pressures from the government and are independent from industry.	▪ Non-specialized judges are ill-equipped to deal with complex telecommunications regulatory issues (*e.g.*, local interconnection cases in New Zealand).23 ▪ Legal processes are often not designed to give a voice to those who are not directly parties to the dispute. ▪ Costs of protracted litigation and regulatory mistakes can be very high. ▪ Sector-specific issues such as interconnection and number portability may be difficult to resolve in the absence of sector-specific requirements. ▪ Lack of clear accountability channels renders it unnecessary to set and achieve sector objectives such as universal service, thereby opening the door for ineffective or sometimes unnecessary regulation. ▪ There is no actual functioning example of this model.

◂ Table 5-4: Model 4 – No Specific Telecommunications Regulatory Authority

6.5.2.2 OVERVIEW AND COMPARISON OF DIFFERENT ORGANIZATIONAL AND ADMINISTRATIVE STRUCTURES

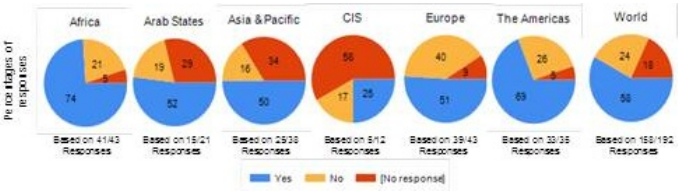
Organizational Structures

Determining the ideal organizational structure for a regulatory authority requires an assessment of various factors including: the country's needs and objectives; political environment; legal requirements; and available expertise in the labor market.1 There are essentially two models of leadership organization for regulatory authorities: (i) the collegial body (a board or commission composed of multiple members); and (ii) the single regulator (often given the title of chairperson or president). Each has its advantages and disadvantages, and variations of each model are in use around the world.

The collegial body model usually involves a board or commission made up of individuals with different areas of expertise, potentially bringing those varied perspectives to bear on each regulatory issue. In addition, a collegial body could be seen as more independent, as it is less likely that all members would be influenced by the same actors, whether in the government or the private sector. Collegial bodies also often impart a sense of legitimacy in decision-making, as it is less likely that a single individual was responsible for any particular decision. However, as in any decision-making process involving more than one actor, the development of regulatory decisions can be a slower process and more subject to internal struggle.

By comparison, the single regulator model has the potential benefit of a consistent approach to regulation and decision-making, as decision-making authority is vested in a single individual who may have a unified plan for the telecommunications sector. In contrast to the collegial body model, single regulators can make decisions much more quickly, even when constrained by due process regulations. However, the single regulator is also potentially more vulnerable to undue influence exerted by external actors, whether in the government or in the private sector. In addition, a single individual may not be able to match the expertise of a collegial body made up of individuals from different backgrounds, although experienced staff can provide substantial expertise.

The number of regulators led by collegial bodies and single regulators continues to fluctuate as governments restructure their regulatory frameworks for telecommunications. However, based on responses received by the ITU to its annual Telecommunications Regulatory Survey in 2010, approximately 58 per cent of the regulators worldwide are collegial bodies.2 Based on 2010 data,3 it can be seen that there are significant differences between the balance of collegial bodies in various regions, ranging 25 per cent in the CIS region to 74 per cent in Africa. (See Figure 5-C.)4



◂ Figure 5- C: Collegial Body Regulators around the World

Source: ITU World Telecommunication Regulatory Database, 2010

Management Structure

(a) Regulatory authorities headed by a collegial body

Nearly 60 per cent of the 158 countries that submitted responses to the 2010 ITU survey indicated that their regulatory agencies are collegial bodies.5 These multi-member commissions or boards of directors are composed of a varying number of members (usually an odd number from three to seven to minimize tie votes) that oversee and direct all activities of the regulator. One member is the chairperson or president of the commission/board and sometimes has a "casting" or deliberative vote that counts twice and acts as a tie-breaking vote, if necessary.

Depending on the appointment process of the regulator, collegial body members can be appointed by one single branch of government, multiple branches of government and/or other industry stakeholders. This issue is further discussed in Section 5.3 on Staffing and Remuneration.

Management and administrative functions

The day-to-day management and administrative functions of the regulator are handled in varying combinations by: an executive director, chief executive officer (CEO), the chairperson, and/or managing director (collectively referred to herein as managing director). In some countries, like Botswana, Brazil, Canada, Greece, Ireland, Jordan, Malaysia, Mexico, Portugal, South Africa, and Venezuela, the managing director of the regulatory authority is the chairperson of the commission/board.6

The managing director acts as a liaison between the commission or board of directors and the departments/divisions that comprise the regulatory authority. In the Dominican Republic, the managing director is part of the board and acts as its secretary, but does not vote.7 In Peru, the managing director of the Organismo Supervisor de la Inversión Privada en Telecomunicaciones (OSIPTEL) participates in the board of directors' meeting sessions, but essentially acts as an observer and cannot vote.8

The duties and responsibilities of the managing director differ from country to country. In Bahrain, the general director not only handles the day-to-day affairs of the regulator, but also determines the internal structure and organization of the agency, and has authority to: delegate his functions to other agency staff; employ staff members and consultants; and establish conditions of employment for staff members (this last one with approval from the board).9 In Peru, OSIPTEL's managing director is responsible for managing the regulator and carrying out the policies established by the board of directors and president of the regulator. In addition, the managing director is responsible for: the legal, administrative and judicial representation of the regulator; proposing policies and strategies for the development of OSIPTEL; developing the annual report and the regulator 's budget for approval; and hiring, promoting, suspending and firing staff members (decisions regarding management staff members need approval from the board of directors and president of OSIPTEL).10

(b) Single individual structure

Single individual regulators are headed by a CEO, president or director general (collectively referred to herein as CEO) who oversees all policy, management, and administrative activities of the regulatory authority. In most cases, the CEO is appointed by the central government, often the minister responsible for communications. The term of office is fixed and generally varies from two to six years. However, in certain countries, including Estonia, Ethiopia, Liechtenstein and Norway, the CEO does not have a specific term of office.11

The duties and responsibilities of the CEO differ from country to country, but they are generally granted a broad scope of authority and responsibility. In Romania, the president of the National Authority for Management and Regulation in Communications (ANCOM) has a broad slate of responsibilities including approving ANCOM's strategies, activity plans, investment plans and internal regulations, issuing decisions, approving the regulator 's organizational structure, including the powers of the two vice-presidents, and representing ANCOM in its relations with the Parliament, Government, ministries and other public authorities and organizations.12 In Guatemala, the Superintendencia de Telecomunicaciones (SIT) is headed by a superintendent who is responsible for managing and defining SIT policies, developing the regulator's organizational structure, appointing and removing SIT employees, preparing its annual budget, and informing (at least twice a year) the Ministry of Communications, Transportation and Public Works of the regulator 's activities and internal administration issues.13

The CEO is typically assisted by one or more deputies to whom he can delegate responsibilities. For example, in Romania, the law sets out that the president of the ANCOM is to be assisted by two vice-presidents.14 Similarly, in Denmark, the director general of the National IT and Telecom Agency is assisted by two deputy director generals.15

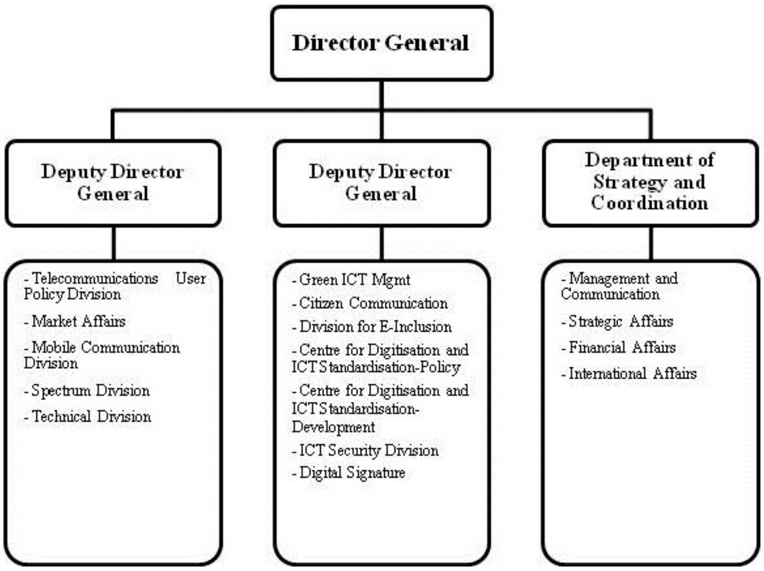
Administrative Structure regarding Functions of Regulatory Authorities

Once the scope of work and type of management structure is established, a country must determine how the functions of the regulatory authority will be organized (*e.g.*, whether by industry/service, function or project).

(a) Industry or service-based departments

Many regulators follow a vertical (all regulatory issues) structure comprised of departments that address specific services areas (*e.g.*, broadcasting, telecommunications, and information technology) under the authority of the regulator, as well as departments typically responsible for operations and administrative functions.16

Denmark's National IT and Telecom Agency, a converged regulator, is divided into 12 divisions : (1) Telecommunications User Policy; (2) Market Affairs; (3) Mobile Communications; (4) Spectrum; (5) Technical; (6) Green ICT Management and Green ICT; (7Citizen Communications; (8) E-Inclusion; (9) Digitisation and ICT Standardisation—Policy; (10) Digitisation and ICT Standardisation—Development; (11) ICT Security; (12) Centre for Digital Signature . In addition, the Department of Strategy and Coordination addresses management and communication; strategic affairs; financial affairs and international affairs.17 Figure 5-D below shows the organizational chart for Denmark's National IT and Telecom Agency.



◂ **Figure 5- D: Denmark National IT and Telecom Agency Organizational Chart**

Source:
http://en.itst.dk/about/organisation-1/organisation-diagram

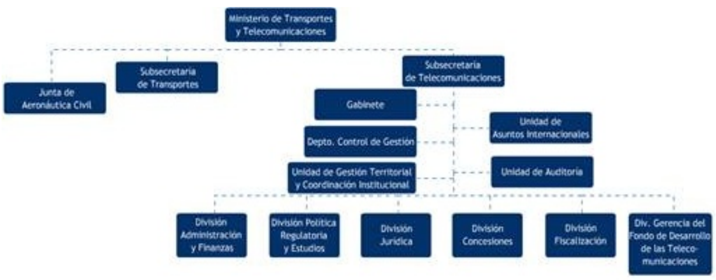
In the case of Luxembourg, which has a multi-sector regulator, departments/divisions are responsible for the following sectors: electronic communications, spectrum management, transport and distribution of electricity and natural gas, postal and railway . Each of these departments/divisions is divided into smaller issue-specific units.18

(b) Function-based departments/divisions

These regulators follow a horizontal (narrow range of regulatory issues) structure, but they cover all the specific service sectors that are regulated. Function-based departments/divisions have responsibility for areas such as: administration and human resources; enforcement; legal analysis; licensing; public relations; technical analysis and development; research and market analysis; user/customer services; and universal service fund administration.

For example, Chile's Subsecretaria de Telecomunicaciones (SUBTEL) is divided into seven function-based divisions: Administration and Finance; Regulatory Policy and Market Analysis; Legal; Concessions; Enforcement; Universal Access to the Information Society; as well as a division for Strategic Planning, Management Control and Technological Policy. Each of these divisions is subdivided into units that are responsible for more specific topics. The Administration and Finance Division, for instance, is subdivided into five units that are responsible for finance, human resources, procurement, documentation, and a unit that handles information (including claims and suggestions). The Regulatory Policy and Market Analysis Division of SUBTEL is subdivided into three units, one for spectrum engineering and administration, one for economic regulation, and one for strategic studies.19

Malaysia's Communications & Multimedia Commission (MCMC), a converged regulator, is also divided into function-based divisions. They include: Industry Development; Regulatory State Coordination; Technical; Resource Planning & Management; Monitoring & Enforcement; and Management & Support Services. Similar to the Chilean model, each of these divisions is then subdivided into topic-specific units. The Regulatory State Coordination Division is subdivided into two departments, one for regulatory coordination (which includes units for licensing and for universal service provision) and the other for state coordination (which includes a unit to manage regional office matters).20 Figure 5-E below identifies the organizational chart for Chile's SUBTEL showing how this regulator has divided responsibilities by function:



◂ **Figure 5- E: SUBTEL Organizational Chart**

Source:
http://www.subtel.gob.cl/transparencia/organigrama/websubtel/organigrama.htm

Some regulators combine aspects of the industry/service and function-based structure models. The Canadian Radio-television and Telecommunications Commission (CRTC) divides the Commission's responsibilities into the following departments/divisions: Broadcasting; Telecommunications; General Counsel; Legal; Strategic Communications and Parliamentary Affairs; Policy Development and Research; and Compliance and Enforcement.21 The SIT of Guatemala distributes responsibilities among three main departments/divisions:

telecommunications; administrative; and legal.22 Figure 5-F provides a diagram of Canada's CRTC showing how a regulatory authority can combine both industry/service and function-based departments/divisions within its organizational structure.

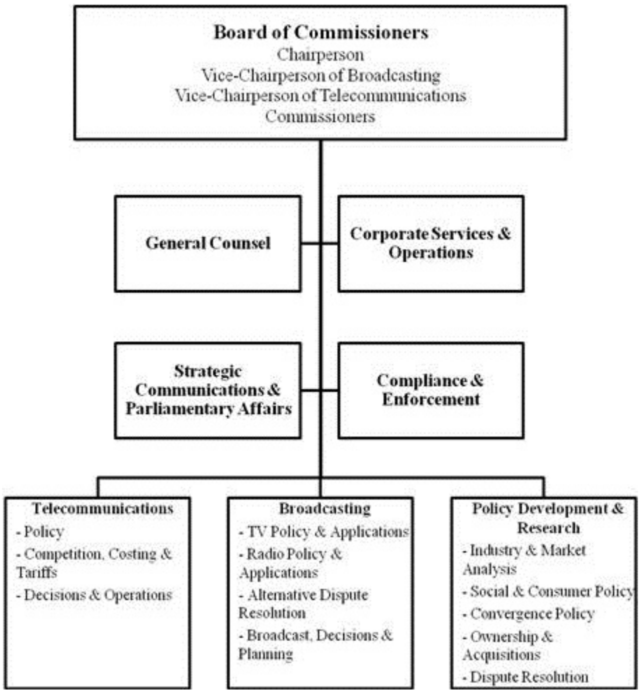


Figure 5-F: CRTC Organizational Chart

Source: http://www.crtc.gc.ca/eng/about/org1.htm

(c) Project-based departments/divisions

These regulators can be organized as either industry/service-based or function-based departments/divisions, but they have a horizontal structure because departments/divisions collaborate when a project needs the support and expertise of various competencies.23 Morocco's Agence Nationale de Réglementation des Télécommunications (ANRT) is a function-based regulator divided into departments/divisions that deal with technical, administrative and operator issues, but has as a horizontal structure because staff members from units within these different departments/divisions are, as a matter of course, brought together to work on projects that require varied skills.24 The Malta Communications Authority (MCA) also utilizes a matrix organizational structure that allows the regulator "to adapt to change and maximize its expertise by shifting emphasis from a functional to a project-based approach."25 Figure 5-G shows a diagram of Malta's MCA, showing how this function-based regulatory authority uses a horizontal structure.

Figure 5-G: Malta Communications Authority Organizational Structure

Source: **http://www.mca.org.mt/aboutmca**

However, it should be pointed out that regardless of the departmental/division structure of the regulators, it is often the case that multiple departments and subunits will work together to accommodate the evolving needs of the telecommunications market, as well as facilitate and expedite internal procedures.

6.5.3 ADMINISTRATIVE STRUCTURES: STAFFING AND RENUMERATION

The administrative structure of the regulator, including staffing processes, the legal status of the staff, remuneration principles, and the ability to contract outside consultants provide key insights into the independence, depth of knowledge, and impartiality of the regulator, as well as its ability to attract and retain qualified personnel. By examining a regulator's qualifications (for both leadership and staff positions), we can discern the types of expertise present among the regulatory leadership and staff, while the appointment and removal processes for regulatory authority leaders can provide an indication of the influence over the regulator wielded by other government agencies. The legal status of the regulator's staff is an important indicator of the protections afforded to the staff, particularly regarding liability for the decisions made by the regulator, as protection from liability is an important consideration for current and potential staff members. Analysis of remuneration principles for both leadership and staff positions provides insight into multiple issues, including the status afforded to the leadership and staff as compared to other government employees and the flexibility afforded to the regulator to offer salaries that will attract and retain qualified personnel. The ability of regulators to contract outside experts is another important enhancement to the regulator's ability to act independently and efficiently, providing the potential for impartial analysis, enhancement of capacity that is lacking within the regulator, and solicitation of advice from concerned stakeholders.

6.5.3.1 STAFFING PROCESS (STAFF RETENTION AND RESOURCE DEVELOPMENT)

Qualification Requirements for Heads of Regulatory Authorities

Most regulatory authorities are empowered by laws or regulations that provide some guidance as to the qualifications of the single regulator or collegial body members. Such qualifications vary, ranging from specific disciplines for collegial body members from various backgrounds to general requirements for relevant expertise. For example, under Bulgaria's Electronic Communications Law promulgated in 2007, members of the five-member Communications Regulation Commission (CRC) must be Bulgarian nationals with professional qualification in the field of communications, information technologies, media, economics and/or law.[1]

Qualifications for members of TRAI in India are similar to Bulgaria's current requirements—members of the TRAI must have special knowledge of or professional experience in telecommunications, industry, finance, accountancy, law, management or consumer affairs.[2] However, Indian law also requires that members appointed from within the Government previously must have held a high position in the Government.[3]

By requiring regulators or collegial body members to have experience in certain professional sectors, an effort is being made to ensure that the regulatory authority is led by individuals with expertise beyond simply telecommunications. Regulators face issues involving questions of law, finance, economics, trade, consumer affairs and security, in addition to telecommunications; thus, it is important that such expertise be reflected not only among the regulatory staff, but also among the regulator 's leadership.

The difference between, for example, the former Bulgarian and current Bulgarian and Indian approaches is that Bulgaria's former membership of the CRC always included at least one lawyer and one economist. One potential downside to this approach is that some countries may find it difficult to find appropriately qualified candidates for the specifically mandated positions. If, for example, the authorizing law requires the presence of an economist and a qualified economist is not available, there would be a vacancy among the regulatory authority leadership. This vacancy might not only manifest itself in a lack of economic expertise, but could also complicate decision-making by a collegial body that is a member short of its intended size and/or which lacks a tie-breaking vote. On the other hand, while the balance of areas of expertise among the members of Bulgaria's current CRC and India's TRAI may fluctuate over time and lack certain areas of expertise depending on the composition of the regulatory authority leadership, it also provides for the flexibility to emphasize differing areas of expertise among the regulatory leadership as the government, as well as market conditions and other factors, influence regulatory priorities.

In addition to mandating specific areas of expertise that the regulator must reflect and setting general expertise qualifications, a third approach to determining regulatory authority or collegial body qualifications is to avoid specifying *any* requirements regarding expertise (*e.g.*, Cameroon, Ecuador, Malaysia, and the United States). This approach provides greater flexibility than the Indian and Bulgarian approach, by allowing the regulatory authority to be led by anyone appointed to the task. While this approach certainly provides the most flexibility to appoint regulators, it also opens the door to the possibility of appointing unqualified regulatory authority leaders. However, in practice, it is unlikely that a completely unqualified individual would be appointed to lead a regulatory authority. In cases where appointees are selected by – or at least recommended by – multiple branches of government, such as Ecuador and the United States, it is improbable that multiple stakeholders would approve of an unqualified appointee. Even in countries such as Cameroon and Malaysia, where the regulatory authority leadership is appointed by a single branch of government, the appointing authority runs the risk of not only negatively impacting the telecommunications sector, but also the political risk of being seen as having made an unwise appointment.

◂ Table 5-5 provides an overview of the advantages and disadvantages of the different approaches discussed above.[4]

Table 5-5: Advantages and Disadvantages of Different Staffing Approaches

Approach	Advantages	Disadvantages
Require regulatory authority to have specific areas of expertise (*e.g.*, one attorney and one economist).	Ensures that certain areas of expertise will always be represented among the regulatory authority leadership.	Because the requirement is written into law or regulation, regulatory authority has less flexibility to adjust its composition in response to changing regulatory needs or market structure. Some countries may face difficulty finding qualified individuals to fill the mandated areas of expertise.
Require all regulatory authority leaders to demonstrate expertise in at least one of several fields.	Ensures that all regulatory authority leaders are well-versed in at least one of several relevant fields. By not mandating which fields must always be represented, regulatory authority retains some flexibility to emphasize certain areas of expertise as necessary. Greater likelihood that regulatory authority leadership posts will not remain vacant due to absence of qualified individuals.	Creates potential for regulatory authority leadership to lack expertise in certain fields.
No specific expertise requirements for regulatory authority leadership.	Provides the most flexibility to appoint regulatory authority leaders.	Potential for appointment of unqualified regulatory authority leaders.

Appointment Process

The manner in which the head of the regulatory authority is appointed provides important insight into the independence of the regulator. Generally, if the head of a regulatory authority is appointed by a single branch of government it is less likely to exhibit independence than those who have the support of multiple branches of government. For example, a collegial body may feature members selected by different branches of the government, ensuring that no single branch has excessive influence over the regulatory authority. In Bulgaria, for example, the chair of the CRC is determined by the Council of Ministers and appointed by order of the Prime Minister;, the deputy chair and two other members are elected by the National Assembly, and one member is appointed by the President of Bulgaria.[5]

In a 2000 report, the Organisation for Economic Cooperation and Development (OECD) found that the majority of its members were characterized by independent regulators that are led by an individual or individuals appointed by the president or minister upon the recommendation of the cabinet or minister.[6] In addition, the legislature may be involved in approving the members of the collegial body. For example, a nomination or appointment may be made by the head of government or a minister and then confirmed or approved by another government body (*e.g.*, council of ministers, cabinet, or Senate). In the United States[7] and Nigeria,[8] the commissioners are appointed by the president of the country, but require confirmation by the country's Senate. In Portugal, the governing ministry (currently the Ministry of Public Works, Transportation and Communication) proposes board member candidates for the Autoridade Nacional de Comunicações (ICP-ANACOM) and their appointments are made official through a resolution issued by the Council of Ministers.[9]

An interesting example of the appointment process is Colombia, which has a rotating leadership. The Comisión de Regulación de Telecomunicaciones (CRT) is officially headed by the Minister of Communications, who serves as the President of the CRT. However, the CRT is also advised by a Committee of Commissioned Experts (Comité de Expertos Comisionados) selected by the President of Colombia. Each year, this panel of three experts elects one of its members to serve as the Executive Director of the CRT for a one-year term. As such, the President of the CRT (the Minister of Communications) is a member of the Government, and the Executive Director is an expert who serves at the will of the President of Colombia.[10]

In addition to appointments recommended by a cabinet or minister, regulatory authority leaders may be nominated by other industry stakeholders. In Turkey, for example, the Telecommunications Authority collegial body includes members who represent the telecommunications sector and consumers. The member representing the sector is selected from among candidates put forward by each operator who claims at least 10 per cent market share. The member representing consumers is selected from among candidates nominated by the Ministry of Industry and Commerce and the Turkish Association of Chambers and Exchanges.[11]

In the Dominican Republic, the head of the five member board is appointed by the central government (*i.e.*, the president), but three members are nominated by various industry groups – one by the telecommunications service providers, two by the broadcasting service community (one nominated by the television networks and the other by the radio and cable television networks), and the last member is selected, based on their professional qualifications, to represent consumer interest groups. However, the central government ratifies all nominations.[12] In Uganda, seven commission members are appointed by the Minister with the approval of the cabinet. However, five of the board members are appointed based on a recommendation from each of the following institutions: the Institution of Professional Engineers, the Uganda Law Society, the Broadcasting Council (nominee must be a member of the council), and the remaining two members are well-respected professionals chosen from the public. Similarly, the legislation establishing the regulatory authority may require that the members of the board represent the different regions of the country (*e.g.*, Nigeria[12]).

By comparison, regulatory authority heads that serve at the pleasure of the government – or the pleasure of one particular branch of the government – may be viewed as less independent because their job security is closely linked to one particular actor. Cases in which regulatory authority heads are appointed by a single or limited group of actors include Barbados[14] and Indonesia.[15] In Botswana, the Minister for Science, Communications and Technology appoints all five members of the Board of Directors, including the Chairperson of the Board.[16]

A variation of the view of such appointees as less independent is when they are appointed by a figure outside the government, such as a monarch. For example, the head of Morocco's ANRT is appointed by a royal decree and can only be removed from office by another royal decree.[17] In the case of Morocco, this arrangement theoretically confers a *greater* degree of independence upon the ANRT's director general with respect to the government, because the director general serves at the pleasure of the king, rather than the government or the prime minister. However, while the director general enjoys a degree of independence from the government, he or she may still be removed from office by the king at any time.

Fixed Terms

A large majority of countries mandate fixed terms for the heads or members of the board of the regulatory authority. Of the 85 countries that responded to the 2005 ITU Telecommunication Regulatory Survey, 75 indicated that their regulators had fixed terms, with the majority ranging between two and five years. The remaining 10 countries indicated that no fixed term of office was specified in their laws or regulations.[18] Similarly, a 2000 OECD report noted that most member states had fixed terms for their regulatory authority heads. [19] In some countries, like Bahrain, Panama and South Africa, the term can vary depending on the position the person holds within the authority.[20] In most countries, collegial body members can serve no more than two consecutive terms of office.

Individuals with fixed terms of office, particularly those that do not coincide with changes in government, are likely to feel more secure in their position and exhibit more independence than those individuals who serve at the pleasure of the government. Often the applicable law or regulation indicates whether individuals can be reappointed to a position after their term has expired. Much like term limits for legislators and heads of state, it is debatable whether limiting an individual's tenure in a regulatory leadership position permits them more freedom to act without regard for reappointment or forces qualified individuals to give up their position due to an arbitrary regulatory or legislative provision.

Removal from Office

Just as important as the appointment process and criteria in establishing regulatory independence is the power of removal of regulatory heads from office. Legislation or regulation often specifies the cases in which a regulatory authority head or collegial body member may be removed from office (such as conflict of interest or failure to perform official duties). For example, in Canada, members of the Canadian Radio-television and Telecommunications Commission (CRTC) must not have any direct or indirect role in a telecommunications undertaking or business and may only be removed during his or her term for good cause.[21] Similar conflict of interest prohibitions are common among telecommunications regulators. For example, in Uganda, a member of the Uganda Communications Commission may be removed if the officer 1) is continuously and persistently unable to discharge the functions of the office; 2) engages in misbehavior or abuse of office; 3) is subsequently disqualified from membership due to holding any interest in a telecommunications company, bankruptcy or mental/physical illness that prevents performance of duties; or 4) fails to disclose to the Commission any interest in contract or proposed contract or any other matter before the Commission.22 In some cases, conflict of interest extends to cover the immediate family of the regulatory body official, as is the case in Jordan where a board member of the Telecommunications Regulatory Commission may be removed if the board member, spouse or first-degree or second-degree relatives have a direct or indirect investment in the ICT sector during the member's term of office.[23] In India, members of the collegial regulatory body, TRAI, can also be removed from office for conflict of interest reasons or for abuse of their position, although the Supreme Court must support such a dismissal.[24]

In addition, it is not uncommon for laws or regulations to specify that regulatory authority heads or collegial body members can be removed from office for failure to commit appropriate time to their duties. In Hungary, members of the Communications Regulatory Commission's collegial body are to be removed from office if they are unable to carry out their duties continuously for more than 90 days.[25] In Jordan,[26] Sudan,[27] and Tanzania,[28] members of the collegial bodies can be removed from office for failure to attend a minimum number of meetings. In India, for example, TRAI board members may be removed from office if they fail to attend three consecutive sessions or six non-consecutive sessions in one year without a reason acceptable to the board. Similar to conflict of interest or abuse of power rules, minimum attendance or participation rules increases the likelihood that regulatory authority leaders are carrying out the job to which they were appointed.

Some regulators also hold their agency leaders to a high moral standard. In India, for example, members of the TRAI can be removed from office as a result of offenses which are judged to involve "moral turpitude" or as a result of a loss of mental or physical function that prevents the member from fulfilling their duties.[29] Similar moral qualifications are found in the laws and regulations governing membership in the collegial bodies of telecommunications regulators in countries including Brazil,[30] Jordan,[31] and Sudan.[32]

Legal Status of Staff

In the majority of cases, the staff members of regulatory authorities are considered public employees (or other similar terms, such as civil servant or public servant), making their employment subject to the same rules applied to public employees throughout the government.

In some cases, the head(s) of the regulatory authority are also considered to be public employees for some or all purposes. For example, the Canadian Radio-Television and Telecommunications Commission Act specifically states that Commission members are public employees for purposes of superannuation.[33] All collegial body members and other employees of the TRAI in India are considered public employees.[34] Similarly, all members, officers, and employees of Singapore's Infocomm Development Authority (IDA) are considered public servants for the purposes of Singapore's penal code.[35] The Singapore penal code includes statutes relating to crimes carried out by public servants, as well as punishments for crimes carried out against public servants and contempt for the authority of public servants.[36] In cases such as Singapore, the explicit application of the penal code to all IDA personnel is in line with the conflict of interest and abuse of power rules previously discussed, stating that IDA members and staff are not immune to the laws of conduct applicable to other citizens.

However, not all regulatory authorities classify their employees as public employees. In Botswana, employees of the BTA are considered parastatal staff in which the terms and conditions of staff employment is determined by the board in the staff members' respective contracts of employment.37 No other civil service rules apply to BTA staff. In addition, as will be discussed below, the fact that BTA employees are not classified as public employees provides the regulatory authority with greater flexibility to offer competitive salaries and benefits. Although not subject to civil service regulations, BTA staff is protected from liability for actions taken in their professional capacities by principles of common law.[38] Similarly, Singapore IDA personnel (including collegial body members, officers and staff) are also protected from personal liability for actions taken in good faith or to carry out the provisions of the IDA Act.[39]

In some jurisdictions, such as India, the law specifically protects not only the personnel authority, but also extends protection to the federal government and the authority itself from liability for any actions carried out in good faith under the law or relevant regulations.[40] Despite the freedom conferred by such protections, some countries do permit the assignment of liability to regulatory authority personnel. For example, all personnel of Venezuela's Comisión Nacional de Telecomunicaciones (National Telecommunications Commission - CONATEL) are jointly and severally liable under civil, penal and administrative law for the decisions undertaken by the regulator.[41] While such laws are likely intended to impress upon all regulatory personnel the importance of taking the appropriate regulatory actions, they are more likely to result in an overly conservative regulatory approach due to fear of personal liability among authority personnel.

Protection from individual liability is important to the functioning of a regulator, as it empowers regulatory personnel to make their best efforts in support of the regulator's goals, or the duties assigned to the regulatory authority by applicable laws and regulations, without fear of being held personally liable for adverse consequences. This freedom is an important protection for employees (and incentive for potential employees) who have an interest in contributing to the effective regulation of the telecommunications sector, but who cannot afford the risk of personal liability for regulatory actions. Protection from liability for actions carried out on behalf of the regulatory authority is a specific protection afforded to regulatory personnel; however, in certain countries, such as Singapore, that protection does not confer immunity from all criminal laws and rules of conduct upon all regulatory authority personnel.

6.5.3.2 STAFFING DESIGN

Many factors affect the staffing design of a regulatory authority. Principally among these are market conditions, established objectives and goals, scope of the regulator's responsibility, selected management structure, distribution of responsibilities/duties within the regulator, and available resources.

In most cases, the head of the regulatory authority is empowered by the applicable law or regulation to hire appropriate staff as deemed necessary to conduct the business of the regulatory authority provided such appointments are made within the confines of the regulator's budget. The hiring of staff for the regulatory authority also is usually subject to national civil service or public employment laws or regulations.

Often the regulatory authority has detailed requirements that it must follow when filling a vacancy within the agency. India's TRAI, for example, must fill each position by promotion, deputation or direct recruitment, with specific guidelines laid out for each method.[1] Detailed regulations, such as TRAI's, provide transparency to the public, ensure that candidates are informed of selection procedures, and facilitate the orderly internal process of hiring new staff.

However, the fact that regulatory authorities may be empowered to hire staff does not guarantee an abundance of qualified applicants. Regulators face significant challenges in recruiting and maintaining qualified staff. First, they need to identify individuals with the relevant expertise. Second, they must be provided by the government with the resources to offer compensation packages that will attract such qualified individuals. Third, they must be able to retain their staff members despite a highly fluid sector in which technologies, business plans, and regulations change with some frequency. Without addressing such challenges, regulators are likely to face staff shortages and high turnover rates.

In general, telecommunications regulators are composed of a diverse group of professionals that include: attorneys, economists, engineers, market analysts, accountants, and administrative support personnel. In addition, depending on the needs and resources of the regulatory authority, some have provisions that allow them to hire consultants on an "as needed" basis.

According to the results of the ITU's World Telecommunication Regulatory Database survey for 2010, telecommunications regulator staff sizes range from three (Micronesia) to over 2,300 employees (Germany).[2] (See Table 5-6 below.)

Region of the World	Country	Staff Size
Africa	Namibia	7
	South Africa	300
Americas	St. Lucia	5
	United States	1,993
Arab States	Comoros	17
	Egypt	429
Asia and Pacific	Micronesia	3
	Korea (Rep.)	1600
Europe & CIS	Liechtenstein	6
	Germany	2,238

◂ **Table 5-6: Lowest and Highest Staff Size of Regulators per Region**

Gender composition, a factor taken into consideration by many human resources departments within telecommunications regulators, shows that the number of male staff members is usually much higher than that of women. According to the 2010 ITU World Telecommunication Regulatory Database, 36 of the 149 (about 25 per cent) responding countries indicated that their regulators currently have at least 50 per cent females on their staffs.3 Notably, however, female staff members in an additional 39 countries make up between 40 and 50 per cent of the total staff. As such, women comprise at least 40 per cent of the total staff members in over half of the responding countries.4 The table below (Table 5-7) shows those countries, per region, which have at least an equal number of female and male staff members:

Region	Country and Percentage of Female Staff Members (50% or more)
Africa	*Rwanda (60%)*
Americas	*Antigua and Barbuda (50%), Bahamas (59%), Barbados (84%), Canada (59%), Colombia (62%), Dominica (57%), El Salvador (54%), Grenada (50%), Guyana (60%), Jamaica (55%), St. Vincent and the Grenadines (63%), Suriname (52%), Trinidad and Tobago (52%), United States (55%), Venezuela (55%)*
Asia and Pacific	*Samoa (60%), Philippines (50%), Solomon Islands (50%)*
Arab States	*Lebanon (50%)*
Europe & CIS	*Austria (56%), Bosnia and Herzegovina (57%), Bulgaria (60%), Cyprus (50%), Czech Rep. (52%), Estonia (53%), Greece (51%), Latvia (58%), Kazakhstan (50%), Kyrgyzstan (50%), Serbia (53%), Spain (54%), TFYR Macedonia (55%), Ukraine (60%)*

◂ **Table 5-7: Percentage of Female Staff Members by Region**

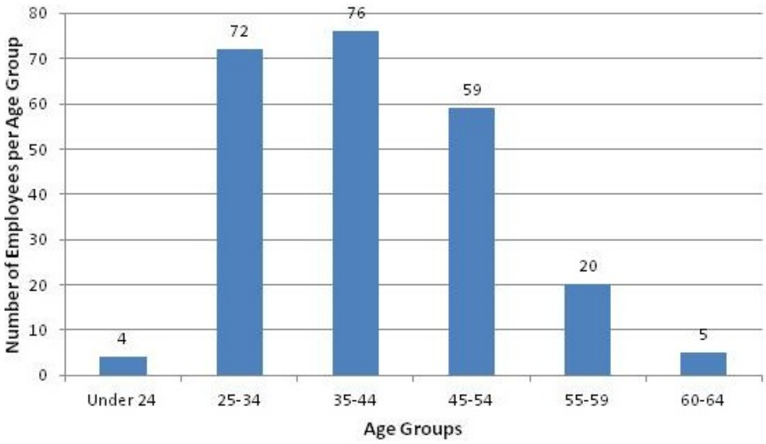
Source: ITU World Telecommunication Regulatory Database (2010)

Interestingly, developing countries as likely to have more equal numbers of female and male staff members within their telecommunications regulators as developed countries. Overall, however, Barbados has the highest percentage of female staff (84 per cent) while Saudi Arabia and Micronesia have the lowest, with no women working at the regulator. (See Table 5-8 for the lowest and highest percentages of female staff members by region).5

Country	Percentage of Female Staff	
Africa	Cape Verde	0.5%
	Rwanda	60%
Americas	Belize	10%
	Barbados	84%
Arab States	Saudi Arabia	0%
	Tunisia	45%
Asia and Pacific	Micronesia	0%
	Samoa	60%
Europe & CIS	Iceland	18%
	Bulgaria, Kazakhstan, Ukraine	60%

◂ Table 5-8: Lowest and Highest Percentage of Female Staff per Region 5Region of the World

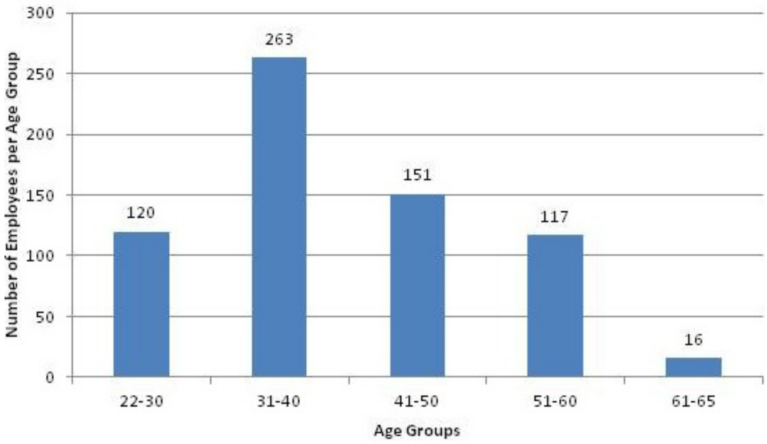
The average age of employees is another aspect of a regulator's staffing composition. For the most part, regulatory authority staff members around the world range from 25 to 65 in age, with the 25 to 34 and 35 to 44 age groups being the most significant in number. In Chile, for instance, SUBTEL's staff of 236 employees had the following age group composition in 2009 (Figure 5-H):6



◂ Figure 5- H: SUBTEL Staff by Age Group

Source: SUBTEL, Balance de Gestión Integral Año 2009

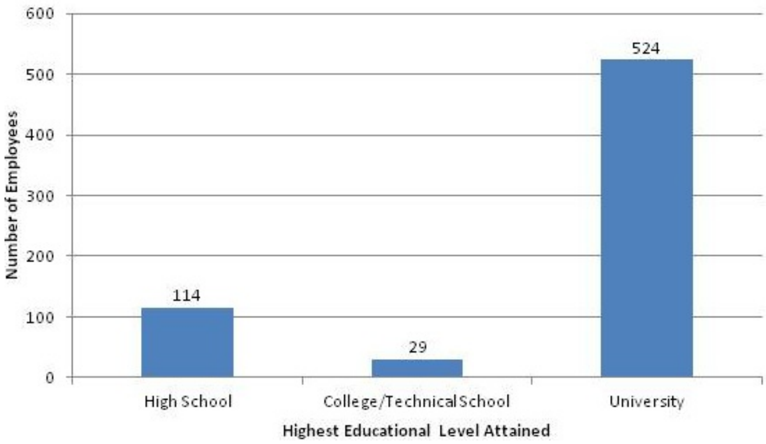
While the 45 to 50 age range is the largest age group of SUBTEL employees, Romania's ANCOM has perhaps a slightly younger staff composition with nearly 40 percent of employees between the ages of 31 and 40 years. (Figure 5-I):7



◂ **Figure 5- I: ANCOM Staff by Age Group**

Source: ANRC Annual Report 2008

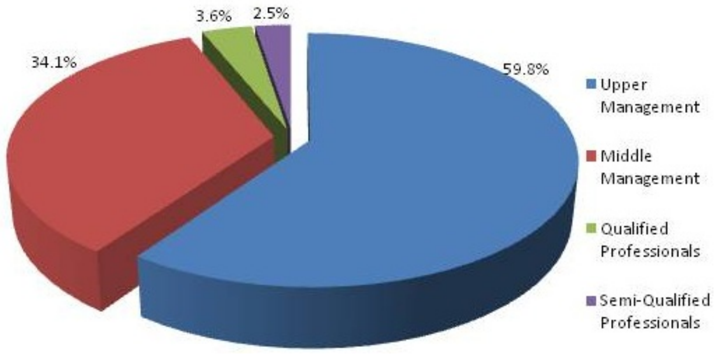
The academic levels of staff members vary from one regulatory authority to another, but usually include: higher education (university degrees such as Ph.D., M.A. and B.A. or their equivalents), vocational/technical education, and high school education. As Figure 5-J shows, of the 667 positions filled at Romania's ANCOM, nearly 85 percent of employees held a degree in higher education (i.e., college/technical school or university). Of those with higher education degrees the majority hold them in technical fields, as well as economics, law and humanities.



◂ **Figure 5- J: ANCOM Academic Level of Employees**

◂ *Source: ANRC Annual Report 2008*

Telecommunications regulators usually organize their staffs hierarchically. There are various levels including: high-ranking management staff; professionals (which can have different levels based on their expertise, as well as their degree of responsibility); technical staff; administrative staff; and others, including consultants. It is not only the hierarchical levels that differ between regulators, but also the distribution of their staffs within each of these levels. For example, ICP-ANACOM in Portugal has the following levels and distribution (Figure 5-K):8



◂ **Figure 5- K: ICP-ANACOM Staff Organization and Ranking**

◂ *Source: Annual Report and Accounts, ICP-ANACOM 2009*

In contrast, the Independent Communications Authority of South Africa (ICASA) shows the following levels and distribution of staff within them (Figure 5-L):9

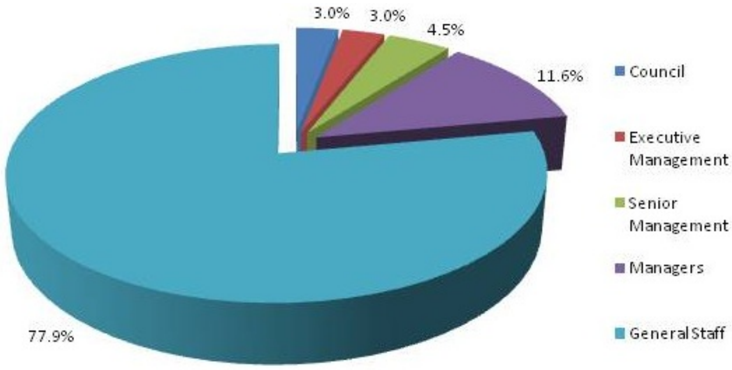


Figure 5-L: ICASA Staff Organization and Ranking
Source: ICASA Annual Report, 2009

These graphs show how two regulators, with a somewhat similar hierarchical staff structure, can have very different distribution of their employees. While almost 50 per cent of ICP-ANACOM's staff is upper/senior management and its semi-qualified professionals represent 30 per cent of the total staff, ICASA seems to have an inverted pyramid in comparison, as its senior management is only 6 per cent of the total staff and its administration staff members represent almost 60 per cent of all employees.

Staff members are commonly selected based on their professional background, experience in the sector, and academic accomplishments. Similar to other staff composition characteristics, this distribution also varies among regulatory agencies. In the case of OSIPTEL in Peru, the agency relies on lawyers, engineers and economists for 70 per cent of its staff (Table 5-9):

Table 5-9: OSIPTEL Staff Background
Source: OSIPTEL Annual Report 2003

Professional Background	Total Number of Employees	Percentage (of total staff)
Accountants	11	8%
Attorneys	37	28%
Economists	23	17%
Engineers	32	24%
Other Professions	14	11%
Secretaries	15	11%
Total	132	100%

In Colombia, lawyers, engineers and economists make up 82 per cent of the staff of the Comisión de Regulación de Telecomunicaciones (CRT) (Table 5-10):

Table 5-10: CRT Staff Background
Source: Jaime Andres Estrada, Commissioner, CRT (2005)

Professional Background	Total Number of Employees	Percentage (of total staff)
Administrative Support/Programmers	11	28%
Attorneys	11	28%
Business/Finance	3	8%
Economists	3	8%
Engineers	10	26%
Journalists	1	2%

The U.S. Federal Communications Commission (FCC) shows the following distribution by profession, based on respondents to the annual employee survey (Table 5-11):10

◂ **Table 5-11: FCC Staff Background**

Source: 2009 Annual FCC Employee Survey Results

Professional Background	Total Number of Employees	Percentage (of total staff)
Attorneys	185	31.2%
Clerical & Administrative Support	29	4.9%
Consumer Affairs & Consumer Outreach	28	4.7%
Economists	20	3.4%
Engineers	85	14.3%
Finance/Accounting/Auditing	31	5.2%
Information Technology	19	3.2%
Management/Program Analyst	58	9.8%
Specialist	78	13.2%
Other	60	10.1%

As shown above, the FCC, OSIPTEL, and the CRT all rely heavily on attorneys, accountants, engineers and other technical specialists. However, there are no specific guidelines regarding the percentage of employees per profession that should comprise a regulatory authority's staff. The particular expertise required is better determined by assessing the needs and upcoming workload of the regulatory authority. In addition, the legislation establishing the regulatory authority often allows the regulator to hire outside consultants and experts if the need arises, as will be discussed in Section 5.3.5.

Another aspect that certain countries consider regarding the staffing design is racial/ethnic diversity. In South Africa for instance, ICASA strives to have a staff that reflects the demographic diversity of its society (Table 5-12):

◂ **Table 5-12: ICASA Staff demographics**

Source: ICASA Annual Report 2009

Race/Ethnicity	Total Number of Permanent Employees	Percentage (of total staff)
African	241	72%
Asian	17	5%
Colored	23	7%
White	54	16%
Total	335	100%

6.5.3.3 JOB DESCRIPTIONS

In general, most regulatory agencies include the following information on job descriptions:

§ key responsibilities and duties;

§ experience required;

§ qualifications/evaluation criteria;

§ special skills (if needed); and

§ how to apply (application instructions and procedures).

Some countries establish specific professional qualifications and background for members of the collegiate body (commissioners/board members) who are chosen on the basis of their knowledge and expertise in the communications field. They can come from both the public and private sectors and have different professional backgrounds (*e.g.*, lawyers, economists, engineers, finance/accounting, academics, and government officials). In some countries, however, the professional background of the chairperson of the commission/board and some members is specified. In India, for instance, members of the TRAI can be drawn from a variety of fields, but the Chairperson must be, or should have been, a Supreme Court Judge or a Chief Justice of a High Court.1 In the Philippines, the National Communications Commission (NTC) consists of the Commissioner and two Deputy Commissioners, preferably one being a lawyer and the other an economist.2 In the United States, it is not only the professional background of the candidates that is taken into consideration when considering the composition of the commission, but also their political affiliation. Of the five FCC commissioners, no more than three can be of the same political party at any given time.3

Certain regulatory agencies, like the Telecommunications Regulatory Commission (TRC) in Jordan, have minimum requirements for professional applicants, regardless of the position for which they are applying. These qualifications include a degree from an accredited university, fluency in both English and Arabic (spoken and written), and knowledge of MS Office applications. They also must be Jordanian citizens.4 OSIPTEL in Peru also includes minimum requirements for professional applicants, among them: university degree (in specific field depending on the job position), experience, and an intermediate knowledge of English.5 Similarly, the Office of the Telecommunications Authority (OFTA) in Hong Kong includes entry requirements for professional candidates, such as: a Hong Kong university degree (or equivalent), fluency in English and Chinese (spoken and written), and knowledge of MS Office.6

Countries such as Canada, Dominican Republic, Nigeria, Panama and South Africa require that commission/board members be citizens of the country.7 In Panama and Peru, commission/board members must have at least ten years of experience in the telecommunications industry and a university degree (master's degree equivalent) in order to be considered for nomination.8

Source: ComReg (Ireland) – **http://www.comreg.ie/recruitment**

For those regulatory agencies that provide job descriptions, the amount of information requested and/or provided can vary from the most general to the most specific. For instance, below is a sample of a job description published by the Commission for Communications Regulation (ComReg) in Ireland (Box 5-2): **Box 5-2: ComReg Sample Job Description**

Senior Legal Advisor

Reporting directly to the Commissioners, your prime responsibility will be to provide strategic, mission-critical legal advice to the Commissioners and the organisation, and to handle legal matters arising from ComReg's remit and activities.

You will develop and implement strategies which result in the provision of well- rounded legal advice to senior management and to the organisation as a whole; oversee the full legal process, including court actions where necessary; and lead and manage ComReg's relationships with external legal advisors. You will also act as a mentor to other lawyers working in the organisation.

The seniority of this position requires that you are a qualified solicitor or barrister with at least 10 years PQE, and have an outstanding professional record and reputation of providing excellent legal advice at the highest organisational levels. You will have a recognised expertise in competition and regulatory matters preferably relevant to the activities of ComReg - namely the electronic communications and postal sectors, and to demonstrate the ability to contribute effectively as a member of the senior management team.

ComReg is an equal opportunities employer.

In comparison, a job description published by the Infocomm Development Authority (IDA) in Singapore provides more detailed information with regards to the duties and requirements of the position (Box 5-3):

IT Infrastructure Project Manager

Responsibilities:

- Involve in the design, management and enhancement of the corporate ICT infrastructure. Lead a small project or assist the Project Manager of a medium to large project, to conceptualise, develop and execute the project plan.
- Responsible for the client computing, messaging, networking and server aspect of the projects from initiation to implementation. Study business and application specific requirements, review organisational ICT infrastructure as well as design and implement the ICT architecture to meet current and future requirements.
- Manage the designated vendor and ICT contract to ensure the designated vendor meets contractual obligations, leading to successful delivery of the project.
- Conduct ICT strategic review, identifying and exploiting suitable technologies, strategies and solutions to meet organization needs. Develop solutions / architectures based on technology trends and standards, to exploit new and emerging technologies and products to meet present and future business needs.
- Manage the customer's expectations, develop and actively engage customers so as to enhance customer intimacy and influence their alignment with the eGovernment agenda, and to achieve customer satisfaction.

Requirements:

- Degree in Computer Science, Computer or Electronics Engineering or Information Technology
- 5 - 6 years of relevant IT experience in designing and deploying enterprise level network and systems infrastructure (Experience in network security and/or development of IT Technical Architecture plans will be an added advantage)
- Good knowledge of servers, network, IT security, desktop and ICT operations to effectively manage vendors
- Experience in designing and managing enterprise infrastructure for application hosting
- Excellent communication (both oral and written) as well as strong project, vendor and contract management skills
- Pro-active, dynamic, dedicated and responsible self-starter with strong customer orientation and multi-tasking capabilities

Successful candidates will be posted to work in customers' premises such as ministries and statutory boards.

◂ **Box 1 IDA Sample Job Description**

Source: IDA (Singapore) – Careers @ IDA
http://www.ida.gov.sg/Careers/20090804162533.aspx

Certain regulatory agencies, such as OFTA in Hong Kong and the FCC in the United States, are even more explicit in the information they include in their job descriptions. OFTA, for example, indicates the term of the appointment (length of contract), newspapers in which the advertisement has appeared, and the policy for applicants with disabilities, among others.

The FCC indicates that it is an equal opportunity employer, whether a security clearance is required or not, whether relocation expenses will be covered or not, the policy for applicants with disabilities and preference in hiring veterans, and information that should be included in the curriculum vitae. In addition, FCC applicants must complete a Declaration for Federal Employment to determine their suitability to work for a government agency and to authorize a background investigation.[9]

Job descriptions for regulatory agencies can readily be found on most regulatory authority websites. However, many regulators do not provide specific job descriptions on their websites. Instead, they provide a description of the different departments/divisions of the regulatory authority and encourage those interested to submit their curriculum vitae for consideration.

The means used to hire employees in the regulatory industry vary from one regulatory authority to the next. For instance, in Nigeria and South Africa, telecommunications regulator employees are considered public/civil servants and as such are entitled to the same salary levels, pension and benefits as other public/civil servants.[10] In Canada, employees of the CRTC are appointed in accordance with the country's Public Service Employment Act.[11]

In Latvia, Peru, Philippines, and Poland, regulators support the professional advancement of their employees by encouraging their participation in specialized training courses, seminars, and workshops.[12] For example, in an effort to prepare its employees for the country's ascension into the EU, the URTiP in Poland organized capacity building courses in foreign languages, as well as courses focused on issues related to Europe's integration.[13] In Latvia, the Public Utilities Commission (PUC) supports efforts by its employees to further university studies at Latvian universities and sponsors employees interested in pursuing foreign language studies and in-service capacity building in regulatory institutions abroad.[14]

In Botswana, in addition to supporting employees' interests in obtaining specialized training and pursuing university degrees, the BTA has established the Botswana Telecommunications Authority Staff Pension Fund and assists employees in obtaining personal, car, and home loans. The BTA has also established a performance management system with the objective of rewarding performance and encouraging productivity among its employees. This system also helps the regulator determine the training needs of its staff.[15]

In Senegal, employees of the Agence de Régulation des Télécommunications (ART) have access to a pension fund and are offered diverse bonuses and loans, as well as medical coverage and grants for mobile phone service and home remodeling. A capacity building plan has been developed to strengthen employee skills in various areas (*i.e.g.*, management and technical) and training is carried out in Senegal and abroad. In 2004, the ART focused its capacity-building efforts on effective regulation to ensure that all staff involved had the same level of knowledge and understanding of the subject matter. In 2005, the agency focused its efforts on providing top management personnel with training, based on each individual's needs, most of which was carried out abroad. Similar to the BTA in Botswana, the ART has established a performance management system that evaluates each employee's annual performance based on their accomplishments and those areas where improvement is needed. Employees are awarded a year-end bonus (a maximum of 1.5 times their net salary) based on the results of this evaluation.[16]

Although various ways exist to engage employees and thus improve a regulator's efficiency and effectiveness, establishing a performance management system - such as that in place in Botswana and Senegal - can ensure consistency in achieving a regulator's objectives and goals.

Regulators must keep in mind that staff turnover is a business risk requiring management.[17] A high turnover rate can be harmful as it can lead to lack of continuity and diminishes the ability to achieve the regulator's goals and objectives. Therefore, regulators need to establish the measures necessary to create a working environment that will keep staff members motivated and enhance their desire to stay with the regulator. However, a low or non-existent turnover rate is not advisable either, as new employees can often bring new skills and insights with them, so measures should be balanced to also attract new employees to the regulator.

Regulators also should continually re-examine their organizational and administrative structures in order to be prepared for changes that may occur within it, as well as in the sector it regulates. Establishing a solid and well-prepared staff can be instrumental in helping a regulator manage internal and external changes in a successful manner.[18] A regulator and its staff should aim to have the skills necessary to keep abreast of the needs and changes of the country's telecommunications market sector and thus be able to respond to these changes in an independent and transparent manner.

6.5.3.4 REMUNERATION PRINCIPLES

Remuneration for Leadership of Regulatory Authority

Often, the compensation of regulatory authority heads or collegial body members is lower than what could be earned in equivalent executive positions in the private sector. As noted below, this also presents a challenge regarding staff remuneration. However, particularly in the case of leadership positions, it is not uncommon for regulators to be composed of individuals who are less concerned about compensation than about some combination of public service along with the experience, public exposure and contacts that can be gleaned through a regulatory leadership position.

In several cases, the governing law or regulation specifies the manner of compensation for the head(s) of the regulators, with many reserving the right for the government or its appointed representative to adjust salaries as necessary. A typical formulation is found in Uganda's Communications Act, which states, "The Chairperson and other members of the Commission shall be remunerated upon terms that the Minister shall approve."[1] Another common approach is for the salary of the regulatory authority head(s) to be determined in the decree or other instrument of appointment, as is the case in Jordan.[2] Such arrangements provide a clear determination of who sets salaries, but provides the flexibility for salaries to be adjusted as necessary by the responsible party. For those regulators in which the board or commission members serve part-time, they are often paid a per-meeting fee, as well as reasonable expense reimbursement.

In some cases, however, the salaries for the head of the regulatory authority or the collegial body members are set by law, although not in explicit numerical terms. For example, the salary of the chairman of the collegial body of Bulgaria's Communications Regulation Commission (CRC) is set at 90 percent of the basic remuneration of the Chairperson of the National Assembly, while the salaries of the deputy chairman is set at 95 percent of the basic remuneration paid to the CRC's chairman and remaining Commission members' salaries are set at 90 percent of the CRC chairman's salary.[3] Similarly, the collegial body members of Hungary's are paid salaries that tied to the compensation and benefits paid to permanent secretaries,[4] Such arrangements serve the dual purpose of ensuring that the head of the regulator's salaries are adjusted in concert with legislators or senior ministry officials, and imbuing the regulatory leadership positions with a level of status on par with such senior government officials. The latter can help to lend legitimacy to regulatory leaders, as well as to attract qualified candidates. Directives regarding remuneration may also be linked to civil service regulations, as is the case in the United States. By law, each member of the U.S. Federal Communication Commission's (FCC) collegial body receives a salary at a particular level of the public employee pay scale.[5]

Remuneration for Staff

In countries where regulatory authority employee salaries are tied to government-wide public employee regulations, it is much more common for salaries to be lower than those offered in the private sector. In such cases, the ability of the regulator to attract qualified candidates can be stifled by the availability of higher-paying private sector opportunities. Further complicating the ability to attract qualified candidates, regulatory authority leaders may be required to obtain permission to pursue additional paid employment, as is the case in Australia (for full-time collegial body members),[6] or simply prohibited from pursuing additional employment, as is the case in the United States.[7] Such restrictions are intended to ensure that employees devote their full attention to their regulatory duties and to eliminate conflicts of interest, but can also prevent candidates from obtaining additional income that would help make up for the income forfeited when accepting a position at the regulatory authority.

In an attempt to circumvent the issues of low civil service salaries or restrictive civil service employment regulations, regulators have attempted to design creative and attractive compensation packages to attract experienced and qualified personnel. In a study of the Botswana Telecommunications Authority, the ITU noted that at the time of the study, the BTA offered an attractive set of fringe benefits and salaries that were likely higher than those available in private sector telecommunications jobs, as shown by the high number of private sector applicants for BTA positions.[8] In the case of Botswana, these fringe benefits combined with the fact that civil service rules do not apply to the regulator, allowed the BTA to offer competitive salaries and benefits to attract the most qualified candidates. A similar arrangement is in effect in Singapore, where the IDA is not required to adhere to the hiring, firing, and benefits practices in place for most public employees, allowing the regulator more flexibility to offer compensation packages that are more competitive with the private sector.[9]

In some cases, the non-leadership staff compensation levels are based upon national public employee regulations when regulatory authority heads are empowered to hire staff as necessary, as long as they comply with applicable public employment laws and regulations. Such is the case in the United States where the majority of the employees of the FCC receive compensation based on a government-wide schedule of compensation in which there are several compensation "bands" and multiple levels within each band.[10] In such cases, staff remuneration is adjusted in concert with other public employees across the majority of government agencies.

6.5.3.5 CONTRACTING OF CONSULTANTS

Options for Contracting out Services

Acknowledging that regulatory authorities may sometimes be best served by contracting certain functions to outside experts, many regulators are empowered to enter into contracts with outside organizations for specific functions. It should be noted that such outside experts may be private sector individuals or companies, but may also be assigned to the regulator by other branches of government. A typical formulation of the authority granted to the regulator is found in Bahrain's Telecommunications Law, which authorizes the Telecommunications Regulatory Authority's General Director (the head of the TRA's staff) to employ such consultants as will enable the TRA to meet its obligations under the Law, while also taking budget considerations into account.[1] Another arrangement is for the outside expertise to be provided by a regional regulatory authority, as is the case in the eastern Caribbean states. In that case, the Eastern Caribbean Telecommunications Authority (ECTEL) serves its members as a shared regulatory body and provides specific expertise, such as tariff reviews or impact assessment studies.[2]

In addition to hiring outside experts, many regulators are also empowered to delegate their powers not only to particular divisions within the authority, but also to outside experts. In Singapore, the IDA is empowered to create committees for purposes which the IDA feels would be better managed or regulated by a committee. Such committees may be comprised of personnel from either within or outside the IDA, and the regulator may delegate any of its authority to such committees, with the exception of the power of delegation.[3] The Australian Communications and Media Authority (ACMA) may also delegate powers, but to a more limited pool of experts, namely those within the ACMA or those made available to the ACMA by other government authorities.[4] Other examples of regulators who may delegate some or all of their authority are found in Bahrain,[5] Hong Kong (SAR),[6] India,[7] and Tanzania,[8] among others. The power to delegate provides the regulator with additional flexibility to determine the most effective or efficient method for regulation of any particular aspect of the telecommunications sector.

In addition to hiring outside consultants and delegating authority, another method of outsourcing is the establishment of advisory or consultative committees. Advisory committees are generally comprised of interested parties or key stakeholders as identified by the regulator. The advisory committee structure provides regulatory authorities with outside expertise that can be drawn upon in the course of normal business, but which are not employed to carry out a particular regulatory task or empowered with any delegated authority role. Regulators empowered to employ such advisory committees include Australia,[9] Bahrain,[10] Hong Kong (SAR),[11] and the United States.[12]

Consultative committees generally do not have the power to carry out actions on behalf of regulatory authorities. However, they may provide valuable input to the regulators in devising positions and strategies on domestic and international issues. In Hong Kong (SAR), for example, the Office of the Telecommunications Authority (OFTA) currently has advisory committees addressing radio spectrum, numbering, technical standards, regulatory affairs and consumer issues.[13] All five Hong Kong (SAR) committees provide advice on domestic issues, while the spectrum and standards committees also assist OFTA in the formation of positions and inputs to international fora. Similarly, the U.S. FCC currently has eight advisory committees, including committees on consumer issues, diversity, media security and reliability, network reliability and interoperability, and numbering.[14] The Australian ACMA provides a standard formulation of the authority to establish advisory committees, in which it states, "[t]he ACMA may, by writing, establish advisory committees to assist in performing any of its functions," and furthermore the ACMA holds the authority to appoint the committee members as well as revoke membership, and provide the committee with specific instructions.[15]

The ACMA Act also notes that committee appointments are not appointments to public office under the terms of Australian law governing remuneration, which brings about another common feature of advisory committees: members are not paid by the regulatory authority for their service. Instead, they provide input to the regulator in order to shape regulatory decision-making, whether for the good of the telecommunications market as a whole or for the good of the stakeholder(s) that they represent.

Reasons for Outsourcing

As more regulatory authorities have been established or reorganized in recent years, outsourcing certain regulatory functions has served as a means for the regulators to perform their duties while building internal capacity and ultimately minimizing the need of outside experts. In the cases of Bahrain and Uganda, a consulting firm was contracted to carry out many of the functions of the regulators as they developed their own internal competencies, which helped to get the regulators quickly functioning after their establishment. In other cases, it may be that a particular staff competency is currently lacking and the regulator determines such a role is better filled by an outside consultant. For example, in the Cayman Islands, an outside consultant was hired to serve as general counsel.

In both of these cases, the deployment of external resources in a regulatory authority can be coordinated so as to maximize opportunities for knowledge transfer. In particular, consultants and regulatory authority personnel can be integrated into teams that address weaknesses in the authority's capabilities. Such arrangements provide opportunities for the regulatory authority personnel to become more familiar with the relevant issues and stakeholders, and to learn from the consultants how best to address such issues. In order to maximize the potential for knowledge transfer, regulators employing external resources should consider three primary factors, and at different phases of the integration:[16]

- *Traits of the consultant or expert*, such as perceived reliability and motivation, which are important to ensuring successful transfer of knowledge at the initiation of any such collaboration;
- *Traits of the recipient*, such as ability to absorb knowledge, which affects how well the authority personnel will employ the knowledge gained;
- *Level of understanding of subject matter*, which can affect the effectiveness and difficulty of knowledge transfer at all times.

As the knowledge transfer process continues and regulatory authority personnel are better able to take on the roles initially assigned to consultants, the authority gains the freedom to redeploy the consultants in other areas in which their skills may be needed.

Regulators, both established and new, may also choose to outsource certain functions not because they lack the internal capacity, but because such functions may be best provided by outside experts. In this respect, outsourcing regulatory functions is similar to the outsourcing of business functions: focused on functions and processes that have been problematic and have led to dissatisfaction.[17]

It is also not uncommon for regulators to contract outside experts on an ad hoc basis for specific short-term needs. For example, regulatory authorities commonly outsource parts of tender processes, such as the development of terms of reference, feasibility studies or evaluation of bids. In Botswana, the regulator employed consultants in 2004 to assist in the evaluation of bids to procure an automated frequency management and monitoring system. Similarly, regulators have engaged the services of consultants to assist in bid evaluation for mobile licence tenders in many countries, including Jordan and the Maldives.

In addition to providing a competency that the regulator may lack, the employment of impartial external analysts for tasks such as bid evaluations may help to avoid conflict of interest issues in environments where the regulator is populated by individuals with close ties to or histories with bidders. This concern extends beyond bid evaluation to any issue for which there is reason to suspect that the regulator may not be able to make an impartial decision, or to cases in which the regulator's actions would be further legitimized by being based on external analysis and evaluation.

While not quite on an ad hoc basis, outside experts can also be contracted to address short term needs in conjunction with a particular project. For example, a concession contract may include a provision requiring outside consultants to monitor adherence to the terms of the contract or to ensure the quality of the service being offered by the concessionaire. Furthermore, outside experts often have established networks of expert contacts that enable them to gather relevant information and best practices in a more effective and efficient manner than a regulator, particularly a new independent regulator.

On an operational level, it is also not uncommon for regulatory authorities to outsource certain other functions, such as security, maintenance and cleaning, as well as employing outside contractors to fill temporary staff vacancies or to recruit support personnel.

Outsourcing can also involve different types of deliverables from the outside experts. In some cases, consultants provide a set of key issues and potential options for the regulator to take, but leave the ultimate decision up to the regulator. In other cases, the consultant may be offered the opportunity to provide binding recommendations that the regulator has no choice but to implement.

Outsourcing can be a useful tool, allowing regulators to act more independently and efficiently, providing impartial analysis of key issues or processes, and augmenting the regulator's own capacities (or lack thereof). Seeking advice from concerned stakeholders provides the regulator with important insights into the current state of the telecommunications sector as well as the possibilities for its future.

6.5.4 LEGAL STATUS OF REGULATORY AUTHORITIES

The legal status of the regulatory authority is a product of the political and legal system of each country. Most regulatory authorities are either public or semi-public institutions, although some regulatory bodies are established as corporate bodies.[1]

6.5.4.1 CORPORATE BODY VS. ADMINISTRATIVE BODY

The legal status of the authority is generally based on providing the most appropriate organizational structure in order to ensure consistency with the legal and administrative framework of the country. Portugal and Austria are two examples of countries that structured their regulatory authority as a corporate body instead of as an administrative body. In Portugal, the new statutes of the Instituto das Comunicações de Portugal (ICP) changed the previous legal status of ICP from a public institute to a public corporation named ICP-AUTORIDADE NACIONAL DE COMUNICAÇÕES (ICP-ANACOM) endowed with administrative and financial autonomy, as well as its own assets.[1] This new legal form was intended to enhance the powers and procedures of the regulator and to provide greater legal and financial flexibility through its regulatory instruments. In practice, the change of legal status had an impact on the internal administration of ICP-ANACOM because the Board was granted more flexibility with regard to internal administrative matters, including salaries of the Board Members and staff, the internal organization of the Institute and procurement of goods. However, the budget is still approved by the Ministry of Public Works, Transportation and Communications and the members of the Board of Administration are appointed by resolution of the Council of Ministers, upon a proposal from the member of government responsible for communications. In terms of regulatory functions, ICP-ANACOM has wide-ranging powers, with the Ministry responsible for the establishment of licence fees. ICP-ANACOM, however, must coordinate with other entities as follows:

- *Numbering Plan*: The member of government responsible for the communications sector approves the guidelines and general principles of the national numbering plan and then ICP-ANACOM administers the plan and grants the numbers.[2]
- *Tariff approval*: The pricing system of the provision of universal service is established through an agreement signed between the central government, represented by the Department of Commerce and Competition (DGCC), ICP-ANACOM and the organization with universal service obligations.[3]
- *Technical standards*: ICP-ANACOM must coordinate with the National Standardization Organization (Instituto Português da Qualidade).
- *Frequency allocation*: ICP-ANACOM must coordinate with the sector ministry which is responsible for public tender procedures.[4]

In Austria, the independent regulator (RTR GmbH) is also a corporate body – specifically, a private sector, non-profit, limited-liability company, and 100 per cent of its shares are owned exclusively by the Austrian federal government. These shares are administered by the Federal Chancellery in cooperation with the Federal Ministry for Transport, Innovation and Technology. RTR's share capital totals €5,741,153.90 and was solely contributed by the federal government. Additional financing of the regulatory authority is governed by law, and inflows of funds include licence fees and financing amounts contributed by telecommunications providers operating in Austria. RTR's regulatory activities with regard to broadcasting are financed by contributions from broadcasting organizations located in Austria.

RTR is in charge of running the day-to-day regulatory business and also acts as the managerial unit of the Austrian Communications Authority (KommAustria – the broadcasting regulator)5 and the Telekom Control Commission (TKK, which acts as the judicial arm of the regulator.) 6 The members of the RTR Advisory Board are appointed by the Austrian Federal Ministry of Transport, Innovation and Technology and by the Federal Chancellery. RTR is split into two specialized sections (broadcasting and telecommunications) and has fairly typical functions and duties of a telecommunications authority.

Since October 1, 2010, KommAustria has also been responsible for legal supervision of the Austrian Broadcasting Corporation (ORF) and its subsidiaries, for the legal supervision of private providers of audiovisual media services on the Internet, and for certain tasks under the Austrian Act on Exclusive Television Rights.7Thus, in practice, regulators legally established as corporate bodies appear to function in much the same way as regulators which are administrative bodies in terms of reporting lines, budget and internal administration.

6.5.5 ETHICS RULES AND CONFLICTS OF INTEREST

A major component of effective and transparent telecommunications regulation is the management of conflict of interest issues between private interests and public service duties.1 Regulators must be fair, impartial and transparent, and just as importantly, the public must perceive them as such in order for the regulators to inspire confidence of the industry and of investors. For instance, in order to maintain the public confidence and address the conflict of interest over the roles of the Telecom Regulatory Authority of India (TRAI) as a regulator and an adjudicator, TRAI amended the telecommunications legislation in 2000 to create an independent Telecom Disputes Settlement and Appellate Tribunal (TDSAT), transferring to it all powers for dispute resolution in the sector. (For a more detailed analysis, see the practice note on the case of India in Section 7.4.1 in the online module.) The ability of a regulator to govern legitimately and effectively is based on the real and perceived integrity, honesty and ethical behavior of its officials and employees and their decisions. Thus, it is necessary for regulators to implement an ethics framework to govern the activities of their employees and ensure the adherence to minimum standards of professional and ethical behavior. Box 5-3 below provides an example of the core values of civil service for Hong Hong (SAR).

- Commitment to the rule of law;
- Honesty and integrity;
- Accountability for decisions and actions;
- Political neutrality;
- Impartiality in the execution of public functions; and
- Dedication, professionalism and diligence in serving the community.

◂ Box 5-3Core Values of Civil Service in Hong Kong (SAR)

*Source: Hong Kong (SAR) Civil Servants' Guide to Good Practices.*2

At the heart of any ethics framework is the prevention of conflicts of interest, which can jeopardize the ability of a regulator to make an objective and transparent decision. One way to establish the core values and standards of conduct that should govern public service is to adopt and enforce a code of ethical conduct that binds all employees. A code of ethics can be part of a more comprehensive administrative code, such as the United Kingdom's Civil Management Code,3 or it can be promulgated as separate legislation, such as Canada's Conflict of Interest and Post-employment Code for Public Office Holders.4 Other regulators, such as Bahrain's TRA, include conflict of interest provisions in the telecommunications legislation. In general, the ethics codes for the public service sector in most countries serve as general ethical guidelines for all government agencies, including independent regulatory entities, although different departments, agencies and regulators may develop supplemental guidelines to take into account their specific functions and circumstances. Ethics codes can vary in content, but should generally address the following:5

- Establishing provisions for disclosure of personal and financial conflicts of interest (which include provisions regarding gifts, impartiality in performing official duties, and seeking outside employment);
- Rules for maintaining confidentiality of information;
- Setting procurement rules;
- Rules on staff relations (such as prohibitions on sexual harassment);
- Establishing methods to report and handle misconduct and what the proper grounds are for disqualification or dismissal; and
- Safeguarding agency assets through rules on spending and financial reporting.

Generally, ethics rules prescribe four approaches to avoiding or mitigating ethical conflicts, whether real, potential or apparent: (1) avoidance, (2) disclosure, (3) divestment or resignation, or (4) recusal.6 A code of ethics may encourage employees to take precautions to avoid situations that may result in a potential conflict of interest or give the appearance of impropriety. For example, the Hong Kong (SAR) Civil Servant's Guide provides the following guidelines: "avoid being placed in a position of obligation to anyone by accepting excessive entertainment or favors" and "avoid putting yourself in a position that may arouse any suspicion of dishonesty, or of using your official position to benefit yourself, your family, relations or friends."7 Employees are also typically required to disclose any conflicting financial interests or personal interests or the receipt of any gifts over a certain monetary value. Where a conflict of interest is identified, the employee may be asked to resign or to divest the conflicting interest. Another resolution may be the recusal, the disqualification or removal, of the employee from the particular matter that involves a conflict of interest. The Organisation for Economic Co-operation and Development (OECD) provides guidelines in dealing with conflict of interest situations (Box 5-4).

The main issues regulators encounter regarding ethics can be grouped into three broad categories: (1) acceptance of gifts; (2) personal and financial conflicts of interest; and (3) post-employment prospects.

Most recently in 2009, immediately upon inauguration, United States President Barak Obama issued an Executive Order requiring that every appointee in his Administration adhere and commit to an ethics pledge.8 The pledge includes bans on accepting gifts from lobbyists or lobbying organizations for the duration of service as a political appointee as well as restrictions on communications with employees of the former government agency.9

6.5.5.1 ACCEPTANCE OF GIFTS

Most ethical codes of conduct prohibit the improper acceptance of gifts between employees or from outside sources, which can influence the independent judgment and performance of official duties of a public employee to the benefit of the gift giver.1 In almost all countries, civil employees cannot solicit and must decline any gifts, hospitability or other benefits from persons dealing with the agency that give rise to impropriety or the appearance of impropriety, which could influence them in their personal judgment and integrity.2 For example, the Charter for the Public Service in Africa, which serves as a policy framework for public service administrations of African countries and as a source of inspiration for the development, strengthening or updating of national codes of conduct, states that: "Public service employees shall not solicit, accept, demand or receive, directly or indirectly, any payment, gifts or other advantage in kind in return for performing or refraining from performing their functions or obligations. It shall be reprehensible for public service employees to offer gifts or other advantages that might influence in their favor or in favor of family members and friends, the judgment or decisions of another person."3

Where it is impossible to decline a gift, there are different ways to handle it, such as disclosing the gift and reporting the gift to one's supervisor immediately,4 returning the gift or paying its market value,5 or obtaining permission prior to accepting the gift.6 For example, in Hong Kong (SAR), civil employees are required to seek permission from an authorizing officer before accepting or soliciting any prohibited gifts, and the approving authority may either allow the acceptance or solicitation of the gift unconditionally or subject to certain conditions, or refuse permission. If the gift is already in the civil employee's possession, the approving authority may (i) require the gift to be returned to the donor, (ii) require the gift to be donated to a charitable organization, or (iii) require the disposal of the gift in such other manner as the approving authority may direct.7

The practice of gift-giving is common in building and maintaining business or personal relationships, and may not always constitute bribery, so it is important to clearly define the difference between token niceties and outright bribery or influence-buying. Therefore, rules regarding the acceptance of gifts usually contain certain exceptions to account for local customs, for gifts below a certain monetary value, or for situations where acceptance of gifts is permissible. Differentiating between token gifts and improper bribes can be done in several ways:8

1. By a general rule prohibiting any gifts, invitations or courtesies;

2. By establishing situational guidelines on acceptance of gifts (*e.g.*, whether there is an impending hearing involving the giver or whether acceptance may be justified on policy grounds, such as to fund or pursue training or developmental programs);

3. By setting guidelines on the nature of the gift (*e.g.*, meals or invitations to ribbon-cuttings may be acceptable, while leisure resort weekends or substantial cash payments would be forbidden);

4. By imposing ceilings on the value of the gift; or

5. By requiring the declaration and registration of all gifts in a central register.

In Brazil, public service employees are prohibited from receiving a salary or any other prohibited remuneration from a private source, or receiving any means of transportation, lodging or any favours that could generate doubts as to the employee's honesty or integrity. However, the public service employee's participation in seminars and conferences is permitted provided that the information on any financial compensation and/or payment of travel expenses by the event promoter, who must not have a personal interest in any decisions made by the employee, is disclosed. Additionally, items are not considered gifts if they do not have any commercial value, or they are distributed by an entity as courtesy, for publicity purposes, as a customary public affairs matter, or on the occasion of a special event or commemorative date, and do not have a value of over BRL 100.9

In the United States, exceptions to the acceptance of gifts under the Standards of Ethical Conduct for Employees of the Executive Branch include, among others: (i) gifts with an aggregate market value of USD 20 or less, provided that the total value gifts received from the same person does not exceed USD 50 in one calendar year; (ii) gifts based on a personal relationship, such as a friend or family; (iii) awards and honorary degrees, other than cash or an investment interest, with an aggregate value of USD 200 or less if such gifts are a bona fide award given for meritorious public service or achievement; and (iv) discounts and similar benefits given to all government employees.10

In Hong Kong (SAR), acceptance of gifts (advantages) is permissible for: (i) gifts, discounts, loans of money or passages from tradesmen, companies or other organizations which are available on equal terms to non-civil servants; (ii) gifts, discounts, loans of money or passages from a relation; (iii) gifts and/or passages not exceeding in total HKD 2,000 from a close personal friend or HKD 1,000 from any other person on each occasion when gifts are traditionally given or exchanged, and not exceeding HKD 400 in total from a close personal friend on each other occasion; and (iv) loans of money from a close personal friend or any other person not exceeding HKD 2,000 and HKD 1,000 respectively, provided it is repaid within 14 days.11 Additionally, acceptance of entertainment, which is defined as the provision of food or drink, is not considered an advantage, and is not a criminal offense. However, a public service employee is advised to refuse lavish or unreasonably generous or frequent entertainment that might result in embarrassment in performing one's duties or bring the public service into disrepute.12

In addition to ethics rules adopted by regulators, many countries also have laws against bribery of government officials. The Canadian Criminal Code states that: "…every one commits an offense who being an official or employee of the government, demands, accepts, or offers or agrees to accept, from a person who has dealings with the government, a commission, reward, advantage or benefit of any kind directly or indirectly, by himself or through a member of his family or through any one for his benefit, unless he has the consent in writing of the head of the branch of government that employs him or of which he is an official, the proof of which lies on him."13 In the United States, under the Foreign Corrupt Practices Act (FCPA), it is unlawful for U.S. persons to bribe foreign government officials to obtain or retain business.14 In Hong Kong (SAR), under the Prevention of Bribery Ordinance, which is enforced by the Independent Commission Against Corruption (ICAC), it is considered a bribery and an offense for public officials to solicit or accept any gifts offered as an inducement to or reward in connection with the performance of their official duty, and it is also an offense for any person to offer such gifts.15

In some countries, specific local practices are prohibited. For example, the Hong Kong (SAR) Civil Servants' Guide also notes that the red packet (*hong bao*), traditionally given during Chinese New Year, is a gift of money and is considered a prohibited advantage under Section 4 of the Prevention of Bribery Ordinance, unless it is between family relations.16 The Kenya Public Officer Ethics Act 2003 explicitly prohibits the solicitation and collection of *harambees*.17 In Kenya, *harambee*, which means "pulling together," is a local practice that entails voluntary contributions in cash and in kind, such as labour, for community activities and projects such as schools and health clinics, and is considered to predispose people, particularly politicians, to corruption because it provides a means for people who steal public funds to legitimize themselves to the public.18

6.5.5.2 PERSONAL AND FINANCIAL CONFLICTS OF INTEREST

Another major consideration in establishing a code of ethical conduct is the conflict of interest arising from an employee's pecuniary interests, personal affiliations and family relations. A conflict of interest is likely to arise when a public office employee's loyalty to the government conflicts with his loyalty to: (a) family and other relations; (b) personal friends; (c) clubs and societies to which they belong; (d) professional colleagues in the private sector; or (e) any person to whom they owe a favor or are obligated in any way.1

Common examples of such conflicts include an employee's participation in proceedings that involve close associates or family members (nepotism), an employee's stockholdings in companies that have dealings with the employee's agency, or stockholdings in companies that the employee has gained confidential information through official capacities.2 For example, the Brazilian telecommunications regulator Anatel's internal administrative regulations prohibit the agency's employees from participating in administrative procedures in instances where they: (i) have a direct or indirect interest on the subject matter being acted upon; (ii) have participated or may participate as an expert, witness or representative, or if such situations involve a spouse, relative or relative in the third degree of consanguinity; or (iii) are in judicial or administrative litigation with the interested party. Anatel employees who find themselves in one of the above situations must communicate this information to their superior and abstain from participating in the procedure. Employees may be subject to investigation if there is suspicion that they have intimate friendship or enmity with any of the interested parties or their respective spouses, companions, or relatives up to the third degree of consanguinity.3

Similarly, Peru's telecommunications regulator, OSIPTEL, issued a Transparency Regulation that governs transparency in the agency's procedural and administrative activities and in the activities of its employees. Article 7 of the Regulation requires that OSIPTEL directors or employees who have decision-making powers or whose opinion on the substance of the proceeding can influence the decision at issue, shall abstain from participating in activities in the following instances:4

1. If their participation can affect their own economic interests, or the interests of their spouse or family member up to the fourth degree of consanguinity or second degree of affinity;

2. If their participation can affect the economic interests of their partners, organizations, companies or groups of which they are a member;

3. If their participation can affect the economic interests of individuals or legal entities with whom they are seeking employment;

4. If they are a family member to the fourth degree of consanguinity or second degree of affinity with any of the other parties or their representatives, or the other party's management staff;

5. If they have acted as advisor, expert or witness in the same proceeding, or if they have taken a stand on the issue at hand, except if their manifestation on the matter involved the correction of an error or the appeal of the decision; and

6. If they have worked in the past year with any of the other parties directly involved in the proceeding or have participated in any project with any of the other parties regardless of whether the project was actually carried out.

To avoid conflict of interest, many regulators also prohibit their employees from holding shares in companies that they regulate. For example, the Romanian Telecommunications Law prohibits the regulator's employees, including the president and vice-president, from having shares or participating as board members in any company under the regulator's competence.5 Similarly, the Telecommunications Act of the Independent Communications Authority of South Africa (ICASA) disqualifies persons from being a councilor if they or their family members have a substantial financial interest in the telecommunications or broadcasting industry, or if they or their business partners are employed by any person or entity in the telecommunications or broadcasting industry.6 The Kenya Public Officer Ethics Act prohibits a public office employee from holding shares or any interest directly or indirectly, in a corporation, partnership or any other body, which would result in a conflict of personal interests with official duties.7 Such conflicts of interest must be reported and the employee must refrain from participating in any deliberations with respect to the matter.8 The Act also prohibits the practice of nepotism or favouritism.9

Civil employees should not take advantage of their positions to further their own private interests, nor should they allow private interests to conflict with their public position. Conflicts may arise when employees use confidential information obtained in the course of employment to further personal interests. In Canada, for example, public office employees are not permitted to give preferential treatment in relation to any official matter to relatives or friends, or to any organization in which they, relatives or friends have an interest, nor are they allowed to use information obtained in their position as a public office employee that is not generally available to the public to further their own or any person's private interests.10

Ethics legislation in most countries also mandates the disclosure of financial and personal interests and even the divestment of such interests in order to prevent personal or financial interests from influencing the independent judgment of a civil employee. The Kenya Public Officer Ethics Act, for example, requires every public employee to annually declare their income, assets and liabilities, as well as those of their spouse(s) and dependent children under 18 years of age.11 In Canada, other than "exempt assets,"12 public office employees must declare and/or divest themselves of "controlled assets," which are those assets that could be directly or indirectly affected as to value by government decisions or policy in which the employee's agency has some role.13 Public office employees are also prohibited from participating in outside activities and employment that could impact their ability to perform their official duties and responsibilities objectively.14

6.5.5.3 POST-EMPLOYMENT PROSPECTS

Regulatory provisions regarding post-employment prospects are intended to prevent any suspicion that the public office employee's duties and decisions might be influenced by the expectation or hope of future employment with a particular firm or organization, and to avoid the risk that a particular firm or organization might gain improper advantage over its competitors by employing someone who had access to information on the competitor through the course of their prior official duties.1 In order to prevent conflicts between the employee's current responsibilities and outside employment, ethics regulation typically require employees to report any outside appointment if there is a potential conflict, such as when an employee had significant contacts with a company while in office, or if the company was a party to the matter that the employee's department was in charge of handling.2 In addition to reporting requirements, former employees may be required to either avoid certain proceedings or obtain permission from a former employer prior to taking a new appointment for a specified time period after termination of employment.

In Brazil, the members of the Board of Directors of the telecommunications regulator Anatel have a four month "quarantine" period (*quarentena*) before they can undertake a new position after termination of employment if the Public Ethics Commission finds that there exists a conflict of interest between the employee's former appointment and his new position.3 Pursuant to Article 13 of the Code of Conduct for Senior Government Officers, any proposals of future work or business in the private sector as well as any negotiations for work that may involve a conflict of interest must be communicated immediately to the Public Ethics Commission, regardless of whether it was accepted or rejected. Article 15 of the Code states that in the absence of a law specifying a different period of time, there shall be a four-month period beginning from the date of their departure from public service, during which former public service employees are barred from performing any activity that is incompatible with the office held previously. Within this period, former public service employees must comply with the following rules: (a) they may not accept any position as a manager or counselor, or establish professional relationships with an individual or legal entity with which they had previously maintained a direct official and relevant relationship within the last six months prior to their departure from public position; and (b) they may not interfere for the benefit of, nor on behalf of, any individual or legal entity, before any federal government entity or agency, with which they had a direct and relevant official relationship during the last six months prior to their departure from a public position.4 In addition, the Telecommunications Law prohibits the former Board member from representing any person or interest before Anatel for a period of one year after termination of employment.5

The United Kingdom's Civil Service Management Code provides that under specific circumstances, within two years of leaving government service, civil employees must file an application pursuant to the Business Appointment Rule and obtain government approval before taking any full-time, part-time, or fee-paid employment in the United Kingdom or overseas in a public or private company or in the service of a foreign government or its agencies. Such specific circumstances requiring government approval include: (i) if the employee is at a senior level; (ii) if the employee has had any official dealings with the prospective employer during the last two years of employment or if they had official dealings of a continued or repeated nature with their prospective employer at any time during government employment; (iii) if the employee has had access to commercially sensitive information of competitors of the prospective employer; or (iv) if the employee's official duties during the last two years of government employment involved giving advice or decisions benefiting the prospective employer for which the offer of employment could be interpreted as reward, or have involved developing policy, knowledge of which might be of benefit to the prospective employer. All civil service employees are required to report if they are considering any approach from an outside employer offering employment. Civil employees dealing with procurement or contract work must report any offer of outside employment whether or not they are considering the offer. The government's approval of an application under the Business Appointment Rule can be: (i) unconditional; or (ii) conditional subject to a waiting period before taking up the new appointment; or (iii) include a ban on the involvement of the applicant in dealings with the prospective employer and the government or with competitors of that employer.6

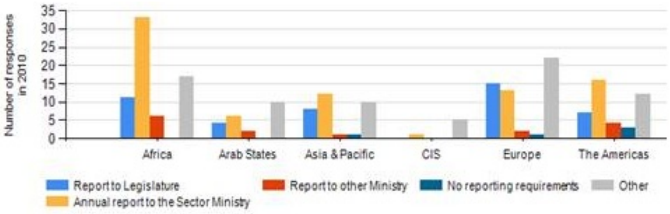
Canada's Conflict of Interest and Post-Employment Code for Public Office Holders requires that before leaving office, all public service employees must disclose in writing to the Ethics Commissioner all firm offers of outside employment that could place the employee in a position of conflict of interest, and any employee who accepts an outside offer must disclose in writing the acceptance of the offer. If the employee is engaged in significant official dealings with the future employer, the employee will be removed from their current duties and assigned to other responsibilities immediately. Within one year of leaving office, or two years for ministers of the Crown or ministers of state, employees are prohibited from accepting service contracts, appointments to a board of directors of, or employment with an entity with which they had direct official dealings during the one year period preceding the termination of employment, or to represent an entity in front of a department that they had direct and significant dealings with during public office.7 Additionally, employees who have official dealings, other than dealings consisting of routine provision of a service to an individual, with former public office employees who are or may be governed by the post-employment compliance measures of the Code must report those dealings to the Ethics Commissioner.8

6.5.6 ACCOUNTABILITY OF REGULATORS AND JUDICIAL REVIEW

The accountability of regulators can be monitored by implementing regulatory transparency and reporting regulatory activities to the government. Additionally, the regulator is also accountable to the public whose interests are affected by the regulator's activities, so adequate mechanisms should be implemented to educate and protect consumers, and allow consumers to voice their opinions and concerns with the regulator. This section will provide an overview of different approaches to ensure the accountability of regulators.

Parliamentary oversight and judicial review

The accountability of regulators is determined by various factors, but principally by the organizational structure of the regulator and its place within the governmental structure. In many cases, telecommunications regulators report administratively to sector ministries or other governmental agencies.1 (See Figure 5-M below on Reporting Requirements.) Accountability can be facilitated if regulators adopt internal procedures to guarantee transparency in their activities (such as ensuring an open and participatory decision- making process through public consultations, as discussed in Section 7.2) and staff accountability, and by fulfilling obligations to report to the legislature which provides external control. Additionally, most telecommunications regulators have the obligation to provide annual reports to Parliament or other executive branch entities such as ministries. According to a recent ITU survey of 192 countries, nearly all indicated that they must provide regular reports to the sector ministry, other ministry, the legislature and/or other governmental body.2 Only five countries, Cambodia, Ecuador, Nicaragua, Turkey and Uruguay have no reporting requirements.3



◄ **Figure 5-M: Reporting Requirements by Regulators by Region**

Source: ITU World Telecommunication Regulatory Database 2010.

Note: Regulators may be required to report to more than one entity.

The Canadian Radio-television and Telecommunications Commission (CRTC), which was established by Parliament in 1968, is a typical example of an independent public authority that reports to Parliament, in this case, through the Minister of Canadian Heritage. The accountability of the CRTC is addressed by various mechanisms. The CRTC must submit annual Departmental Performance Reports (DPR) to Parliament. These reports are based on specific principles contained in the DPR Preparation Guide and must reflect a comprehensive, balanced, and transparent picture of the organization's performance for each fiscal year. This report is made available on the CRTC's website.4 The CRTC also must prepare and publish its financial results in accordance with Treasury Board Guidelines and submit an annual report to the Standing Committee on Justice and Human Rights.

Additionally, Canada has implemented a "Proactive Disclosure" public policy so that all Canadians are better able to hold Parliament, their government, and public sector officials accountable. Under this policy, there is a requirement of mandatory publication on departmental websites of travel and hospitality expenses for selected government officials, contracts entered into by the Government of Canada, and reclassification of positions.

Procedures to overturn regulatory decisions

Another mechanism to ensure the accountability of regulators is to allow for appeals of regulatory decisions to a higher level in the regulatory and institutional framework. The legal framework for individual countries is of paramount importance when considering what mechanisms are available for appealing or overturning regulatory decisions. The effectiveness of the regulator can be undermined if the appeal process is closely linked to the executive branch, if regulatory decisions are put on hold or "stayed" during the appeal process, or if the appeal process is easily manipulated for the benefit of particular stakeholders.

In the first instance, the country's telecommunications law usually articulates the general process for appeals or reconsiderations of the regulator's decisions, and then the regulatory authority implements detailed internal procedures for reviewing and appealing administrative decisions. Clear and transparent appeal procedures enhance the independent regulator's credibility and give operators and other stakeholders, including consumers, a sense of stability in the regulatory process.

(a) To whom regulatory decisions are appealed

Typically, regulatory decisions may be appealed to the regulatory authority itself as an initial step. After reconsideration by the regulator, the decision usually may be appealed to a higher authority, such as the sector ministry, or to a court. In the Philippines, for example, appeals of the National Telecommunications Commission Board's decisions, rulings, orders, and resolutions can be filed with the Supreme Court.5 In many countries, including Malaysia and Nigeria, the regulator may require that all other remedies for review and appeal provided under the telecommunications law be exhausted before a person can seek judicial review.6 Sometimes regulatory decisions may be appealed to a specialized body established within the regulatory agency itself, such as an Appeal Tribunal or Appeal Board. For example, Hong Kong (SAR)'s OFTA has established an Appeal Board comprised of a chairman and deputy chairman that are "eligible to be appointed a judge of the High Court" and panel members who are not public officers. The decision of the Appeal Board is final.7 In Kenya, the Communications Act established an Appeals Tribunal with powers to adjudicate matters between the regulator and consumers, with powers of the High Court.8

When the appeal to the judiciary concerns policy matters or technical issues, the trend is for courts to defer to the specialized regulatory authority. Rather than making a decision on policy or technical matters, courts will often "remand" or refer a decision back to the authority for further review and action, sometimes indicating the scope of the further review.9

The ITU World Telecommunication Regulatory Database indicates that the judiciary has the authority to overturn a decision of the regulatory authority in almost two-thirds of the countries responding to the survey. Only 14 per cent of the respondents stated that the sector ministry had ultimate authority to overturn the regulator's decisions. Appeals to other government authorities also may be possible. For example, in the Maldives, parties who believe that a decision by the regulator, the Telecommunications Authority of Maldives (TAM), adversely affects their interests may first appeal to the minister charged with the responsibility of telecommunications, and if the aggrieved party remains dissatisfied with the decision of the minister, then a petition of appeal may be presented to the President of the Maldives.10 The President's decision is final and binding on the aggrieved person.

(b)Timeframe for an appeal to be filed and decided

The timeframe for aggrieved parties to file an appeal varies from 10 days, such as in the Dominican Republic,11 to 30 days, as in the United States.12 Countries such as Singapore, and the Philippines have deadlines of 14-15 days for filing an appeal against the regulator.13

The timeframe for resolving an appeal can range from under a month (*e.g.*, 10 days from filing the appeal with the Dominican Republic regulator, Instituto Dominicano de las Telecomunicaciones (Indotel), to no specific timeframe (*e.g.*, the United States). Most countries responding to the

2005 ITU World Telecommunication Regulatory Database indicated that they did not have a defined timeframe for resolving an appeal; among those which did have a timeframe, it was usually one to six months.

(c)Reasons for filing an appeal

An aggrieved party may file an appeal of a decision made by the regulatory authority in specific instances usually set forth in the telecommunications law. The reasons can be quite broad (any decision made by the regulator) or more narrowly focused to allow only procedural appeals. In New Zealand, for example, appeals from the Telecommunications Commission to the High Court are limited to questions of law.14 On the other hand, in the Philippines, the authority to appeal a decision is very broadly defined, where "a party adversely affected by a decision, order, ruling or resolution may, within 15 days from receipt of a copy thereof, file a motion for reconsideration."15 In Hong Kong (SAR), the scope of an acceptable appeal is more carefully defined as:

(1) Any person aggrieved by:

(a) an opinion, determination, direction or decision of the Authority relating to:

(i) anticompetitive practices, abuse of position, misleading or deceptive conduct, and non-discrimination, or (ii) any licence condition relating to any such section; or

(b) any sanction or remedy imposed or to be imposed under this Ordinance by the Authority in consequence of a breach of any such section or any such licence condition, may appeal to the Appeal Board against the opinion, determination, direction, decision, sanction or remedy, as the case may be, to the extent to which it relates to any such section or any such licence condition, as the case may be.16

(d) Effect of an appeal on a regulatory decision

The question of what happens to a regulatory decision during the appeal process can have a serious effect on the regulator's ability to enforce its decisions. If decisions can easily be appealed and are stayed or put on hold, then parties have an incentive to appeal every decision of the regulator to delay the implementation process of new rules and regulations that might affect them. This is particularly true of incumbent operators when faced with new rules dealing with the introduction of new licensing regimes or competition.

When asked about the effect of an appeal on a regulatory decision in the 2005 ITU World Telecommunication Regulatory Database, the vast majority of responding countries reported that they either: (i) allowed a regulatory decision to remain in force while it is under appeal; or (ii) depending on the merits of the particular case, either permitted suspension of the decision (or a stay) or allowed a choice between putting the decision on hold or allowing the regulation to remain in force. Hong Kong (SAR) is an example of the latter case, where it is the subject matter of the appeal that determines whether the appeal suspends the operation of the decision.17 A much smaller number of countries, about ten per cent of those responding, automatically stay a regulation when it is undergoing an appeal process.18

6.6 FUNCTIONAL ASPECTS OF REGULATION

When measuring the effectiveness and independence of a regulator, it is necessary to look not only at the structural and organizational design, but also at the functional aspects of regulation. In addition to the institutional design, in order to regulate effectively, a regulator should possess the proper authority and competency to exercise its regulatory functions. The scope of the regulator's mandate should be clearly established, which can vary depending on the degree of independence of the regulator and its interaction with other entities responsible for the ICT sector, such as the sector ministry, as well as its institutional design. Effective regulation also requires that the regulator adopt and implement procedures that are transparent and open to public participation and ensure accountability. These elements encourage public confidence in the regulator, compliance with regulatory decisions, laws and regulations, and create an enabling environment conducive to growth and development in the sector.

This Chapter provides an analysis and overview of the regulator's competencies and mandate, as well as regulatory procedures, focusing on three main issues: (i) ensuring an open participatory decision-making process through public consultations, (ii) ensuring the accountability of regulator's activities to the state and to consumers, and (iii) ensuring regulatory efficiency and promoting growth and competition of the sector through dispute resolution and enforcement procedures.

Practice Notes

- **Box 6-4: OECD Guidelines on Dealing with Conflict of Interest Situations [6.5]**
- **Case Study Converged Regulator: Ofcom [6.1.1]**
- **Case Study Multi-Sector Regulator: Latvian Public Utilities Commission (PUC) [6.1.1]**
- **Case Study Single Sector Regulator - Instituto das Comunicações de Portugal (ICP-ANACOM) [6.1.1]**
- **Case Study Single Sector Regulator: Botswana Telecommunications Authority (BTA) [6.1.1]**
- **Case Study: Conflict of Interest Regulations in Bahrain [6.5]**
- **Table 6-1: Model 1 – Single-Sector Regulator [6.1.1]**
- **Table 6-2: Model 2 – Converged Regulator [6.1.1]**
- **Table 6-3: Model 3 – Multi-Sector Regulator (MSR) [6.1.1]**

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- Uganda - Communications Act 1997
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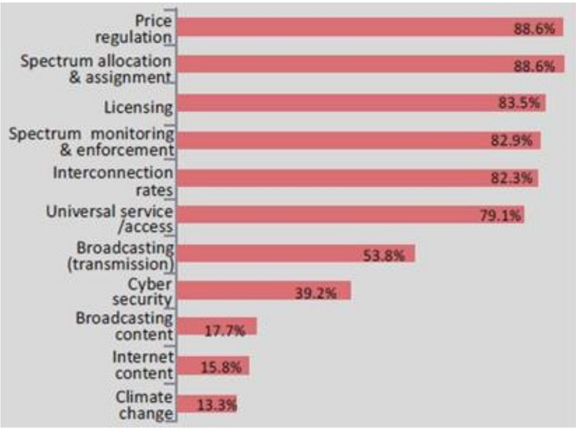
- US Spam Act
- US Standards of Ethical Conduct for Employees of the Executive Branch
- World Bank - Code of Ethics

6.6.1 OVERVIEW OF REGULATOR'S FUNCTIONS AND RESPONSIBILITIES

Telecommunications regulators generally are granted authority to carry out a broad range of functions through legal instruments such as the telecommunications law, subordinate regulations, and government decrees. These functions include the authority to conduct rulemakings and issue regulations, grant licences and other authorizations, undertake adjudication and enforcement matters, as well as address various telecommunications issues, including interconnection, price regulation, numbering, and spectrum management.

In a global survey conducted by the ITU, 158 countries reported a wide range of responsibilities under the regulator's jurisdiction (see Figure 6-A) .1 Nearly 90 per cent reported that the regulator is responsible for price regulation and spectrum allocation/assignment. Other prominent functions under the regulator's mandate include licensing; spectrum monitoring and enforcement; interconnection rates; universal access/service; and broadcasting transmission (i.e., non-content related issues). Less often, regulators are also responsible for cybersecurity; broadcasting and Internet content; and climate change issues.



◂ Figure 6- A: World Survey of Ten Regulatory Functions

Source: ITU, Trends in Telecommunication Reform 2012:Smart regulation for a broadband world, 2012.

Similarly, in Taiwan, the 1996 Telecommunications Act specifies that the Directorate General of Telecommunications (DGT) is responsible for developing an integrated telecommunications development plan, supervising telecommunications enterprises, and promoting the development of an information society so as to enhance public welfare.3

The rapid development of the telecommunications and information technology sectors, as well as the evolution of convergence, creates an increasing number of responsibilities for regulators regarding the manner in which to regulate (*i.e.*, the appropriate structure and regulations), as well as the manner in which to treat new technologies and services. This has produced a need to reorganize administrative functions in the telecommunications sector. For example, as described in Chapter 6, many regulators are including information technology as one of the areas of focus, and therefore have created offices dealing with such issues. In other countries, regulators are also dealing with broadcasting issues. Moreover, in yet other countries, regulators are still charged with dealing with other sectors such as postal services.

6.6.1.1 OVERVIEW AND COMPARISON OF DIFFERENT INSTITUTIONAL DESIGNS

There are four main institutional designs for telecommunications regulatory entities. First is the single-sector regulator whose sole function is to oversee the telecommunications sector (designated as Model 1 in this Section). The term single-sector is somewhat misleading as these entities, which in most cases originated from the separation of the operational and regulatory activities of state-owned post and telecommunications companies (PTTs), often include the postal and telecommunications industry as well as radiocommunications. The second design is known as the "converged" regulator, meaning those regulatory entities that oversee a broader range of services which, in addition to telecommunications, also include information and communications technologies, including broadcasting (designated as Model 2 in this Section). The multi-sector regulatory authority (Model 3) usually encompasses various industry sectors that are considered public utilities, *e.g.*, telecommunications, water, electricity, and transportation. The fourth category is not a regulatory authority per se, but an approach in which general competition policy is the main method of overseeing the telecommunications sector (designated as Model 4 in this Section).

Characteristics of these models of institutional entities for telecommunications regulatory agencies are as follows.

Model 1 – Single sector regulators

This organizational structure focuses mainly on the telecommunications (and sometimes postal) sector, with other government entities responsible for broadcasting and information technology issues. Many countries around the world still use the single-sector regulatory authority approach,[1] including Algeria (Regulatory Authority for Post and Telecommunications), the Comoros (National Society of Postal Services and Telecommunications), Jordan (Telecommunications Regulatory Commission, which includes postal oversight), Egypt (National Telecommunications Regulatory Authority), and Oman (Telecommunications Regulatory Authority).[2] The single-sector regulator also includes organizational structures where the ministry is a regulator, such as the Ministry of Internal Affairs and Communications in Japan.

Prior to liberalization it was common for a state-owned operator to be responsible for regulating the post and telecommunications industries as well as for radiocommunications issues, and in some cases, even serving as international representatives of their respective countries with regard to their operations. After liberalization, this structure was no longer possible under most countries' legislation.[3] Thus, the operation and regulation functions were separated and independent regulators were established. In many countries, when telecommunications regulators were initially established, they simply took over the "regulatory function" from government-owned PTTs and therefore their mandate almost automatically included the administration of radiocommunications and postal services in addition to telecommunications.

In Europe, once the PTTs were separated and privatized, the regulation of telecommunications, radio and the postal sector often was assigned to one agency.[4] Telecommunications regulators in Europe were established by combining certain units within the public administration (or from the state-owned operator) or by transferring employees or units from the ministry to the new organization. The units that were transferred often remained the same and were integrated into the structure of the new organization, which was based on fields of activity and communications technologies. Within this context, regulators in Europe were generally organized in a technology/field-oriented regulatory structure and emphasis was placed on the recruitment of technologically-oriented staff (*e.g.*, engineers).

A key advantage of a single-sector regulatory authority is that it can be focused on the complex technical challenges of the telecommunications sector, including network and service development. The telecommunications sector tends to be more dynamic than other utilities and a single-sector regulator can often adapt to this more easily. One disadvantage of sector-specific regulators is that sufficient resources may not be available to staff the different regulator agencies and there may be duplication for regulatory activities that are common to different industries.

A justification for a single-sector regulator is based on the perception that the telecommunications sector includes specific technical issues, such as numbering, that are unique to the telecommunications sector and exhibits specific characteristics that differentiate it from other industries. Decision-making within communications policy is based on the expertise of the regulators. As experts, they participate in drafting laws and act as advisors to the appropriate ministry or other authorities when necessary. Regulators require not only need expertise in the technical, financial, and legal aspects of communications, they also need to systematically analyse present and future developments, and be able to cooperate with other countries on sector issues at the international level. Therefore, it is vital that staff is sufficient in number and suitably qualified to be able to face such a task. The perceived need for a specialized skill-set led the Cape Verde Government to establish a separate ICT specific regulator in 2004 (Institute of Communications and Information Technology – ICTI) in parallel with and despite the existence of a multi-sector (economic) regulator (Autoridade de Regulamentação Economica – ARE) which also has a mandate to regulate telecommunications. Since becoming operational, ICTI has in practice undertaken both the technical and economic tasks in the ICT sector, with ARE focusing on the other sectors. This has been in part because ICTI has the staff and desire to review a wide range of telecommunications issues, including tariffs, that would normally be within the purview of ARE, and because the two institutions have come to an agreement allowing ICTI to take the lead role on telecommunications issues.[5]

Another advantage of single-sector regulators relates to the origin of their staffing. In many cases, single-sector regulators tend to inherit staff from the former PTT and therefore have a core of specialized professionals from the start with a thorough understanding of the technical issues and strong engineering skills, a key advantage when dealing with complex network issues. Opponents of the single-sector regulatory structure argue that the origin of this specific skill set is, in fact, one of the key disadvantages of establishing a single-sector regulator. These critics argue that staff could be biased in favour of the incumbent, and thus more subject to capture by dominant forces. While this is an issue to be considered, it is not unique to the single-sector regulator. Whatever the option chosen, there must be a series of "checks and balances" to ensure that the regulator can perform its mandate independently.

One major concern within the single-sector model is the possibility of institutional rigidity. Since a single-sector regulator is restricted to telecommunications, this type of structure can limit the effectiveness of the agency and its staff members as it faces the issues raised by convergence. Given that regulatory authority has historically focused on a narrow sector, the regulatory authority may become nearly frozen in time in terms of defining the sector it is regulating. As a consequence, it may not necessarily draw the appropriate staff from across the broader communications sector necessary to be flexible and, therefore, is unable to adapt to the continuous changes in the communications sector. A practical example of such difficulties has been the case of single-sector telecommunications regulators having difficulties when incorporating next generation technologies and services into the regulatory framework.

In recent years, and especially with convergence in the communications sector blurring the boundaries between industries, overlapping responsibilities between sectoral regulators has also become an issue, leading sometimes to duplication of regulations and required authorizations for what are essentially similar services being offered to the public. This can cause conflicting decisions across sectors, or indeed lack of decisions where overlap between mandates cannot be resolved on a political level. The challenges of convergence have led several countries, including South Africa and the United Kingdom, to move away from single-sector regulators and evolve towards a converged regulator, thus merging agencies in charge of the various aspects of the communications sector.

Model 2 – Converged regulator With a **converged institutional design**, all communications services *i.e.*, telecommunications including radiocommunications, broadcasting and media (and in some instances postal services), are under the umbrella of one agency.

Several countries have followed the route of converging their institutions dealing with the communications sector, typically combining formerly discrete agencies responsible for telecommunications, broadcasting or information technology into one entity:

- In December 1999, the Info-Communications Development Authority of Singapore Act of 1999 disbanded the former telecommunications regulator (Telecommunications Authority of Singapore, TAS) and the information technology agency (National Computer Board, NCB), to create one new statutory board, the Infocomm Development Authority (IDA).[6]

- The Independent Communications Authority of South Africa (ICASA) is the regulator of telecommunications and the broadcasting sectors. It was established in July 2000 as a result of the Independent Communications Authority of South Africa Act No.13 of 2000. It took over the functions of two previous regulators, the South African Telecommunications Regulatory Authority (SATRA) and the Independent Broadcasting Authority (IBA).
- In 2001, the Saudi Arabian Council of Ministers issued a decision changing the name of the Saudi Communications Commission to the Communications and Information Technology Commission in light of new tasks it assumed in information technology.
- Several EU member states, including Finland and the Netherlands, are also moving to converged regulators that regulate the licensing of infrastructure across the telecommunications and broadcasting sectors through a single regulatory body. In 1997, Italy created a single regulatory body with responsibility for all telecommunications and broadcasting matters. Austria also established such a regulatory authority in 2001.
- A similar approach was also taken by the United Kingdom. The Office of Communications (Ofcom) was established in the United Kingdom in December 2003 as a result of the Communications Act 2000[7] and became the regulator for television, radio, and telecommunications. Ofcom combines five former agencies: the Broadcasting Standards Commission (BSC), the Independent Television Commission (ITC), the Office of Telecommunications (Oftel), the Radiocommunications Agency (RA), and the Radio Authority.
- Even the European Commission's Information Society Directorate was granted new responsibilities for audiovisual and media policies. The new Information Society and Media Directorate General brings together all three aspects of modern day electronic communications: broadcasting; computer networks; and electronic communication services.[8]

Like the single-sector telecommunications regulator, the converged communications regulator tends to be strong in specialized engineering skills in the communications sector, which is an important core expertise in dealing with complex network issues. In addition, the converged communications regulator also meets the challenges posed by service convergence by bringing in related skills, and therefore overcomes what is generally viewed as being one of the main disadvantages of a single-sector regulator (*e.g.*, a telecommunications regulator overly focused on the telecommunications sector).

This model also better meets the need for flexibility in terms of its internal administration's ability to meet market realities. It gives the regulatory authority and its staff the flexibility to better handle the continuous technological and regulatory changes and developments within the ICT sector. By having all services – which are increasingly provided over a single network – under one regulator, the staff responsible for specific services can work with other parts of the regulator that are dealing with related issues, and therefore the regulator can take a more consistent approach when considering changing technologies and their effect on legacy regulations.

In addition, the converged model tends to resolve some of the overlap between telecommunications and broadcasting that has tended to become one of the regulatory issues regarding convergence. As was clearly shown in the EU's 1997 Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors,[9] and in its "99 Review,"[10] convergence in communications has called into question the service-based vertical regulatory system, with industry increasingly demanding a reorganization of the regulatory institutions in order to address the challenges posed by convergence.

As further stated by David Currie:[11]

"Ofcom believes that convergence is a reality and that a converged regulator is best placed to nurse that convergence. When the Internet can deliver what looks to all intents and purposes like television broadcasting in a few years' time, then Ofcom and the Government will face awkward choices. Should, in the interests of fairness, the content regulation of terrestrial, cable and satellite broadcasting be rolled out to Internet broadcasters? Or should the content regulation of terrestrial, cable and satellite broadcasters be significantly rolled back, passing the baton to smart navigational devices that allow people to find the content that they want (subject to the law) and avoid the content that they do not want to see or hear? A converged regulator like Ofcom will I hope be able to bring wisdom to that debate."

Model 3 – Multi-sector regulator

Multi-sector regulators oversee not only the telecommunications sector, but other industry sectors with common economic and legal characteristics (*e.g.*, telecommunications, water, energy, and transportation). Costa Rica, the Gambia, Jamaica, Latvia, Luxembourg, Niger and Panama, as well as state public utility commissions in individual states in the United States, have chosen this type of organizational structure.[12]

The advantages and disadvantages of multi-sector regulators have been discussed in various fora, and opinions vary. One of the main arguments generally raised in favour of a multi-sector regulator is based on the perceived lack of resources and the need for economies of scale to effectively regulate the different infrastructure industries and sectors. It is often argued that with this type of structural organization, one set of staff can be used to oversee a variety of industries. The rationale is that telecommunications is considered to form part of the overall infrastructure sector along with other utilities, such as electricity and water, and that infrastructure services share certain aspects: they are aimed at providing basic needs to the public; they often use similar rights-of-way; and they typically involve the economic regulation of large monopolies with network economic characteristics (*i.e.*, high sunk and fixed costs). However, experience in some countries, such as Latvia, has shown that existing multi-sector regulators are performing poorly.

The answer to the staffing question is straightforward on the one hand and more complex on the other. Looking at the question in the strictest sense, single-sector regulators will look for highly technical staff focused on the telecommunications sector and generally organize their staff in industry-based units (*e.g.*, post, telecommunications, radiocommunications). Converged regulators will look for staff that can bring in the expertise and know-how from the different sectors they are regulating. Generally these regulators are organized in functional units or indeed in horizontal, project-based units (See section 6.1.2.3. for details on administrative structures regarding functions of regulatory authorities). Multi-sector regulators will recruit staff specialized in the different sectors, and are generally organized in terms of the sectors within their mandate although some pool legal and economic resources to deal with, for example, tariffing issues that may be common across the different sectors.

An important question within this context, however, is to what extent staff can actually be used across the sectors. Our experience shows that staff within this model is generally recruited in terms of the sector they are regulating and only legal and occasionally economic staff is pooled to deal with specific issues that occur across the sectors. Luxembourg, for example, has organized its agency according to industries/services: telecommunications, electricity, gas, postal and spectrum management issues – these are then divided into smaller issue-specific units.**13** This can also be seen in Belize and Niger. An interesting discussion of this issue is presented in the WDR Discussion Paper # 0204 of March 2002 which claims that:

*"Examination of the actual organization of U.S. state-level multi-sector regulatory agencies, the Public Utility Commissions (PUCs), does not provide much evidence of economies of regulation, except at the level of the decision-makers, or Commissioners. Generally, staff members specialize in a particular sector such as telecommunications or water and work within distinct divisions that are devoted to sector-specific regulation. Resources are shared at the levels of commissioners, who hear cases pertaining to all sectors, the senior staff who manage the agency as a whole, and the legal staff responsible for hearings and related procedural matters. Generally, the different divisions are located in common facilities and use common amenities such as libraries, which may yield certain savings. … It must also be noted that U.S. PUCs do not have jurisdiction over frequency management, cable and broadcasting. … The U.S. PUC experience shows that there may be significant economies in areas such as use of buildings, libraries, and training facilities in common. This does not, however, justify multi-sector regulation as such, only close collaboration among sectoral regulatory agencies."***14**

It is also often the case that a multi-sector regulatory authority is not created from scratch, but is the result of merging several existing agencies. In most countries it is not possible to dismiss employees in the course of such a merger, negating the realization of the hoped-for economies of regulation. In addition, a merger of two going concerns often creates significant morale problems and results in increased expenditures.**15**

Another disadvantage of this model is that often the telecommunications sector is the most liberalized sector under the auspices of the multi-sector regulator and therefore can be negatively affected if the telecommunications regulator is merged with other more highly regulated and less agile industries. Indeed, it may make matters worse by having telecommunications regulated in an environment with utilities that are progressing at a different pace where the needs and priorities are different, or where resources are practically non-existent. Moreover, by adding sectors, such as electricity and gas, that do not always produce revenues for the regulator, the telecommunications sector may bear a disproportionate share of the costs of regulation, potentially driving up regulatory costs for telecommunications providers.

Supporters of this model argue that having a multi-sector regulator can reduce political and other influences regarding the decision-making process as opposed to, for example, the single-sector regulator. Despite such claims concerning "capture" (meaning undue influence by politicians and/or dominant players), this does not necessarily seem linked to the institutional design option *per se* but is more a product of whether a clear set of "checks and balances" is incorporated in the design of the regulator. Indeed, a risk of the multi-sector regulator could even be that "capture" by a dominant ministry or entity not only affects a single sector but all sectors regulated by the multi-sector regulator. In addition, there may be greater complexity in establishing the legal framework for the multi-sector regulator, including the level of independence and allocation of functions as between the minister and the regulator.**16** Furthermore, potential delays in instituting necessary reforms may result due to the disadvantages mentioned above.

Some argue that using cross-sector institutions to regulate telecommunications is justified in light of the growing convergence between telecommunications and other sectors. Ensuring that cross-sector rules and institutions are used to regulate telecommunications as well as other similar (utility) sectors may bring benefits, such as greater regulatory certainty (as operators may better forecast what to expect by observing how the regulatory framework is applied in other sectors) and lower risks of distortion between different activities. A counterargument is that the rationale behind establishing a multi-sector regulator is more a question of regulatory efficiency than of dealing with convergence in the communications sector. Even within this model it really depends on the mandate of the multi-sector regulator (*i.e.*, whether it deals with just telecommunications or with communications as well as water, electricity, and transport) to determine whether a utilities-based regulator has the staff and internal administration that allows it to effectively cope with the challenges posed by ICT convergence.

As the market develops, and convergence affects the way in which communications is offered to the people, regulators not only are expected to possess high technical expertise, but to have an understanding of the structure and development trends of the communications market. Furthermore, regulators should be able to anticipate potential situations that could threaten or interfere with the development of the electronic communications industry. The concern that staff in a single-sector telecommunications regulator may face difficulties when incorporating next generation technologies and services into the regulatory framework is heightened with a multi-sector regulator since the staff of a multi-sector regulator would not necessarily be as technically focused on the communications sector. Obviously, a multi-sector regulator could recruit staff suited to the task of regulating the communications market, but the risk, especially where economists and legal experts are shared across the utilities sector, is that the pool of expertise becomes more diluted, thus compromising the capability and ultimately the credibility of the regulator.

A clear discussion of the advantages and disadvantages of multi-sector regulators is presented by Schwartz and Satola in the Table 6-3.**17**

Model 4 – No specific telecommunications regulatory authority

An alternative approach is to rely on the application of competition and antitrust rules rather than on detailed sector-specific rules and institutional designs. Until the passage of the Telecommunications Act of 2001, New Zealand, for example, had chosen to entrust antitrust authorities with the task of administering all rules controlling market power in telecommunications.**18** There was no sector specific regulatory requirement except for special obligations on Telecom New Zealand, called the Kiwi Share Obligations, which in effect regulate the price and availability of residential telephone service. Instead of sector specific regulation, the regulatory regime for telecommunications in New Zealand relied primarily upon general competition law, the Commerce Act 1986, to prevent anticompetitive behaviour. Thus, the primary constraint on the conduct of telecommunications firms in New Zealand was the same competition law that applied to all economic enterprises in New Zealand.**19**

However, in late 2000, the Minister of Communications determined that New Zealand's reliance on the Commerce Act and general competition authority was inadequate in some respects to regulate the telecommunications sector.[20] As a result, the Telecommunications Act 2001, which contained sector-specific provisions, was passed in December 2001 to complement the generic competition provisions of the Commerce Act. Furthermore, the position of a Telecommunications Commissioner, a specialist stand-alone commissioner within the Commerce Commission, was established, *inter alia*, to regulate the telecommunications sector, and in particular to resolve disputes over regulated services, to report to the Minister on further designations or specifications of additional services, and to monitor and enforce the Kiwi Share obligations.[21] Additionally, the Telecommunications Commissioner has statutory responsibility for decisions made under the Telecommunications Act.

◂ Table 6-4: Model 4 – No Specific Telecommunications Regulatory Authority

Advantages	Disadvantages
▪ Simple to implement. ▪ Inexpensive. ▪ Reliance on economy-wide rules and institutions to regulate the sector promotes a coherent treatment between telecommunications and other sectors. ▪ Less risk of political capture where the judges are ultimately in charge of enforcing economic regulation in the telecommunications. Judges are seen to enjoy a clearer and more straight-forward protection against undue pressures from the government and are independent from industry.	▪ Non-specialized judges are ill-equipped to deal with complex telecommunications regulatory issues (*e.g.*, local interconnection cases in New Zealand).[22] ▪ Legal processes are often not designed to give a voice to those who are not directly parties to the dispute. ▪ Costs of protracted litigation and regulatory mistakes can be very high. ▪ Sector-specific issues such as interconnection and number portability may be difficult to resolve in the absence of sector-specific requirements. ▪ Lack of clear accountability channels renders it unnecessary to set and achieve sector objectives such as universal service, thereby opening the door for ineffective or sometimes unnecessary regulation. ▪ There is no actual functioning example of this model.

Practice Notes

- Case Study Converged Regulator: Ofcom [6.1.1]
- Case Study Multi-Sector Regulator: Latvian Public Utilities Commission (PUC) [6.1.1]
- Case Study Single Sector Regulator - Instituto das Comunicações de Portugal (ICP-ANACOM) [6.1.1]
- Case Study Single Sector Regulator: Botswana Telecommunications Authority (BTA) [6.1.1]
- Table 6-1: Model 1 – Single-Sector Regulator [6.1.1]
- Table 6-2: Model 2 – Converged Regulator [6.1.1]
- Table 6-3: Model 3 – Multi-Sector Regulator (MSR) [6.1.1]

6.6.1.2 OVERVIEW AND COMPARISON OF DIFFERENT ORGANIZATIONAL AND ADMINISTRATIVE STRUCTURES

Organizational Structures

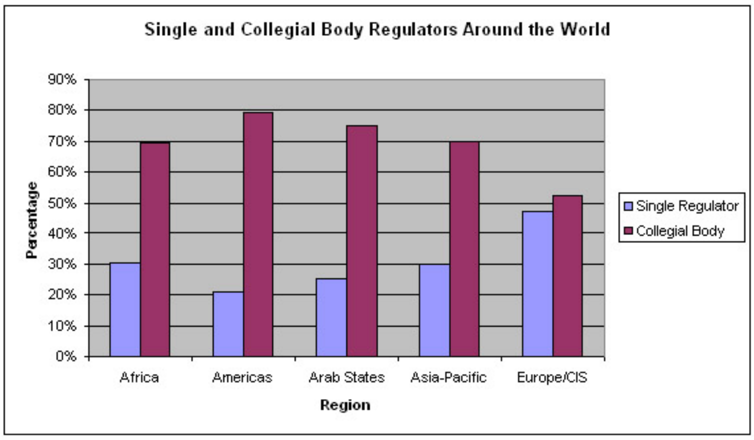
Determining the ideal organizational structure for a regulatory authority requires an assessment of various factors including: the country's needs and objectives; political environment; legal requirements; and available expertise in the labor market.[1] There are essentially two models of leadership organization for regulatory authorities: (i) the collegial body (a board or commission composed of multiple members); and (ii) the single regulator (often given the title of chairperson or president). Each has its advantages and disadvantages, and variations of each model are in use around the world.

The collegial body model usually involves a board or commission made up of individuals with different areas of expertise, potentially bringing those varied perspectives to bear on each regulatory issue. In addition, a collegial body could be seen as more independent, as it is less likely that all members would be influenced by the same actors, whether in the government or the private sector. Collegial bodies also often impart a sense of legitimacy in decision-making, as it is less likely that a single individual was responsible for any particular decision. However, as in any decision-making process involving more than one actor, the development of regulatory decisions can be a slower process and more subject to internal struggle.

By comparison, the single regulator model has the potential benefit of a consistent approach to regulation and decision-making, as decision-making authority is vested in a single individual who may have a unified plan for the telecommunications sector. In contrast to the collegial body model, single regulators can make decisions much more quickly, even when constrained by due process regulations. However, the single regulator is also potentially more vulnerable to undue influence exerted by external actors, whether in the government or in the private sector. In addition, a single individual may not be able to match the expertise of a collegial body made up of individuals from different backgrounds, although experienced staff can provide substantial expertise.

The number of regulators led by collegial bodies and single regulators continues to fluctuate as governments restructure their regulatory frameworks for telecommunications. However, based on responses received by the ITU to its annual Telecommunications Regulatory Survey during the past two years, approximately 75 per cent of the regulators are collegial bodies with the remaining 25 per cent constituting single regulators.2 Based on 2005 data,3 it can be seen that there are significant differences between the balance of collegial bodies and single regulators in various regions. (See Figure 6-A.)

In the Americas, 20 per cent of the 29 countries indicated that their regulatory agencies were headed by a single regulator, while among the 38 European/CIS states, 47.4 per cent reported regulators headed by a single individual. Approximately 30 per cent of countries from both the African and Asia-Pacific regions reported that they had single regulators, as did 25 per cent of the Arab states.4



◂ Figure 6- A: Single Regulators and Collegial Bodies Regulators around the World

Management Structure

(a) Regulatory authorities headed by a collegial body

Almost two-thirds of the 131 countries that submitted responses to the 2005 ITU survey indicated that their regulatory agencies are collegial bodies.5 These multi-member commissions or boards of directors are composed of a varying number of members (usually an odd number from three to seven to minimize tie votes) that oversee and direct all activities of the regulator. One member is the chairperson or president of the commission/board and sometimes has a “casting” or deliberative vote that counts twice and acts as a tie-breaking vote, if necessary.

Depending on the appointment process of the regulator, collegial body members can be appointed by one single branch of government, multiple branches of government and/or other industry stakeholders. This issue is further discussed in Section 6.2 on Staffing and Remuneration.

Management and administrative functions

The day-to-day management and administrative functions of the regulator are handled in varying combinations by: an executive director, chief executive officer (CEO), the chairperson, and/or managing director (collectively referred to herein as managing director). In some countries, like Botswana, Brazil, Canada, Greece, Ireland, Jordan, Malaysia, Mexico, Portugal, South Africa, and Venezuela, the managing director of the regulatory authority is the chairperson of the commission/board.6

The managing director acts as a liaison between the commission or board of directors and the departments/divisions that comprise the regulatory authority. In the Dominican Republic, the managing director is part of the board and acts as its secretary, but does not vote.7 In Peru, the managing director of the Organismo Supervisor de la Inversión Privada en Telecomunicaciones (OSIPTEL) participates in the board of directors’ meeting sessions, but essentially acts as an observer and cannot vote.8

The duties and responsibilities of the managing director differ from country to country. In Bahrain, the general director not only handles the day-to-day affairs of the regulator, but also determines the internal structure and organization of the agency, and has authority to: delegate his functions to other agency staff; employ staff members and consultants; and establish conditions of employment for staff members (this last one with approval from the board).9 In Peru, OSIPTEL’s managing director is responsible for managing the regulator and carrying out the policies established by the board of directors and president of the regulator. In addition, the managing director is responsible for: the legal, administrative and judicial representation of the regulator; proposing policies and strategies for the development of OSIPTEL; developing the annual report and the regulator 's budget for approval; and hiring, promoting, suspending and firing staff members (decisions regarding management staff members need approval from the board of directors and president of OSIPTEL).10

(b) Single individual structure

Single individual regulators are headed by a CEO, president or director general (collectively referred to herein as CEO) who oversees all policy, management, and administrative activities of the regulatory authority. In most cases, the CEO is appointed by the central government, often the minister responsible for communications. The term of office is fixed and generally varies from two to six years. However, in certain countries, including Estonia, Ethiopia, Iran, Liechtenstein, Norway, Oman, and Sudan, the CEO does not have a specific term of office.11

The duties and responsibilities of the CEO differ from country to country, but they are generally granted a broad scope of authority and responsibility. In Romania, the president of the National Regulatory Authority for Communications (ANRC) has a broad slate of responsibilities including managing the regulator, issuing decisions, approving the regulator 's organizational structure, and acting as the liaison with high-ranking authorities and officials both in Romania and abroad12. In Guatemala, the Superintendencia de Telecomunicaciones (SIT) is headed by a superintendent who is responsible for managing and defining SIT policies, developing the regulator's organizational structure, appointing and removing SIT employees, preparing its annual budget, and informing (at least twice a year) the Ministry of Communications, Transportation and Public Works of the regulator 's activities and internal administration issues.13 In addition, recent global events such as the Enron and Worldcom incidences have led to the evolution and shaping of a broad body of corporate governance and reporting principles which are gaining wide acceptance globally. The move to define principles for corporate standards of performance has also been quite active leading to new legal requirements as shown by the King Report in South Africa and the Sarbanes-Oxley Act in the United States.

The CEO is typically assisted by one or more deputies to whom he can delegate responsibilities. For example, in Romania, the president of the ANRC is assisted by a vice-president.14 Similarly, in Denmark, the director general of the National IT and Telecom Agency is assisted by two deputy generals.15

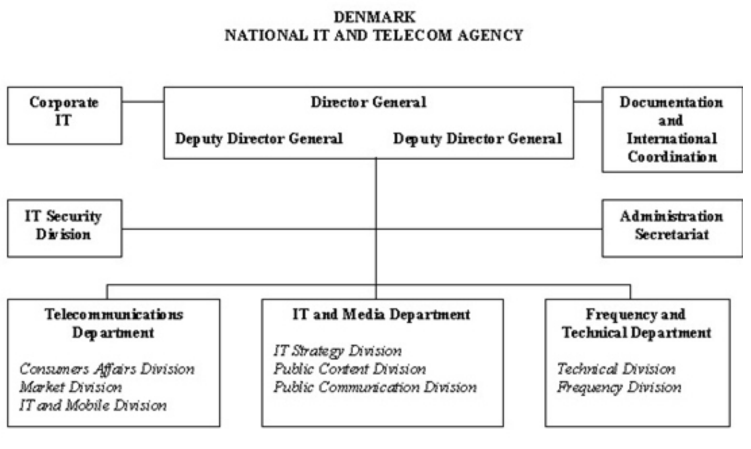
Administrative Structure regarding Functions of Regulatory Authorities

Once the scope of work and type of management structure is established, a country must determine how the functions of the regulatory authority will be organized (*e.g.*, whether by industry/service, function or project).

(a) Industry or service-based departments

Many regulators follow a vertical (all regulatory issues) structure comprised of departments that address specific services areas (*e.g.*, broadcasting, telecommunications, and information technology) under the authority of the regulator, as well as departments typically responsible for operations and administrative functions.16

Denmark's National IT and Telecom Agency, a converged regulator, is divided into seven departments/divisions: (1) telecommunications; (2) IT and Media; (3) frequency and technical; (4) IT security; (5) documentation and international coordination; (6) corporate IT; and (7) the administration secretariat. The Telecommunications, IT and Media and Frequency and Technical departments are further divided into smaller units that are responsible for specific issues such as public content, frequency, consumer and market affairs within those industries/services.17 Below is the organizational chart for Denmark's National IT and Telecom Agency:



◀ **Denmark - National IT and Telecom Agency**
Source: http://www.itst.dk/mainpage.asp

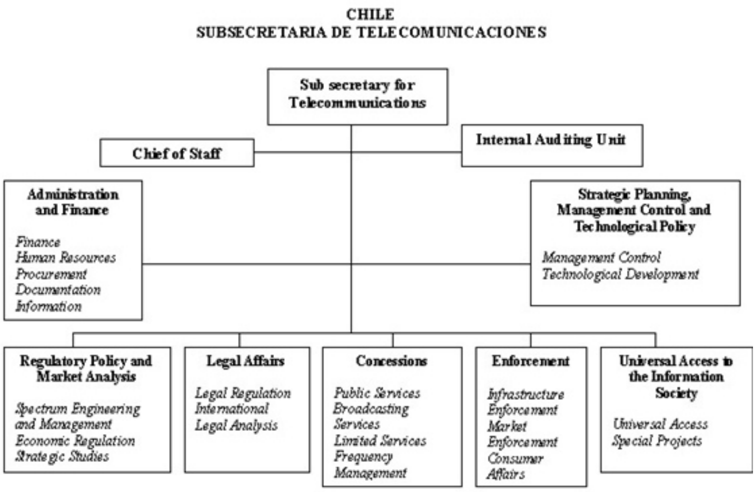
In the case of Luxembourg, which has a multi-sector regulator, departments/divisions are responsible for the following industries/services: telecommunications, electricity, gas, postal and spectrum management issues. Similar to Denmark's regulatory authority, each of these departments/divisions is divided into smaller issue-specific units.18

(b) Function-based departments/divisions

These regulators follow a horizontal (narrow range of regulatory issues) structure, but they cover all the specific service sectors that are regulated. Function-based departments/divisions have responsibility for areas such as: administration and human resources; enforcement; legal analysis; licensing; public relations; technical analysis and development; research and market analysis; user/customer services; and universal service fund administration.

For example, Chile's Subsecretaria de Telecomunicaciones (SUBTEL), is divided into seven function-based divisions: Administration and Finance; Regulatory Policy and Market Analysis; Legal; Concessions; Enforcement; Universal Access to the Information Society; as well as a division for Strategic Planning, Management Control and Technological Policy. Each of these divisions is subdivided into units that are responsible for more specific topics. The Administration and Finance Division, for instance, is subdivided into five units that are responsible for finance, human resources, procurement, documentation, and a unit that handles information (including claims and suggestions). The Regulatory Policy and Market Analysis Division of SUBTEL is subdivided into three units, one for spectrum engineering and administration, one for economic regulation, and one for strategic studies.19

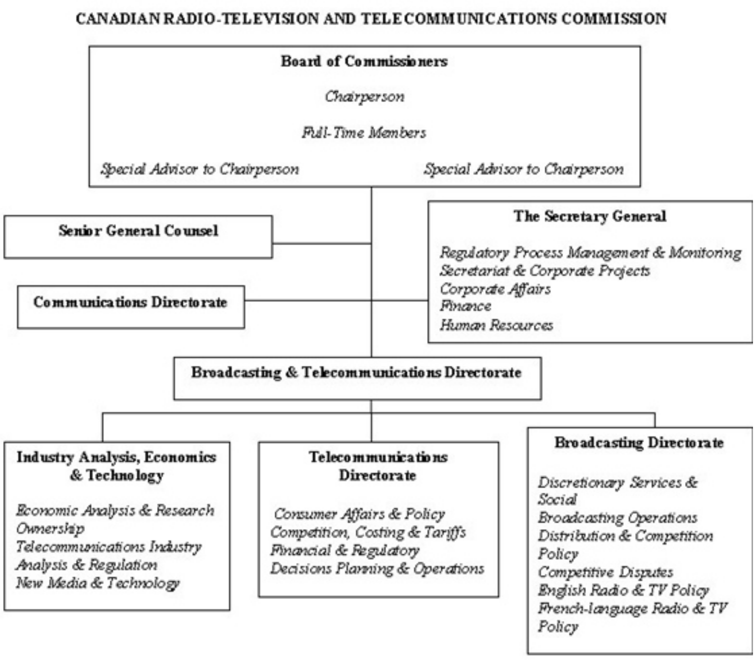
Malaysia's Communications & Multimedia Commission (MCMC), a converged regulator, is also divided into function-based divisions. They include: Industry Development; Regulatory State Coordination; Technical; Resource Planning & Management; Monitoring & Enforcement; and Management & Support Services. Similar to the Chilean model, each of these divisions is then subdivided into topic-specific units. The Regulatory State Coordination Division is subdivided into two departments, one for regulatory coordination (which includes units for licensing and for universal service provision) and the other for state coordination (which includes a unit to manage regional office matters).20 Below is the organizational chart for Chile's SUBTEL showing how this regulator has divided responsibilities by function:



◂ Chile - Subsecritaria de Telecomunicaionces

Source: http://www.subtel.cl

Some regulators combine aspects of the industry/service and function-based structure models. The Canadian Radio-television and Telecommunications Commission (CRTC) divides the Commission's responsibilities into the following departments/divisions: Broadcasting and Telecommunications Directorate; General Counsel Directorate; Communications Directorate; and Secretary General.21 The SIT of Guatemala distributes responsibilities among three main departments/divisions: telecommunications; administrative; and legal.22 Below is a diagram of Canada's CRTC showing how a regulatory authority can combine both industry/service and function-based departments/divisions within its organizational structure:

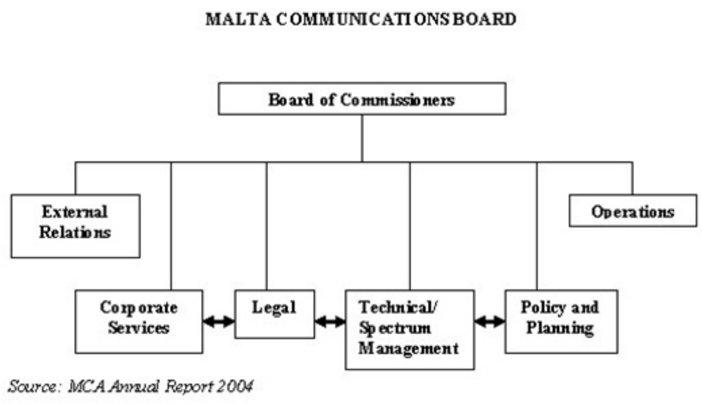


◂ Canadian Radio, Television and Telecommunications Commission

Source: http://www.crtc.gc.ca

(c) Project-based departments/divisions

These regulators can be organized as either industry/service-based or function-based departments/divisions, but they have a horizontal structure because departments/divisions collaborate when a project needs the support and expertise of various competencies.23 Morocco's Agence Nationale de Réglementation des Télécommunications (ANRT) is a function-based regulator divided into departments/divisions that deal with technical, administrative and operator issues, but has as a horizontal structure because staff members from units within these different departments/divisions are, as a matter of course, brought together to work on projects that require varied skills.24 The Malta Communications Authority (MCA) also utilizes a matrix organizational structure that allows the regulator "to adapt to change and maximize its expertise by shifting emphasis from a functional to a project-based approach."25 Below is a diagram of Malta's MCA, showing how this function-based regulatory authority uses a horizontal structure:



◂ **Malta Communications Board**

Source: MCA Annual Report 2004

However, it should be pointed out that regardless of the departmental/division structure of the regulators, it is often the case that multiple departments and subunits will work together to accommodate the evolving needs of the telecommunications market, as well as facilitate and expedite internal procedures.

6.6.2 GENERAL FUNCTIONS

6.6.2.1 RULEMAKING FUNCTION

The rulemaking function allows regulators to issue proposed regulations setting forth their intended procedures before issuing new rules and regulations. In order to fulfill this function, regulators must implement appropriate internal procedures that not only include detailed steps to govern all aspects of the regulator's decision-making process, but also have the institutional capacity necessary to effectively handle all of its regulatory roles. The rulemaking function generally includes the following procedures: petitions for rulemaking; requests for declaratory ruling; complaint procedures; licence applications; licence modification requests; guidelines for interaction with members of the public and interested parties during consideration of a particular issue; procedures for the formal issuance and publication of decisions; and procedures for seeking formal appeal or reconsideration of regulatory decisions. Box 6-1 below describes the decision-making process of the FCC in the United States.

Many regulators have implemented detailed procedures which address each of the processes mentioned. A complete analysis of the decision-making and public consultation processes is included in Section 6.6.

◂ **Box 6-1The rulemaking process of the Federal Communications Commission (FCC)**

The rulemaking process consists of the following stages**:**

Preliminary Consultations**Petition for rulemaking**: The initiative to change FCC rules and regulations, or to adopt new ones, originates from sources both within and outside the Commission. When submitted from outside the FCC, the interested party must file a "petition for rulemaking" requesting that the FCC undertake such action. If the FCC determines that the petition presents sufficient reasons to warrant the initiation of a rulemaking proceeding, an appropriate notice of the proposed rulemaking will be issued. In cases where the FCC determines that insufficient grounds exist for initiating a rulemaking proceeding, the petition will be denied and the petitioner will be notified of the FCC's decision along with the basis for the decision.[1]

Petition for Declaratory Rulings: This procedure is one that may be utilized by members of the public who want the FCC to clarify the scope or application of an existing rule.

Notice of Inquiry (NOI): If the FCC is interested in a particular issue but has not formulated a specific rule change proposal, the agency may issue an NOI. In an NOI, the FCC generally asks interested parties to respond to specific questions regarding novel issues or concerns for which the FCC seeks further information before deciding on the appropriate course of action. For example, recent NOIs have addressed such issues as IP-enabled services and mobile termination rates. NOIs are initiated either in response to an outside request or by the FCC itself.

Rulemaking**Notice of Proposed Rulemaking (NPRM)**: When the FCC seeks to introduce changes to its rules, it issues an NPRM and seeks public comments on these proposals. NPRMs are publicly available, placed on the FCC website, and summarized in the Federal Register. A deadline is specified for both comments and reply comments. Interested parties may visit the FCC commissioners and staff to express views on the proceeding, but they must file an *ex parte* letter in the public record of the proceeding, detailing whom they visited and what they discussed. In any rulemaking where the FCC determines that an oral argument, hearing or any other type of proceeding is warranted, notice of the time, place, and nature of such proceeding will be published in the Federal Register.[2] After considering comments in response to an NPRM, the FCC renders its decisions in the form of a Report and Order (R&O). In the R&O, the FCC not only issues its final rules, but discusses and responds to comments submitted by interested parties. The R&O explains the FCC's decision and its rationale. It may develop new rules, amend existing rules or decide not to take any action.

Confidentiality request: If the public requests that the comments be withheld from public inspection, the documents must be clearly marked as "Confidential - Not for public inspection."

6.6.2.2 OVERSIGHT FUNCTIONS: OVERVIEW OF DISPUTE RESOLUTION AND ENFORCEMENT

This function consists of the regulator's ability to monitor the performance of telecommunications companies and ensure compliance with the telecommunications regulation and other subordinate rules. To ensure the effectiveness and transparency of the oversight function, regulators must put in place detailed subordinate guidelines such as dispute resolution and enforcement procedures.

Dispute resolution regulations generally include procedures for handling and resolving disputes between: (i) licensees and consumers; (ii) licensees, and (iii) the regulator and investors, operators or service providers.

Additionally, to ensure compliance and enforcement of regulations and licence conditions, the regulator must have the authority to investigate the activities and company records of all service providers when needed, and to impose penalties for violation of laws, regulations or licence conditions. This need is accentuated in markets transitioning to a competition market. Here, the regulator must focus on facilitating the development of the marketplace to ensure that the market power of previous monopolies, or dominant players, does not damage the prospects and opportunities for commercial development in the sector by the newer participants. In these conditions, incumbents have clear incentives to delay the entry of such new market players (*e.g.*, by obstructing interconnection) in order to prolong their dominance. Therefore, the overall success of a regulator's mandate is directly related to the adequate discharge of oversight powers in order to track the performance of incumbent operators, as well as their compliance with regulatory obligations.

Generally, regulations regarding monitoring and enforcement include procedures for conducting investigations regarding violations, determining fault standards, imposing penalties, requesting the regulator's review of enforcement decisions, and submitting appeals to the regulator or to the courts.

The following are examples of various procedures implemented by regulators as part of their oversight functions (Box 6-2):

Regulators have implemented internal procedures and guidelines to ensure that information requests to stakeholders and the public are issued in accordance with pre-established parameters. These information requests are to effectively monitor and analyse telecommunications markets.

Peru The regulator, Organismo Supervisor de Inversión Privada en Telecomunicaciones (OSIPTEL), has oversight functions that include the power to request information from both public and private parties. For instance, OSIPTEL may request telecommunications companies to provide information regarding items such as their financial records, customer contracts, and installed infrastructure. Any information provided to OSIPTEL in response to its request will be considered as having been submitted in the form of a sworn legal statement. If the information provided is incomplete, unclear or equivocal in any way, the providing party may be deemed in breach of its statutory obligation to supply information and documentation to OSIPTEL.

Portugal Regulators have also implemented oversight procedures allowing their personnel to access a licensee's premises. Portugal's regulator, Autoridade Nacional de Comunicações (ICP-ANACOM), for example, has regulations governing the inspection of a licensee's premises or sites.1

Article 12 - Exercise of Oversight

1. Under terms of the law, ICP-ANACOM may proceed with inquiries and tests at any site or entity within the scope of those functions. 2. For effects of the aforementioned paragraphs, ICP-ANACOM may accredit especially skilled or qualified persons or entities.

Article 48 - Supervisory Functions

ICP-ANACOM's workers, respective attorneys and the qualified and duly accredited personnel or entities who perform oversight functions, when exercising their functions, shall be considered agents of the authority and thus shall enjoy the following prerogatives:

- Access to installations, equipment and services of entities subject to inspection and control by ICP-ANACOM;
- Authority to requisition documents and analysis, as well as material to conduct tests;
- To identify, for subsequent action, all individuals who violate the laws and/or regulations whose observance they are obliged to respect;
- To demand the collaboration of the proper authorities when deemed necessary for the performance of their duties.

◂ **Box 6-2 Procedures to request information form market players and public**

6.6.2.3 DISPUTE RESOLUTION AMONG ICT PROVIDERS

As the telecommunications sector continues to undergo changes caused by privatization, liberalization, and convergence, it becomes increasingly important for countries and regulators to have an effective and efficient dispute resolution and enforcement system.[1] The failure to resolve disputes quickly can limit competition, cause delays in the introduction of new services and infrastructures, block or reduce investment in the sector, and impede liberalization and development of the sector.[2] The appropriate dispute resolution mechanisms, however, vary depending on the stage of a country's telecommunications market and regulatory development, regulatory framework and approaches, as well as general business culture.

The following sections review the various dispute resolution and enforcement mechanisms employed in the telecommunications sector, with particular emphasis on regulatory adjudications and the various mechanisms of alternative dispute resolution. In addition, this section tracks the systems of dispute resolution available to foreign telecommunications operators, mainly international investment disputes and trade dispute arbitrations.

Overview of the main types of disputes in the telecommunications sector

Disputes in the telecommunications sector generally arise out of various circumstances. However, disputes with the greatest impact on telecommunications investment and growth typically relate to: (i) interconnection and other relations between various network, service, application and content providers; (ii) liberalization; (iii) foreign investment and trade; and (iv) radio frequency use (e.g., harmful interference or spectrum refarming).

Interconnection disputes are among the most prevalent type of disputes between service providers, as operators of all different types of access networks (*e.g.*, fixed-mobile, wireline-wireless) must be able to interconnect with each another. (See **Box 6-3**.) Many aspects of the interconnection relationship involve key policy considerations for the telecommunications sector; therefore, most regulators consider it important to maintain some form of regulatory oversight of the negotiation and implementation of interconnection arrangements In recent years, for example, an increasing issue regarding mobile interconnection has been the often high rates charged by mobile providers to terminate traffic on their networks. As a result, many regulators have made determinations that mobile providers have a monopoly over termination on their own networks and should be regulated. Regulators have opted between various mechanisms in order to strike an appropriate balance between the need to protect the interests of new market entrants while also leaving room for parties to negotiate agreements on their own. Among such approaches are: (i) prescribing interconnection arrangements on an *ex ante* basis; (ii) establishing interconnection guidelines; (iii) approving reference interconnection offers (RIOs) or model interconnection agreements; (iv) policing operators with significant market power; and (v) generally overseeing the interconnection process.

In addition, disputes also may arise as a consequence of introducing competition into the telecommunications market. The liberalization process often undermines the established financial and business interests of incumbent network operators. These liberalization-related disputes generally derive from the incumbent's desire to protect and maintain its dominant position in the market. Similarly, investment and trade disputes often occur where regulatory reforms or actions diminish the value of private-sector interests. These types of disputes have the potential to *internationalize* disputes arising between regulators and foreign investors in the telecommunications sector. Investment disputes typically stem from complaints by investors, operators, and service providers about early termination of exclusive rights, licensing of new competitors, new rate-setting structures and changes to licences. Current trends indicate a recent rise in international investment disputes within the telecommunications sector, based primarily on provisions of bilateral investment treaties. Trade disputes in the context of the WTO, on the other hand, are instituted by member states against other member states primarily due to lack of compliance with obligations assumed under the GATS and related documents.

Finally, radio frequency allocation and assignment disputes are dealt with internationally through mechanisms available through the ITU, particularly the Radiocommunications Bureau (ITU-R). Domestically, disputes may arise from interference, licence conditions, and pricing.

Approaches towards dispute resolution

Dispute resolution can be addressed from two separate approaches, namely through official and non-official mechanisms. Governmental authorities, statutory bodies and courts commonly discharge official functions in dispute resolution, their authority deriving principally from the constitutional, legislative and regulatory framework applicable to the telecommunications sector. Non-official dispute resolution – or alternative dispute resolution (ADR) – consists of mechanisms such as arbitration, mediation, and negotiation, where the individuals associated with these processes do not discharge any executive or judicial duties.

A well-resourced "official" sector, utilizing regulatory adjudication and the courts, is crucial to a successful dispute resolution environment. The resolution of disputes through regulatory adjudication with the option to seek final determination through the courts has emerged as a preferred method in both developed and developing countries.3 Alternative approaches, however, are often useful to deal with the lack of available regulatory or judicial resources, or where less formal techniques offer particular advantages.4 Therefore, it is important to identify those circumstances in which the use of each mechanism is more appropriate.

ADR mechanisms, such as arbitration and mediation, traditionally have been associated with solving private and commercial disputes, while regulatory adjudication has been understood as best suited for public policy issues. This compartmentalization may be too strict. As the case of interconnection disputes in the United States and Jordan evidence, regulators are increasingly using arbitration tools, either informally or formally. Moreover, in light of the rapid changes in the telecommunications sector, countries such as Saudi Arabia have instituted highly flexible approaches to determine which mechanisms (*i.e.*, mediation, arbitration, or regulatory adjudication) to adopt for resolving specific disputes.5

From a different perspective, other countries, as is the case of the United Kingdom, take the position that ADR techniques can be employed where disputing parties have similar levels of market power, since in that case parties are more likely to negotiate solutions that meet their mutual or on-going needs.6 In such cases, regulatory intervention is more often considered necessary where disparities of market power mean that one party effectively requires the protection of the official sector from abuse of process by the other.7

Thus, when designing and evaluating the role of the official sector in dispute resolution processes, the concern should be:

§ *Less* about rigid lines between official and non-official sectors, and

§ *More* about seeking the roles in which the official sector can best use its efforts and presence to assist in the speedy resolution of disputes – and in a manner consistent with regulatory policy, the rule of law, and due process.8

Due to differences in social, legal, and commercial traditions the approach for selecting a method of dispute resolution varies considerably between jurisdictions; even with regard to similar types of disputes. The following are certain elements to consider when making such a determination:9

§ ***Drawing on "non-official" resources***

The commercial world's extensive experience with arbitration and other ADR techniques can help policy-makers and regulators encourage the use of non-official dispute resolution approaches in a regulated industry. Commercial arbitration illustrates how regulators can keep control over important policy issues and also ensure the usefulness of their dispute resolution systems – while easing their workload burdens.

§ ***Quality control over official and non-official processes***

The type of dispute resolution process that is chosen influences what role regulators and courts will play in dispute resolution. Regulatory adjudication and arbitration require court oversight of procedures, because the parties have relinquished control over the outcome to the adjudicator or arbitrator. Regulatory adjudication also may be subject to various levels of "internal" agency and "external" court review for substantive appeal. It is important, however, not to undermine the credibility or timeliness of regulatory adjudication through over-use of review procedures.

The success of voluntary negotiated processes, including mediation, depends on their freedom from official review. Even where doubts exist about the efficacy of voluntary negotiations, regulators may be able to provide incentives for good faith engagement in negotiations instead of imposing substantive decisions.

§ ***Confidence factors in relying on non-official approaches***

There are several important factors in gauging whether non-official dispute resolution approaches are as mature and suitable as regulatory adjudication or court action in any given setting. These factors include how professional the arbitration and mediation boards are, how well developed the arbitration and mediation institutions are, and the effective use of the oversight procedures.

Official Dispute Resolution Mechanisms: Regulatory Adjudication

Regulatory adjudication refers to the legal powers exercised by regulators pursuant to the resolution of the disputes brought before them. Currently, regulatory adjudication is recognized as the cornerstone of dispute resolution in telecommunications sector. However, regulatory adjudication is a relatively new mechanism since until recently, with the exception of a few countries, regulatory and policy-making responsibilities were concentrated in a single governmental structure. With liberalization and the introduction of competition in the telecommunications market, these functions were separated and regulatory authorities were created and charged with responsibility for overseeing and regulating the telecommunications sector.

In the United States, a country with long-developed administrative tradition, the FCC interprets, coordinates, and adjudicates policy issues, as well as disputes arising out of them. The FCC's internal processes for dispute resolution include a final decision handed out by a Commissioner or a panel of Commissioners. Such decisions may be subject to internal review by the agency within a prescribed period, and can also be appealed before the U.S. Court of Appeals. In Canada, the CRTC follows court-like dispute settlement procedures. An Industry Committee consisting of parties and experts also has been established to resolve most telecommunications issues. Recourse to the CRTC is taken only when consensus cannot be reached by the Committee. In the United Kingdom, Ofcom follows a methodology for dispute settlement that involves the placing of evidence into a complaint before initiating a formal investigation. Investigation into the complaint involves clear identification of a relevant obligation or abuse under the Competition Act and deadlines are given for settlement of a complaint or dispute. France's regulator, ARCEP, is also vested with dispute settlement authority to rule on disputes between network and service providers in four areas: i) interconnection and access disputes; ii) provision of telecommunications services on cable networks; iii) shared use of infrastructure on public and private rights-of-way; and iv) cross-border disputes. However, ARCEP can only hold a hearing on a dispute if the complaining party has attempted to resolve the issue and negotiations have failed.10Many countries with newer regulatory authorities also have empowered such agencies to consider and adjudicate disputes among telecommunications market players. In Morocco, for example, the regulator has been given broad power over interconnection dispute resolution (**Box 6-4**).

(a) Advantages and disadvantages of regulatory adjudication

When effectively and efficiently applied, regulatory adjudication has certain distinct advantages.

§ It can draw upon the legitimacy of the official sector, as well as the benefits of its enforcement mechanisms;

§ A well-staffed regulatory agency can access staff resources with different expertise (*e.g.*, technical, economic, and legal) to provide input into decisions;**11**

§ The adjudication process can give the public a channel to provide input into the decision-making process.

However, the potential drawbacks to regulatory adjudication can be significant, and thus warrant paying close attention to the alternative approaches of dispute resolution. Some of these disadvantages are the following:

§ It can result in lengthy and cumbersome procedures;

§ Possibility of misuse of regulatory intervention by market-players, particularly incumbent operators, as part of a strategic response in order to hinder competitive conditions;

§ Legislative mandates dealing with issues of sector development, such as convergence, can reduce the regulator's flexibility in confronting significant disputes and sector issues; and

§ A tendency of regulatory bodies to fragment or compartmentalize decisions into separate proceedings, as regulatory adjudication is the response of a single regulatory body, based on a narrow jurisdictional mandate and limited enforcement powers, to individual claims defined by parties on specific legal grounds.

(b) Procedural considerations of regulatory adjudication

When establishing a framework for regulatory adjudication, it is important that the procedural rights and obligations of the parties to the dispute, as well as the powers of the regulatory authority, are addressed. This would include establishing whether aggrieved parties are entitled to a closed hearing or whether the dispute, as well as all testimony and other evidence, is to be made publicly available. Additionally, other considerations include the regulatory authority's power to call witnesses and order the production of documents.

(i) Formal hearings

As an official dispute resolution procedure, regulatory adjudication may involve a hearing by quasi-judicial body, which may be the telecommunications regulator or independent tribunal. Regulatory adjudicatory hearings are typically led by a panel or tribunal following formal, written and published procedures for filing initial complaints, introducing evidence and witnesses, hearing parties' arguments and issuing decisions. Where formal hearings are established, the rules of procedure should generally follow standard best practices for judicial proceedings. In particular, formal hearings should be open to the public to help ensure transparency and fairness. However, there may be provisions for closing certain portions or types of hearings to the public, such as where confidential or proprietary information is discussed. Another consideration in hearings is whether the parties' testimony is introduced in written or oral form. Unlike traditional court proceedings, hearings for regulatory adjudication often involve the submission of written testimony and other evidence with the tribunal or regulator reserving the right to call witnesses for cross-examination, if needed. Malaysia's regulator, the MCMC, also follows a public hearing approach in which parties generally submit written arguments, but may be required to present witnesses in front of the tribunal for cross-examination or clarification.12 In such cases, it is important that the regulator or tribunal has the authority to issue subpoenas for witnesses, if necessary, as well as possess the general authority to order the production of documents.

India's approach to regulatory adjudication provides a clear example of the formal hearing process. The Telecom Regulatory Authority of India (TRAI) Act, as amended in 2000, established the Telecom Dispute Settlement and Appellate Tribunal (TDSAT).13 Independent from TRAI, India's ICT regulator, TDSAT is composed of a Chairperson and two Members. The TDSAT Chairperson must also currently be or have previously acted as a Judge of the Supreme Court or the Chief Justice of a High Court while the two Members must have held a high official post in the central or a state government for at least two years or must be an expert in the field of technology, telecommunication, industry, commerce or administration.

As the independent tribunal for telecommunications disputes, TDSAT conducts quasi-judicial hearings of any party—whether the government, an operator, a consumer or other stakeholder—who seeks to appeal a decision, order or other ruling made by TRAI. In 2005, the TDSAT published formal procedures for hearings, which includes:14

- Procedures for filing a petition, appeal or other pleading, including fees;
- Procedures for the Tribunal's denial of a pleading;
- Procedures for the hearing of a petition or appeal, including requirements for parties to present their arguments on the specified hearing date;
- Procedures for introducing evidence, which requires written affidavits and permits the Tribunal to require the presence of the witness for cross-examination;
- Requirements that the hearings be open to the public, unless otherwise determined by the Tribunal that proceedings should be closed.

(ii) Public consultation

Rather than hold court-like hearings, the formal regulatory adjudication process may instead involve a public consultation that allows any party to openly participate (see Section 6.5 below for more on public consultations). Under this framework, the regulator or appeals tribunal follows a set of published rules of procedure that governs the introduction of complaints and pleadings, as well as who may participate, how comments and evidence must be submitted and how the tribunal will decide the issues. Public consultations for dispute resolution are useful for ensuring the greatest amount of participation from all stakeholders. However, they may also require the authority to review and a large number of submissions, which can lead to a lengthy process that demands a high amount of staffing resources. One of the main draws of the consultation process is to help ensure transparency and maximize participation. As such, all statements, arguments and other "evidence" to be introduced should be made publicly available unless certain documents (or portions of documents) must be withheld or redacted in order to protect proprietary and other confidential information.

In the United States, for example, although there are rules of procedure for conducting formal hearings, public consultations are also used to resolve controversies or clarify rules causing uncertainty in the market. Referred to as "declaratory rulings", the FCC's rules of procedure permit any party to request review of an issue. After consideration of the request, the FCC may initiate a public review to terminate a controversy or remove an uncertainty in the rules, policies or laws.15 The bureau or office within the regulator to which a petition for declaratory ruling has been submitted must seek comment on the petition via public notice and provide a 30-day public comment period. The FCC will then issue a decision to clarify the controversy or uncertainty based on these comments.

Unofficial Dispute Resolution Mechanisms: Alternative Dispute Resolution

Alternative Dispute Resolution (ADR) encompasses different processes and procedures directed at settling disputes by means other than litigation and administrative adjudication. ADR methods include arbitration and mediation, and several other hybrids and variations.16

ADR is based on the general premise that, where possible, it is more beneficial for private parties to settle disputes by private process and negotiated agreement as opposed to contentious litigation or regulatory adjudication. These methods have the benefit of preserving and, in some cases even enhancing, business relations that otherwise may be negatively affected by an adversarial process.17 Moreover, ADR can aid in saving costs associated with litigation. ADR procedures may either take the place of formal adjudication or complement adjudication and litigation by producing settlements within those fields. Flexibility is thus another principal advantage of ADR, as it usually allows parties to address different kinds of disputes through different procedures and approaches.

These mechanisms also may serve to alleviate the burden on official institutions in charge of settling disputes, by redirecting many types of disputes away from traditional courts and regulatory authorities. In Europe, for instance, the EU Framework Directive explicitly contemplates that national regulatory authorities should encourage the use of ADR mechanisms, such as mediation, where they are available.18 Pursuant to such initiatives, the Office of the Telecommunications Adjudicator was created in the United Kingdom to facilitate swift implementation of the processes necessary to enable competitors to gain access to the local loop. The Telecommunications Adjudicator also has the function of bringing all parties together to find prompt, mediated resolution of working-level implementation disputes. The scheme is a private contractual mechanism for dispute resolution agreed between the parties, and in this respect is similar to arbitration.19

ADR procedures fall into three primary categories: (i) negotiation; (ii) mediation and conciliation; and (iii) arbitration.

(a) Negotiation

Negotiation is the premise upon which all consensual ADR activity is based. It is a consensual process designed to allow parties to arrive at a mutually agreeable solution. Negotiations are usually held on a confidential basis, and "without prejudice" to any legal recourse to which the parties may have a right. Negotiation differs from mediation because no third-party facilitator is usually involved. This provides additional flexibility because parties can generally schedule the process of negotiations on their own, avoiding adversarial processes present in other ADR mechanisms.

(b) Mediation and Conciliation

Mediation is a consensual process involving a neutral third party whose role is to facilitate resolution of the dispute. Both regulators and private individuals not involved in the regulatory process may act as mediators.

In discharging its duties, the mediator must initially solicit the views of the parties on the nature of the dispute and its key issues. The objective here is to seek potential points of agreement between the parties and propose constructive "win-win" solutions. The mediator often serves as a neutral third party that conveys views of the dispute between the parties to facilitate communication, and potentially develop a direct negotiation. At the appropriate time in the mediation process, the mediator may be able to suggest potential solutions or views of the underlying issues to both sides. For example, in Japan, mediation is used to resolve interconnection disputes.

Conciliation is closely related to mediation, but involves more formal procedures. Here, the parties do not meet together, as the conciliator assumes the role of an intermediary or liaison. The conciliator's primary function is to communicate each disputant's position to the other, relay settlement options, and sometimes offer nonbinding advice in an effort to bring the sides closer to settlement.[20]

The United Nations has long encouraged conciliation and mediation to resolve disputes among states, and has recently recognized that mediation and arbitration are becoming common in commercial practice. On 19 November 2002, the United Nations General Assembly adopted a resolution encouraging all member states to give due consideration to enacting the Model Law on International Commercial Conciliation, which had been completed and adopted by the United Nations Commission on International Trade Law (UNCITRAL). See **Box 6-5** for the UNCITRAL Model on International Commercial Conciliation.

Advantages and disadvantages of mediation

Mediation has many benefits. These include the following:[21]

§ It may preserve long-term relationships upon which the telecommunications industry is based;

§ Mediation costs are usually lower than adjudication or litigation;

§ Parties can select a compatible mediator, usually without regulatory intervention;

§ Mediation processes are more structured than negotiation (specific rules and procedures are available);

§ Professional organizations are available to assist;

§ Mediation allows the selection of a mediator with specific technical experience on the issue;

§ Mediation facilitates resolution without public adversarial processes; and

§ In addition to regulatory support, the benefits of mediation have led to judicial support for established mediation services and institutions.

Notwithstanding such benefits, mediation has certain drawbacks:

§ The success of this method depends on the willingness of the parties to work together in good faith; and

§ Mediation can also be subject to abuse by parties seeking to protract a dispute or obtain information that may be relevant at another stage of a dispute resolution process.

Factors for success

Various factors can contribute to the success of mediation:

§ The parties involved should be committed to arriving at an agreeable outcome;

§ Mediators and the parties must be able to establish a successful rapport;

§ While the parties have ultimate control over their participation in the process, the mediators' management of the discussion makes it more structured than negotiation;

§ By diplomatic "reality checking" on the positions and assumptions of the parties, the mediator can enable parties to ease back from rigid, embedded, and unrealistic positions;

§ The mediator plays a critical role by focusing parties on their underlying interests rather than the abstract merits of their positions; and

§ Good mediators demonstrate patience, insight, and psychological finesse to convince parties to modify their entrenched positions.

Successful mediation in the regulatory context can depend on the role of regulatory officials. Involving regulatory staff as mediators, or having a neutral mediator report to the regulator, can discourage disputing parties from taking unreasonable positions during the mediation process. In some cases, however, involvement of regulatory staff may compromise the confidentiality of the dispute resolution process. Such confidentiality is a key element in the success of mediation because parties may wish to avoid potentially self-damaging consequences of changing their positions on important regulatory issues. In these cases, it may be preferable to use an outside neutral mediator, who can be trusted by both parties to maintain the confidentiality of the mediation process.[22]

(c) Arbitration

Arbitration is a dispute resolution method that takes the place of conventional litigation. Through this consensual process, parties agree to submit a dispute to a neutral third party arbitrator or panel of arbitrators for resolution. The commitment to arbitrate may arise at the outset of commercial agreements through arbitration clauses that bind parties to seek arbitration for future disputes or it may derive from legal instruments or international agreements. Arbitration may also be chosen as an alternative to litigation or regulatory adjudication when a dispute arises.

Arbitration is of particular importance in the international context, since arbitral awards are enforceable in a large number of different countries under the provisions of the New York Convention of 1958 on the Recognition and Enforcement of Arbitral Agreements and

Awards.[23]

Advantages and disadvantages of arbitration

Arbitration has several advantages. First, since it is generally a private or non-official procedure, it can better assure privacy and secrecy, protecting against disclosure of a party's confidential business information. Parties can agree on the confidentiality of the information and documents disclosed during arbitration proceedings. In addition, the fear of a negative precedent may be reduced due to the private nature of ADR mechanisms.

The flexibility of ADR mechanisms allows parties to combine arbitration with informal negotiations or mediation, thus resolving their dispute in a manner similar to an assisted negotiation. This helps foster a continuing working relationship which is valuable if the parties' dealings require ongoing interaction.

Arbitrations can sometimes take less time than conventional litigation or regulatory adjudication because of several factors, including the following:

§ Ability to design and schedule the steps needed at an early stage of the proceedings;

§ Ability to reduce steps that are otherwise mandatory in conventional litigation; and

§ Increased availability and flexibility of arbitrators.

From industry's perspective, the potential shorter timeframe offers commercial advantages, including reduced interference with business objectives. In the case of international arbitration, a considerable advantage is the availability of more neutral forums for adjudicators than parties would find in either party's national courts.[24]

Among some of the potential drawbacks of arbitration are the following:

§ Arbitration is an essentially adversarial process, thus when used in isolation, it generally does not create "win-win" solutions or improve relationships;

§ Arbitration may be more expensive than litigation when the issues in dispute are complex and a considerable amount of time is required to hear the dispute; and

§ Arbitration proceedings cannot be consolidated into one action without the consent of all the parties, thus they create a risk of contradictory decisions on closely related issues.

Using arbitration in telecommunications disputes

Although arbitration as a dispute resolution tool is generally agreed upon by the parties involved in a specific contractual relation, in certain instances arbitration is compulsory or encouraged either by regulatory policy or legislation. For example, in certain countries internal regulation require interconnection disputes to be resolved through arbitration. Such is the case in Brazil, where disputes pertaining to the application and interpretation of the regulations during interconnection contract negotiations must be resolved by Anatel through arbitration, which is conducted by an Arbitration Council composed of three members appointed by the President of Anatel. The arbitration process begins when a party submits a petition to the President of the Council. The petitioning party then must submit all relevant information and documentation within the next 10 days. The Council is required to arbitrate the interconnection conditions within 15 days.[25]

In some countries, the regulatory framework adopts a more flexible approach and allows disputants to select the type of dispute resolution method. This is the case of interconnection dispute resolution in Jordan, where after a dispute continues 20 working days after the parties have begun negotiating a solution, the parties may either: (i) ask the regulator to intervene; or (ii) seek the assistance of an arbitrator. The consent of both parties is necessary to send a dispute to arbitration, while a dispute may be referred to the regulator for resolution on the request of only one party. The Jordanian interconnection dispute resolution process also explicitly provides that referring a dispute to arbitration, or to the regulator for resolution, does not prejudice the rights of the parties to seek remedies through the courts.[26]

In addition, arbitration is also used in the context of consumer disputes in the telecommunications sector. For example, some privately-run ADR bodies have created specific programs resolving such disputes. This is the case of the **American Arbitration Association (AAA)** Wireless Industry Arbitration Rules.[27]

Factors for success

Numerous issues arise out of the use of arbitration mechanisms in the telecommunications regulatory context, including: (i) the role of the regulatory authority in the arbitration process; (ii) whether the arbitrators will be regulatory officials or independent persons approved or appointed by the regulatory authority; and (iii) whether the results of the arbitration proceeding will be subject to public comment and ultimately approved by the regulatory authority.

Because of this, the use of arbitration techniques and tools in the telecommunications sector requires addressing several important public policy concerns such as:[28]

§ Potential limitations in the scope of proceedings (*i.e.*, dealing with the precedent-related aspects of a dispute or with implications for related issues);

§ Potential concerns about the enforceability of proceedings and about initiatives of the regulator to protect the integrity of its own jurisdiction at the expense of the credibility of the arbitration process;

§ Concerns about the expertise and experience of the arbitrator(s);

§ Concerns about the potential for conducting protracted proceedings in a quasi-judicial context without taking full advantage of opportunities for procedural streamlining;

§ Concerns about confidentiality-related considerations versus the interest in transparency that is usually characteristic of public decision-making;

§ Concerns about the legitimacy of a private dispute resolution process as a venue for resolution of issues affecting public policy and government interests;

§ Concerns about costs (which can be similar to concerns about litigation); and

§ Concerns with respect to a party's limited rights of appeal.

Where these concerns are successfully addressed, it may be possible to structure credible, efficient, and effective alternatives to regulatory agency adjudication through arbitration, thus possibly improving the overall quality of dispute resolution in the telecommunications sector.**29**

Disputes Involving Foreign Operators

The privatization and liberalization trends that have characterized telecommunications regulations in the past decade have introduced a steady flow of foreign investment into the telecommunications sectors of many countries. However, such processes also may give rise to disputes between investors of telecommunications companies and regulatory agencies or ministries responsible for regulatory reform.

This section addresses two specific types of disputes resolution regimes directly related to foreign investment in the telecommunications sector, namely: (i) international investment disputes; and (ii) international trade disputes.

(a) Investment disputes

Investment disputes tend to arise when the process of regulatory reform negatively affects the value of foreign investors' stakes in the sector. Among the examples of such regulatory changes are: (i) the termination of an incumbent operator's monopoly; (ii) rate rebalancing; (iii) mandatory interconnection; (iv) the introduction of a new rate-setting structure; and (v) changes in the terms and conditions of concessions or licences.**30**

The legal basis on which investors may initiate a claim against the government varies from jurisdiction to jurisdiction. An investor may argue that a government's actions constitute an unlawful seizure of property or diminish the value of their property rights. Furthermore, investors may claim that the government has not complied with existing legislation or its statutory obligations (*e.g.*, in a rate-setting case, an investor may argue that the government did not take into account certain statutorily required criteria). Such a claim has been made in various cases recently instituted against the Government of Argentina due to price-freezes associated with the emergency economic measures taken in the wake of the 2001 financial crisis.

Claims also may derive from an alleged breach of contract between the investor and the government. In such cases, failure to comply with contractual commitments to conduct regulation of the telecommunications sector in a certain way may serve as a basis for an investor's compensation claims. These types of disputes may arise in the case of privatization of publicly-owned telecommunications companies, where it is not uncommon for contracts governing the sale of a government-owned stake in a telecommunications operator, to include an exclusivity period and a minimum rate of return, as well as to allow an increase in rates within a certain timeframe.

As an increasing number of countries have dropped foreign investment restrictions, sometimes in conjunction with commitments to open market access under the WTO GATS, it has become common for local operators, including incumbents, to be owned in whole or in part by foreign investors. Disputes arising in this context often become more complicated because they may raise issues of international law, the application of bilateral and multilateral treaties, conflicts between laws in different jurisdictions, and whether the laws of the parent company's home jurisdiction apply to the dispute.

(b) International investment disputes

International investment disputes (*i.e.*, disputes between states and nationals of different states), may be referred for resolution to the World Bank Group's **International Centre for Settlement of Investment Disputes** (ICSID), as well as other centers such as the International Chamber of Commerce (ICC). This may be achieved through: (i) provisions in contracts between governments of member countries and investors from other member countries; and (ii) the operation of local investment laws and bilateral investment treaties.

A vast majority of the claims currently pending before the ICSID were brought pursuant to bilateral investment treaties. This reflects a trend whereby the ICSID caseload has shifted in recent years away from disputes brought pursuant to individual investment contracts toward cases invoking an international investment treaty.**31**

*Relevant aspects of bilateral investment treaty based disputes***32**

Investment treaties typically provide foreign investors with the ability to bypass local and national legal systems, in favour of international arbitration, as they rarely require investors to exhaust their domestic legal remedies as a prerequisite to pursuing an international claim. This holds true even where contracts between an investor and a state expressly limit recourse to local dispute settlement options. For example, in the dispute between the Government of Ghana and Malaysia Telekom (further developed in **Box 6-6**) the arbitral tribunal upheld its jurisdiction to hear *treaty* claims, notwithstanding the fact that the contract in question provided for different means of dispute resolution.

Thus, once concluded, investment treaties containing open offers to investor-state arbitration open the door for foreign investors to take their claims out of the local legal system. Proponents of such mechanisms often describe them as safety valves that operate in the event that foreign investors may not be able to receive a fair hearing in a host government's courts.

In addition, investment treaty arbitration also insulates proceedings from extensive review by local court systems. Arbitrations under ICSID rules, for example, are exempt from the supervision of local courts, with awards subject only to an internal annulment process. Meanwhile, arbitrations under other sets of rules may be subject to limited challenge in domestic courts. This is evidenced in a case instituted by France Telecom against Lebanon were appeals were brought before the Swiss courts. Such review will typically be circumscribed by laws designed for ordinary commercial arbitrations, which, as a result, may accord a higher degree of deference to the findings of the arbitral tribunal.

Furthermore, investment arbitration can be plagued by lack of consistency in the interpretation of the substantive provisions of investment treaties from one case to the next. Thus, tribunals can, and have, reached widely divergent conclusions in parallel cases.[33] Governments can take steps during treaty drafting to minimize some of these problems, by including rules for the consolidation of related claims under the jurisdiction of a single tribunal, thus reducing the risk that parallel proceedings will lead to divergent rulings.

Hence, governments acceding to investment treaties should be aware that these agreements may serve to *internationalize* disputes that arise between regulators and foreign investors in sensitive sectors, including telecommunications. In such cases, foreign investors may bypass domestic legal systems in favour of international dispute resolution forums.

International investment disputes in the telecommunications sector

The number of international investment disputes has increased in the past years, including telecommunications disputes.[34] Since 2004, 10 separate disputes between telecommunications sector participants and various States have been reviewed and concluded by the ICSID.[35]

Three cases at ICSID have been brought against the Argentine Government,[36] based on claims that the foreign investors are entitled to compensation for losses derived from emergency measures adopted during the 2001 financial crisis, mainly related to price freezes. For example, in the case of Telefónica S.A. v. Argentine Republic, investors are alleging that the emergency measures amounted to the expropriation of their investments, and are seeking monetary compensation for their damages. These cases evidence the risk, noted above, of similar disputes being resolved by separate tribunals operating in parallel, thus raising the prospect of a succession of different rulings.

The following Box 6-7 provides a short summary of certain telecommunications-related investment disputes before the ICSID.

◂ Box 6-7Telecommunications-related Investment Disputes Before ICSID

§ ***Telefónica S.A. v. Argentine Republic***. Telefónica S.A., which provides basic telephone and long-distance service in Argentina, filed a claim alleging that the Argentine Government partially expropriated its investment following the imposition of emergency measures during the recent Argentine financial crisis.[37] Telefónica S.A. asserts that a freeze in service tariffs imposed by the Argentine Government, coupled with the 70 percent currency devaluation, cost the company US$3.8 billion.[38] The parties reached a settlement and discontinued the proceeding in September 2009.39

§ ***Telenor Mobile Communications v. Hungarian Government***. The Norwegian firm Telenor Mobile Communications has registered a claim against the Hungarian Government in relation to Telenor's subsidiary Pannon GSM, which has a cellular telephone concession in the eastern European state. Telenor's ICSID claim was brought pursuant to the Norway-Hungary bilateral investment treaty and seeks to challenge regulatory rate-setting measures imposed on Pannon by the Hungarian Government. On September 13, 2006 the ICSID determined that it did not have jurisdiction over the matter and dismissed the case.

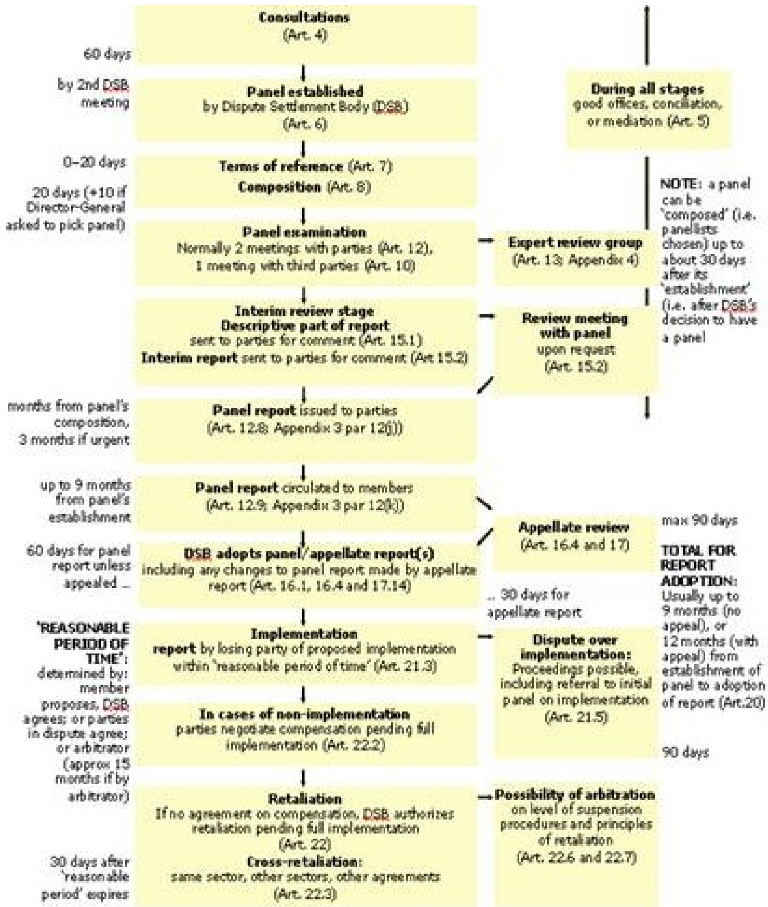
In addition, several other telecommunications-related investment disputes have been brought to arbitration outside the scope of ICSID. As of April 2004, at least four telecommunications-related claims had been conducted outside of ICSID, based upon provisions in bilateral investment treaties in force between the host and investor's countries. These cases include Ameritech v. Polish Government; Telekom Malaysia v. Government of Ghana; France Telecom v. Lebanon; and William Nagel v. Czech Republic. These proceedings involve claims of expropriation of investments, as in the cases against Lebanon and the Government of Ghana, as well as violations of contractual obligations related to the award of licences (*i.e.*, the cases against the Government of Poland and the Czech Republic).

(c) Disputes related to international trade: WTO dispute settlement

International trade law is applicable, under certain situations, to disputes within a country's telecommunications sector. The WTO's GATS is the principal multilateral trade agreement affecting the provision of telecommunications services. In addition, a series of related documents contain specific commitments pertaining to the opening and regulation of telecommunications markets: (i) the Fourth Protocol to the GATS Agreement; (ii) the Schedules of Specific Commitmentsof Individual GATS Signatories; and (ii) the WTO Reference Paper, which was included in the commitments of most signatories.

In many cases, these obligations are applicable to telecommunications disputes arising in GATS signatory countries. An international trade dispute arises when one country adopts a trade policy measure or takes some action (*e.g.*, interconnection rate regulation) that one or more WTO members consider to be in breach of pre-existing WTO agreements, or to be a failure to comply with validly acquired obligations. In such cases, WTO members have agreed to use the multilateral system of dispute settlement, rather than take unilateral action.

The following Figure 6-B is a diagram of the dispute resolution procedure before the WTO:



◂ Figure 6-B: WTO Dispute Resolution Procedure

Source: WTO available at **http://www.wto.org/english/thewto_e/whatis_e/tif_e/disp2_e.htm**

The main objective of WTO dispute resolution proceedings is to settle disputes, through consultation if possible.40 To date, only one telecommunications case has been before a WTO Dispute Settlement Body (DSB) for resolution, the U.S.-Mexico case. In that case, the United States argued that Mexico had failed to comply with its commitments and obligations under the GATS, specifically it had failed to: (i) ensure that Telmex provided interconnection to U.S. cross-border basic telecommunications suppliers on reasonable rates, terms and conditions; (ii) ensure reasonable and non-discriminatory access to, and use of, public telecommunications networks and services for U.S. basic telecommunications suppliers; and (iii) provide national treatment to U.S.-owned commercial agencies. The panel's report on "Mexico – Measures Affecting Telecommunications Services", later adopted by the DSB on 1 June 2004, principally sided with the U.S. position. Nevertheless, following its adoption the parties notified the DSB that they had arrived at a mutually agreed solution to the conflict by which Mexico would, within a 13 month period: (i) adopt revised International Long Distance Rules eliminating the "uniform settlement rate" and "proportional return" systems in force at the time; and (ii) implement a regulation to allow the resale of international long distance public switched telecommunications service.41

Other telecommunications-related disputes between WTO Members have been under discussion and at least two cases have nearly come to the WTO but have been settled through purely bilateral channels, including: (i) a dispute between the United States and Japan on interconnection; and (ii) a dispute between the United States and the European Communities on standards for licensing mobile services.42

Under WTO rules, individual service providers lack "standing" to seek remedies through the GATS dispute resolution procedures. As such, typically, the service provider's country of origin puts pressure on another country's government to comply with its GATS obligations. These mechanisms have the potential of turning what could initially be characterized as a domestic dispute (*e.g.*, about licensing or interconnection) into an international trade law dispute.43

6.6.2.4 PROCESS FOR RESOLVING CONSUMER COMPLAINTS: ACCOUNTABILITY FOR CONSUMERS

Regulatory accountability also involves regulators having appropriate procedures to channel consumer inquiries or claims, to educate consumers regarding their rights, and to protect consumers in case of market failures. In a majority of countries, regulators assume responsibility for handling consumer complaints1.Disputes between service providers and consumers are also common and occur in every jurisdiction. These conflicts principally stem from the consumer's lack of bargaining power or the lack of consumer choice among service providers. The main type of disputes arising between consumers and service providers derive from the following causes: (i) service charges; (ii) billing; (iii) payment of charges; (iv) "slamming";2 (v) quality and terms of service; (vi) violation of privacy; and (vii) false or deceptive advertising.3 To ensure effective resolution of consumer disputes, regulators are using a variety of mechanisms, ranging from requiring service providers and consumers to initially resolve disputes themselves (the case of the United States and Botswana); using ombudsmen type institutions (as the telecommunications industry Ombudsman in Australia); and even employing the broadcast media (as is the case of the Nigerian "Consumer Parliament" evidences). The particular mechanisms developed and instituted for consumer protection in each country may differ and require tailoring to the needs of the country depending on the country's particular legal and institutional systems and culture. For instance, certain mechanisms, such as ombudsmen, tend to work best in countries with a long history of consumer activism.4

Mechanisms for consumer protection

Telecommunications regulators have implemented different methods to make themselves accessible to the public and to facilitate the handling of consumer complaints. Some countries have administrative offices outside the regulator, while others have utilized internal offices of consumer affairs. As telecommunications markets become more competitive, regulators continue to take a proactive role to protect consumer rights through consumer protection legislation, licence conditions, consumer education and information, and encouragement of industry self-regulation through industry codes. For example, many regulators have published consumer information fact sheets, guides and brochures on their websites. Most telecommunications legislation and related regulations contain provisions on quality of service standards, telecommunications fraud, number portability, carrier selection, and universal service. In many countries, consumers have more than one avenue to file complaints with the regulator so the regulator is better able to handle consumer concerns in a competitive market. Usually, consumers can file complaints in several ways: (i) in writing, (ii) by e-mail; (iii) by telephone, (iv) by fax, or (v) in person at the regulator's offices, in consumer centers/call centers or in a Consumer Parliament (*e.g.*, Nigeria). The procedures for filing complaints with the regulator are generally simple in order to facilitate their submission, and are published on the regulator's website, in official publications and available at the regulator's offices.

In some countries, such as Australia, Hong Kong (SAR) and Malaysia, the regulators place significant emphasis on industry self-regulation and on codes that are developed by industry and approved and registered with the regulator, covering issues such as billing, number portability, pricing information, and complaint handling by operators.[5] Other regulators have also established consumer advisory committees and forums to provide the regulator with advice on consumer concerns, promote consumer input into policies and regulations and to ensure that the consumers' interests are taken into account during the regulator's decision-making process. In Australia, the regulator is required by legislation to establish a consumer forum.[6] Australia has also created an independent Telecommunications Industry Ombudsman to investigate complaints about the provision of telephone or Internet services and to help parties settle disputes regarding such services.[7]

In Canada, the Governor in Council issued ***Order requiring the CRTC to report to the Governor in Council on consumer complaints*** , which required the creation of an independent telecommunications consumer agency. Pursuant to the terms of the Order, telecommunications service providers are required to participate in and contribute to the financing of this independent agency. The Canadian regulator, the Canadian Radio-television and Telecommunications Commission (CRTC) was charged with approving the structure and mandate of such an agency. The CRTC subsequently gave provisional approval to the structure and mandate of the Commissioner for Complaints for Telecommunications Services (CCTS). The CCTS has been operating since the summer of 2007, although the CRTC has made a number of changes to its structure and mandate in order to ensure its effectiveness and its independence from the telecommunications industry.

Many regulators, particularly in developing and less competitive markets may not be able to rely on industry self-regulation and find it necessary to assume a larger role in consumer empowerment and protection. Some regulators, such as Anatel in Brazil and the Nigerian Communications Commission (NCC) have created innovative ways for addressing consumer complaints. (See Box 6-8 below for example of Brazil.) The NCC has established a Consumer Affairs Bureau to serve as the industry watchdog for educating, informing, and protecting consumers. Additionally, the NCC has published a Consumer Bill of Rights recognizing the inalienable rights that every consumer should have, including: (i) the right to be informed; (ii) the right to safety; (iii) the right to choice; and (iv) the right to be heard. The NCC also instituted a Consumer Parliament, which brings all stakeholders, consumers, operators, and the regulator together and provides a live broadcast, public forum where the regulator can educate the public and consumers can ask questions and voice their grievances.[8]

In Brazil, three entities work with Anatel to assist with consumer complaints: the Office of Consumer Affairs, Anatel's Citizen Rooms, and the Committee for the Protection of Telecommunications Service Users.

Office of Consumer Affairs The Office of Consumer Affairs within Anatel accepts consumer complaints sent to Anatel by e-mail, letters, or through Anatel Call Centers. Complaints about service providers must be sent first to the relevant service provider, which is required to contact the consumer within five days. Complaints about Anatel are sent to the specific department within Anatel that is subject of the complaint. The Office of Consumer Affairs has the following functions: (i) advise Anatel on matters of consumer rights; (ii) receive, respond, and channel internally and externally, complaints, requests or comments of consumers; (iii) implement and expand methods and procedures for the relationship between Anatel and consumers; and (iv) manage Anatel's Call Centers.9

Citizen Rooms Anatel's Citizen Rooms also provide a communication channel between Anatel and the public. Interested parties can use the Citizen Rooms to submit licence requests for the provision of a variety of services, and file complaints regarding services. The Citizen Rooms provide access to Anatel's public database and are equipped with computers, printers, fax, scanners, telephones, VCR, as well as attendants to provide information related to Anatel's activities. Any party can conduct online searches of Anatel's reports, contracts, decrees, resolutions, standards, and have access to telecommunications legislation.10

Committee for the Protection of Telecommunications Service Users Anatel has also created several strategic external committees, which are intended to develop studies, proposals and recommendations on specific matters. The committees act as advisory bodies to the Board of Directors. The Committee for the Protection of Telecommunications Service Users advises the Board of Directors regarding consumer protection. The Committee is comprised of members of different Anatel offices, a representative of the Department of Consumer Protection of the Secretary of Economy, a representative of users of fixed telephony services; a representative of users of mobile services, a representative of users of mass media services, a representative of users of other telecommunications services, and entities representing telecommunications service providers. The Committee has the following functions: (i) advise Anatel's Board regarding its relationship with the National System of Consumer Defense; (ii) provide Anatel's Board with directives regarding consumer rights; (iii) develop procedures for prevention of violation of consumer rights; and (iv) advise the Board regarding dispute resolution mechanisms for consumer disputes.

◂ Box 6-8 Brazil - Consumer Protection Entities

Some countries have specialized tribunals to assist consumers with adjudicating their claims against operators. In Peru, the Administrative Tribunal for the Settlement of Users Claims (TRASU)11 adjudicates claims filed by users of public telecommunications services. TRASU is part of OSIPTEL but is fully independent in its rulings and is the last administrative review for users' claims. The six members of TRASU are elected by OSIPTEL's Board of Directors based on a recommendation submitted by OSIPTEL's Chairman, and are remunerated for their services. TRASU can be part of OSIPTEL's staff, or professional experts. Its functions are to: (i) resolve claims and appeals submitted for its consideration; (ii) propose to OSIPTEL's Managing Council the modification of the procedures to deal with users' claims, and those related to violations and sanctions; (iii) approve the content of forms and other materials to be used, to allow the expeditious resolution of claims and appeals submitted for its consideration; and (iv) engage in other matters entrusted to it by OSIPTEL's Managing Council.12 TRASU has jurisdiction over:

1. Revision of decisions concerning users claims issued by telecommunications operators;

2. Claims or appeals against decisions issued by the operators in connection with claims filed against the operator's administrative procedures; and

3. Appeals against decisions related to quality of service problems.

Colombia has taken a different approach to consumer complaints. While one of the regulator's functions is to provide information to customers regarding telecommunications services, the authority to adjudicate disputes between telecommunications operators and customers has been delegated to the Superintendencia de Servicios Publicos Domiciliarios (Superintendency of Domestic Public Services -SSPD).13 This is a multi-sectoral administrative body independent from the telecommunications regulator, created by the Colombian Constitution in 1991, to exercise the functions of supervision, inspection, and oversight of entities providing public services such as energy, gas, and telecommunications services. The SSPD receives appeals filed by users and subscribers after they have been filed directly with the telecommunications operator. The SSPD can impose sanctions on public service providers.

The United Kingdom has adopted an interesting approach to handle consumer complaints concerning telecommunications services. In January 2003, the Office of the Telecommunications Ombudsman (Otelo) was established as a voluntary dispute resolution service, independent from the regulator Ofcom. Otelo reviews and seeks to resolve consumer complaints against companies that are members.14 Otelo's current members cover more than 96 per cent of the fixed line telephone market, over 55 per cent of the mobile telephone market and 33 per cent of the ISP market. Otelo is composed of an Ombudsman, two senior managers, a board composed of seven members (five nominated by member companies and two appointed from the independent council members), and a Council whose main role is to appoint the Ombudsman and manage Otelo's services. Otelo's terms of reference detail the range of telecommunications services that are covered, and what Otelo can and cannot do.15 Otelo considers complaints against member companies where the complainant and the company have been unable to reach an agreement, and determine whether the member company must take any action for the consumer's benefit.

With the development of the Internet, many countries are also in the process of drafting and adopting guidelines and regulations for protection of consumers involved in online activities, such as data protection laws, cybercrime laws, and anti-spam laws. The approach to consumer protection in the ICT environment varies among countries, with some countries, such as the United States, adopting a more hands-off approach and others, such as the EU, adopting a stricter regulatory approach.[16] Because of the variations in laws among countries, and the need to coordinate international efforts in handling the flow of Internet data and cyber-crimes, there is a movement to harmonize standards in ICT-related laws among countries.

Consumer complaints against operators

The majority of consumer complaints relate to the conduct of telecommunications operators and service providers. Regulators have created specific standards and filing requirements for telecommunications operators to protect consumer interests. Regulations often require companies to establish procedures to handle consumer complaints. In addition, in some instances, the regulations also include a requirement that the company have customer service personnel available 24 hours to handle consumer inquiries, and that any information concerning the procedures and the right to submit claims should be publicly available and located conspicuously at the company's offices and/or on its website. Further, operators are sometimes required to create special forms designed to facilitate consumer claims, to keep registers of consumers' claims, and to establish specific timeframes for resolving consumer complaints or applying specific rules, such as the positive administrative silence rule used in civil law countries.[17]

Generally, primary responsibility for handling consumer complaints against telecommunications operators resides with the company providing the service, since the operator has all the relevant information concerning the service and therefore is better able to address the claims. The company's procedures dealing with the consumer complaint set the framework for the initial administrative review of the user's claim, before intervention by the regulator. The regulator generally intervenes only after the consumer is unable to resolve the issue directly with the operator or service provider, or if the consumer complaint involves a breach of the telecommunications law and regulations or licence provisions. In Hong Hong, OFTA states clearly that its powers and functions regarding consumer complaints against an operator are limited to the conduct and practices of the operators regulated under the telecommunications laws and licence conditions, and OFTA does not have any power to adjudicate contractual disputes between individual consumers and operators.[18] Contractual disputes between consumers and operators can often be resolved through dispute resolution mechanisms, as described in Section 7.4.1.

Additionally, depending on the nature of the complaint and whether the complaint is outside of the regulator's scope of authority, consumers may seek recourse with the courts or other consumer organizations or agencies. In Ireland, for example, consumers can address complaints to the Small Claims Court, the European Consumer Center, Regtel (the independent regulator for content and promotion of premium rate telecommunications services), the Office of the Data Protection Commissioner, the Advertising Standards Authority for Ireland, and the Office of the Director of Consumer Affairs.[19] The intervention of an attorney for consumer claims generally is not required because this would oblige the consumer to incur further expenses and discourage claims. The consumer, however, usually has discretion to use an attorney if desired.

6.6.2.5 ENFORCEMENT AUTHORITY

In order to ensure that parties to the regulator's dispute resolution process abide by the decisions, the regulator must be given sufficient power to enforce its decisions. In addition, the regulator must have sufficient authority to enforce all provisions under the telecommunications law, regulations and other rules. The regulator should have the ability not only to enforce rules of general applicability, but also to issue directions and mandate operators to carry out or to stop a particular activity. The Telecommunications Regulatory Authority (TRA) of Bahrain provides a good example of the necessary tools that regulators must have to carry out their responsibilities. Among other rights, the TRA has the power to:

1. Issue regulations, orders and determinations as necessary to implement the provisions of the Telecommunications Law;

2. Monitor and enforce compliance with licence terms;

3. In coordination with the Radiocommunications Authority, monitor and enforce spectrum usage in accordance with the Telecommunications Law and to ensure efficient spectrum usage;

4. Encourage, regulate and facilitate adequate access, interconnection and interoperability of services, including enforcing sharing of facilities and property by operators;

5. Examine complaints and resolve disputes between licensees, subscribers, and other interested parties, as well as take any necessary and proportionate measures in relation to such matters.[1]

Except in emergency cases, if a TRA enforcement action is expected to have a material impact on a particular telecommunications market, it must give affected parties an adequate opportunity to submit comments on the planned action.[2]

The regulator should also possess the proper authority enabling it to sanction operators. The sanction power consists of the ability of the regulator to establish a fault standard for violations as well as the level of fine applied due to the violation. Most regulators' competencies include the ability to impose sanctions in order to enforce compliance with applicable laws, regulations, and licence conditions.

6.6.3 CORE RESPONSABILITIES

6.6.3.1 LICENSING

In most countries, licensing is one of the primary functions of the regulator, although in certain countries, this responsibility falls under the jurisdiction of the sector ministry or is shared between the regulator and the ministry. Through licensing, governments often implement policies aimed at opening the market, providing services to underserved areas, modernizing telecommunications infrastructure, and supporting ICT policies. Licensing responsibilities generally include: preparation and publication of model licences; development of licence application guidelines and evaluation criteria; establishment of licence fees; and licence renewals. Recently, regulators have begun to re-examine their licensing practices as a result of increasing technology convergence and are moving towards unified or converged licensing models.

As more regulators examine the need to adopt new licensing regimes in light of increasing liberalization and technological developments, it is critical to take into account and review the impact of the proposed new licensing regimes on the existing licensees and, in particular, any exclusivity provisions that were previously granted to incumbent operators. Usually, incumbent operators are concerned with issues such as licence parity; therefore, regulators are often faced with the challenge of facilitating the market entry of new service providers while at the same time addressing the acquired rights of existing operators.

In addition, when establishing licence award processes in cases where a beauty contest (comparative evaluation) process is used to select and award the licence to the best applicant, regulators should formulate objective and transparent evaluation criteria. Not only will transparent evaluation criteria be more attractive to potential new entrants, but these will also minimize the potential for unsuccessful applicants to appeal the licence award.

Practice Notes

- **Facilitating Cooperation between Regulatory Agencies – Memorandums of Understanding and Cooperation Protocols**

Reference Documents

- **Netherlands: Agreements between the Commission of the Independent Post and Telecommunications Authority (OPTA) and the Director General of the Netherlands Competition Authority (the NMa) on the method of cooperation in matters of mutual interest, 2004**
- **Nigeria: Memorandum of Understanding between the Consumer Protection Council and the Nigerian Communications Commission**

6.6.3.2 COMPETITION POLICY AND COMPETITIVE SAFEGUARDS

Liberalization and increased competition in telecommunications markets require active regulatory involvement to provide new entrants with a level playing field when attempting to compete against well-established incumbent operators. Incumbent operators usually have substantial advantages, such as a legacy ubiquitous network that is largely depreciated, a substantial customer base, and market power. New entrants require assurances that adequate regulatory protection will in place so that the incumbent operators will not be permitted to engage in anticompetitive behavior or abuse their dominant position. Accordingly, regulators are generally given the power to establish competition policy and address anticompetitive practices in the telecommunications market. Regulations developed in this regard generally include elements such as market definitions, definitions of thresholds for market power, and accounting separation.

(a) Jurisdiction and Mandate over Competition Matters

Many regulators have explicit mandates in the telecommunications law to deal with anticompetitive practices in their sector. Nevertheless, countries frequently also have a separate competition authority with statutory responsibility for competition matters, generally in consultation with a sector-specific regulator. One example where this approach has been followed is Peru.

Although there is an established competition bureau, Instituto Nacional de Defensa de la Competencia y de Protección de la Propiedad Intelectual (INDECOPI), the telecommunications regulator Organismo Supervisor de Inversíon Privada en Telecomunicaciones (OSIPTEL) was given primary responsibility to regulate anticompetitive behavior in the telecommunications sector. OSIPTEL's regulation states that "the rules of free competition are ancillary to regulations issued by OSIPTEL within its areas of competence. In cases of conflict, the rules issued by OSIPTEL shall prevail."[1]

(b) Mandate to Issue Regulations on Competitive Safeguards

A major responsibility of a regulator in a liberalized telecommunications market is to ensure that operators with market power or dominance do not abuse their position with respect to their customers and existing and potential competitors. In the telecommunications industry, a dominant operator has the ability to control the essential facilities involved in interconnection unless measures are in place to restrict the operator from doing so. For example, the power to deny or overprice interconnection and network facilities gives a dominant service provider unfair and potentially insurmountable advantages over its competitors. Thus, safeguards must be designed to define, deter, and punish anticompetitive activities while at the same time creating an enabling environment that will attract the investment needed to establish competing ventures.

As telecommunications markets continue to become more competitive, many ways exist in which dominant operators can engage in anticompetitive behavior (*e.g.*, predatory pricing, cross-subsidization, price discrimination, discriminatory provisioning of network facilities, overpricing of essential facilities and other network elements and services provided to competitors, unfair trade practices, tie-in sales, and anticompetitive bundling). Regulators can anticipate many complaints from new entrants in this regard and it is extremely important that clearly defined rules are in place to deal effectively and transparently with such allegations.

Regulators have several tools to deal with competition issues. Competitive safeguards applied to dominant operators may be: [2]

§ Structural, by requiring the establishment of a fully separate subsidiary to draw a clear distinction between the provision of competitive and non-competitive services;

§ Non-structural, such as accounting safeguards employing cost allocation rules for various services;

§ Conduct compliance requirements and specific obligations; and

§ Explicit pricing rules.

Finally, regulators must demonstrate their credibility from the outset when dealing with competition issues. This requires resources to thoroughly investigate cases brought forward by complainants as well as to initiate investigations in instances where the regulator determines there is a need to do so. Furthermore, regulators also require strong enforcement powers in order to impose penalties and apply remedies in proven cases of anticompetitive behavior. Without these powers, the regulator cannot adequately ensure that sufficient incentives and protection exist for potential new entrants and thus the market will not be fully competitive.

6.6.3.3 TARIFF REGULATION

Regulators must establish effective and transparent tariffing regimes in order to contribute to the orderly evolution to competition in the telecommunications sector. As markets become more competitive, tariff regulation becomes a less important regulatory function. However, when tariffs are still being set by the regulator, they should be set formally through the issuance of rules and other regulatory instruments. Additionally, before the market is fully competitive, regulators usually apply different tariff regulations on non-dominant operators versus dominant operators. In order to ensure that fair competition can develop, non-dominant operators are generally subject to less onerous tariff regulations. Dominant operators, on the other hand, can be subject to *ex ante* tariffing regulation. For example, dominant operators may be required to submit their tariffs for regulatory approval, whereas non-dominant operators may be subject only to publication requirements.

A fundamental reason for tariff regulation is to prevent the abuse of dominance. There are two market situations in which tariffs are required to address dominance: non-competitive or monopoly markets and competitive markets. For service markets in which a dominant operator does not face effective competition, the regulatory concern is that prices will be set substantially above cost so that the operator earns a monopoly level of profit. In this circumstance, regulators have historically used “rate of return” regulation, which establishes the maximum return on capital invested, or increasingly, regulators have imposed a price cap regime (with or without consideration of the rate of return), which provides some level of incentives for operators to function efficiently and reduce costs. Price cap regulation involves the regulator creating “baskets” of services that are non-competitive. The composition of such baskets tends to vary by country to reflect individual market circumstances. Some examples of possible “baskets” of services include: basic services; basic and mobile services; basic local service; and local and access service.

For those markets in which a dominant operator faces competition, especially in the early stages of liberalization, the regulatory concern shifts to anticompetitive pricing tactics (*e.g.*, predatory pricing and cross-subsidization) that are intended to weaken or damage new entrants. In this case, the concern is that retail prices for some services will be set below cost by a dominant carrier. Many regulators have explicit prohibitions regarding anticompetitive pricing, particularly predatory pricing.

For example, Singapore’s regulator, Infocomm Development Authority (IDA) requires dominant carriers to provide telecommunications service on terms and conditions that are just, reasonable and non-discriminatory and pursuant to filed tariffs. A dominant carrier may not abuse its market position by, for example, setting prices at levels that are so low so as to unreasonably restrict competition. The IDA[1] utilizes a three-pronged test for predation, namely whether:

- The dominant carrier is selling service at a price below marginal cost;
- There is a likelihood that such price cutting will drive efficient rivals from the market or deter future efficient rivals from entering the market; and
- Entry barriers are so significant that, after driving rivals from the market or deterring entry, the dominant carrier could impose price increases that would be sufficient to recapture the full amount of the loss that it incurred during the period of price cutting.

After making a determination of dominance, all regulators should adopt consistent principles and procedures to ensure that prices are just and reasonable, which is often expressed as “cost-based” prices.

Implementation of such tariff-fixing processes and procedures also requires that the regulator establish or approve a cost accounting system and allocation regime so that all of a dominant operator’s costs that relate to regulated services are identifiable and consistent with the cost accounting system.

6.6.3.4 INTERCONNECTION

Regulators play a critical role in overseeing interconnection. In most cases, they must review relevant economic principles regarding interconnection pricing, analyse and propose interconnection costing approaches, develop common cost models to be utilized by all operators, and develop interconnection guidelines and regulations. Interconnection is often the most contentious regulatory issue given its fundamental impact on the overall operation of competing telecommunications networks. It is also one of the most important regulations to put in place before competition can be successfully introduced. To facilitate competition, regulators must ensure that the interconnection framework is clearly defined and that interconnection charges between networks are based on objective, economically sound, and solidly substantiated costs.

As with tariff regulation, before the market is fully competitive, interconnection regulation is generally applied asymmetrically on dominant versus non-dominant operators to ensure that non-dominant operators have access to interconnection services controlled by dominant operators. Generally, dominant operators are required to publish reference interconnection offers and interconnection agreements, which serve to inform and facilitate interconnection by new entrants and other non-dominant operators, and to discourage discriminatory behaviour by dominant operators in providing interconnection.

Investor concerns regarding interconnection regimes have grown steadily over the last five years due in large part, but not limited to, numerous problems encountered between mobile operators and fixed line service providers. In the early days of competition, regulators often have difficulty in establishing adequate interconnection guidelines for mobile-to-fixed and mobile-to-mobile calls. Many investors have suffered financially as a result and thus are more diligent about ensuring that the interconnection regime is economically sound and supported by a clear regulatory position.

In this era of convergence, regulators are facing new issues such as how to transition different rights of individual groups of licensees under a specific interconnection regime to a unified licensing regime. Finally, regulators are also facing the challenge of how to address the complexities created by a multiplicity of operators utilizing a variety of technologies interconnecting among themselves. In the ITU-D study group question on interconnection, for example, the participants studied possible solutions to this issue, including the interconnection gateway exchange and interconnection billing clearing house.[1]

6.6.3.5 SPECTRUM MANAGEMENT

As a scarce resource that is becoming increasingly valuable as the number of mobile phone users and the range of bandwidth-hungry services and applications grow, spectrum management is an essential part of telecommunications policy and regulation. Spectrum management refers to a wide array of responsibilities, including spectrum allocation, methods of spectrum assignment, development of technical and service rules and enforcement of rules and licensing obligations, such as preventing harmful interference or coverage obligations. At the national level, spectrum management may be under the authority of the ICT regulator or a government ministry or responsibilities may be shared between the two. Whether the ICT regulator or a ministry is better for managing spectrum depends largely on each country's particular circumstances. Regardless of the entities that manage the spectrum, it is important that the mechanisms for allocating and assigning spectrum are transparent, non-discriminatory, fair and provide effective accountability. Additionally, where spectrum management responsibilities are shared, it is important that there are clear measures in place to facilitate cooperation between the regulator and ministry. Spectrum management and the role of the regulator are further addressed in **Module 5** on Radio Spectrum Management.

In Nigeria, for example, the Nigerian Communications Act of 2003 tasks the National Frequency Management (NFM) Council, a ministerial level body with developing Nigeria's positions at the ITU, as well as preparing bilateral and multi-lateral spectrum allocation treaties with other sovereign administrations.1 Notably, the NFM Council is responsible for preparing, updating and publishing the national frequency allocation table with the NCC's advice. The NFM Council is comprised of members from various ministries, including ministries associated with communications, science and technology, aviation, transport and the national security agencies. In addition, the country's independent ICT regulator, the Nigerian Communications Commission (NCC), and the National Broadcasting Commission also have membership on the NFM Council. Although the NFM Council is responsible for spectrum allocation, the NCC has the "sole and exclusive power to manage and administer the frequency spectrum for the communications sector." As part of this authority, the NCC is tasked with granting spectrum authorizations and regulating licensees' use of spectrum. By clearly identifying the roles that the NCC and the NFM Council play in spectrum management, as well as providing the NCC a position on the Council, the Nigerian Communications Act helps to ensure that the bodies function in a cooperative and effective manner.

6.6.3.6 QUALITY OF SERVICE - REGULATORY ROLES AND RESPONSIBILITIES

Often, a regulator's responsibility is to establish quality of service (QoS) guidelines or parameters, as well as the methods and procedures for monitoring operators' performance against these established parameters. The fundamental objective in establishing QoS targets and reporting is to ensure that the general public (*i.e.*, the consumer) is served and, at the same time, that the operator is not impeded from carrying out day-to-day operating routines as a result of excessive reporting requirements. The level of regulatory intervention with respect to QoS is often dependent on the degree of competitiveness that is present in the market. Generally, the regulator takes a more hands-off the approach with respect to QoS monitoring and reporting requirements if a market is highly competitive. Nonetheless, the reporting and the report analysis process should not be too onerous for either the operator or the regulator irrespective of market conditions. In addition, it also should be developed in consultation between the operators and the regulator to establish realistic benchmarks and make the process manageable and useful in identifying areas where the consumer is receiving inadequate service levels.

Although different approaches have been adopted in various jurisdictions, the regulatory goal should be to ensure: (i) the delivery of acceptable service for the telecommunications user; and (ii) that consumers are aware of the variations in performance from various service providers/operators thereby allowing them to make an educated choice regarding their preferred service provider. QoS indicators are one of the most effective regulatory tools in this regard.

Ultimately, consumer should reap the benefits from the enforcement of QoS regulations. In certain instances, for example, operators opt to run the risk of incurring a penalty as opposed to investing to improve the QoS. In such cases, the imposition of monetary fines does not result in any direct benefit to consumers. On the other hand, consumers may benefit directly when the penalty for violating QoS standards is, for example, to provide consumers with services free of charge; to give the consumer retroactive rebates as compensation for the poor QoS; or to move them up to the top of a waiting list for the provision of services.

6.6.3.7 UNIVERSAL ACCESS/SERVICES

Although universal access/service (UAS) policies and the underlying institutional framework are often first set out in national legislation or ministry policies, the telecommunications regulatory authority is often tasked with carrying out the policies and implementing regulations and enforcing UAS obligations in licenses. As such, regulators should be empowered to address universal service[1] and universal access issues.[2] Many find that the regulatory authority should implement universal access/service policies. For example, the West African Telecommunications Regulators Assembly (WATRA) set out Guidelines on Universal Access/Service in 2005, which provided that: "National Regulatory Authority's (NRAs) must be established and capacitated to play a key role in implementing universal access policies first through addressing the market efficiency gap (letting the market deliver universal access/service), and second through the true access gap."3 The 2005 WATRA Guidelines further stated that NRAs should be responsible for implementing UAS policies directed towards assuring the best quality reliable services at the most affordable prices that meet the needs of consumers."

Despite a preference for implementation of UAS policies by the regulatory authority, in a number of countries, the ministry responsible for communications is tasked with carrying out policy relating to universal access or service, which is the case in Colombia, Guatemala and India.4 The advantage of such an approach is that the entity that defines policy also carries it out. However, a problem may arise from this framework where UAS policies are funded through a specific Universal Service Fund (USF), which is often made from industry contributions in which government is not perceived as being far enough removed to be an independent administrator of the finances. This issue is more likely to arise where government still has any ownership interest in the industry.

Where USF is used to achieve universal service, it is important to ensure that the funds are administered and awarded on a transparent, non-discriminatory and timely basis. In Taiwan, for example, the Directorate General of Telecommunications (DGT), a division of the Ministry of Transportation and Communication (MOTC), administers and manages the Universal Service Fund. The DGT oversees the affairs of the fund through the Universal Service Fund Administrative Committee, composed of seven to eleven members from agencies, academia, and sector experts. The Director General of the DGT is the chairman of the committee, and other members of the committee are selected by the DGT. The main functions of the committee include: assessment of the annual implementation plans and subsidy applications for universal service; assessment of the revenues as reported by contributing parties; auditing and calculation of the contribution proportion and amount to be made by contributing parties towards universal service charges; auditing and assessment of the Telecommunications Universal Service Fund; evaluation of the universal service regime; and other matters related to universal service in Taiwan.[5]

Similarly, in Chile, the Telecommunications Development Fund (FDT) is managed by the Telecommunications Development Council, a group composed of three ministers (including the Minister of Transportation and Telecommunications who acts as Chairman of the Council) and three telecommunications experts representing different regions of the country. However, unlike Taiwan, the Council is supported by the regulator, SUBTEL, and the Council's members include a broader group of government representatives. Each year, the Council is responsible for: (i) determining the criteria SUBTEL will consider when evaluating projects; (ii) carrying out the annual agenda of projects to be tendered and those being subsidized, as well as establishing their priorities and the subsidies necessary for their execution; and (iii) determining, through public tenders, the disbursement of funds for subsidies for projects to be carried out. The Council can request necessary information from regional, provincial or community authorities. Once a project is selected, the Council forwards all relevant information to SUBTEL for the regulator to issue the pertinent authorizations. The Council also is responsible for preparing and distributing the FDT's annual report that allows for periodic assessments of the fund.[6]

6.6.4 NON-CORE RESPONSIBILITIES

In addition to their core responsibilities, ICT regulators are increasingly expanding their roles in areas not directly related to telecommunications (i.e., "non-core" responsibilities). These include areas where ICT regulators have long played a role, such as consumer protection, as well as new areas, such as cyber security and climate change. ICT regulators are particularly positioned to impact these other areas due to the impact of technological convergence on every aspect of society and sector of the economy.

6.6.4.1 CYBERSECURITY

Cybersecurity, which requires protecting network infrastructure, as well as individuals' data privacy, pose substantial technical and legal challenges to law enforcement.1 First, increasing use of and reliance on ICTs means that even temporary service disruptions can cause significant economic losses. Secondly, with billions of Internet users worldwide, the number of potential targets for cybercrime makes it difficult to identify and track cybercriminals. Third, cybercrimes are often committed across national boundaries in which the offender is in one country while the victim is in another and the means for committing the crime may be in a third country. Without effective international cooperation, it is likely to be difficult—if not impossible—to locate, arrest and prosecute cross-border cybercriminals.

Due to the law enforcement and transnational components of cybersecurity, ICT regulators have not taken the lead on drafting and implementing cybersecurity regulations. Instead, these issues are typically addressed in national legislation, as well as through international and regional initiatives seeking to harmonize the legal frameworks of various countries. For example, the Group of Eight (G8) adopted Ten Principles to combat cybercrimes, which included commitments to 1) ensure that there would be no safe havens for cyber criminals anywhere in the world and 2) implement a coordinated international legal framework capable of investigating and prosecuting cybercrimes regardless of where the harm has occurred.2 As addressed in Section 4.4.4, the Council of Europe's Convention on Cybercrime also sets out specific measures to be implemented by Member States to ensure that domestic laws regarding confidentiality, integrity and availability of computer data and systems, such as illegal access or interception, were consistent. Additional regional commitments to the prevention and prosecution of cyber crimes have been implemented through the Asian Pacific Economic Cooperation (APEC), Organization of American States (OAS), Association of South East Asian Nations (ASEAN), the Arab League and the African Union.

However, ICT regulators are in a position to leverage certain core competencies within the ICT sector to make significantly contribute to cybersecurity, particularly with respect to facilitating the mobilization of various stakeholders and coordinating the efforts of these stakeholders in the fight against cybercrime.3 Additionally, ICT regulators can use their expertise to participate in developing or reviewing national legislation and policies related to data protection, data transmission, spam, and the responsibilities of ISPs and other Internet intermediaries. Particularly in developing countries with limited or no legislation to specifically address cybercrime, the ICT regulator is playing an advisory role to help draft effective legislation. For example, the Ugandan Communications Commission was a member of the multi-stakeholder National Task Force established in 2003 to draft cybercrime legislation.4 This draft legislation is now part of a regional initiative called the East African Countries' Task Force on Cyber Laws seeking to develop and harmonize cybercrime laws throughout the region. In Zambia, as a member of the National Working Group on Cybersecurity, the Zambia Information and Communications Technology Authority (ZICTA) has also played an advisory role in drafting the country's cybersecurity legislation,5

Some countries are exploring the possibility of expanding the ICT regulator's role beyond that of an advisor to assisting with the enforcement of cybercrimes, particularly regarding copyright infringement and spam. For example, the United Kingdom passed a digital piracy law in 2010, called the Digital Economy Act (DEA), which places most of the implementation and enforcement powers with the ICT regulator, Ofcom, rather than with a law enforcement agency.6 The DEA details a three-stage notification process for informing subscribers of copyright infringements and requires ISPs to provide infringing subscribers' IP addresses to the relevant copyright holders. Ofcom's powers include deciding upon the appropriate enforcement action against any person found to have breached the code, including imposition and collection of a financial penalty up to £250,000.

6.6.4.2 ICTS AND CLIMATE CHANGE

Countries at all stages of development face environmental problems related to climate change, pollution, energy and decreases in biodiversity. ICTs can improve environmental performance and address climate change across the economy, particularly in energy, construction and transportation sectors and can also improve water management techniques, protect biodiversity and reduce pollution. Despite these benefits, ICTs are also a contributor to global emissions, an impact that will continue to grow with the rise of broadband-enabled devices using "always on" connections and increased processing capabilities that require greater amounts of energy in order to power these devices, Countries are examining new approaches to ICT policies and regulation in order to capture the benefits of ICTs on the environment, while minimizing their negative effects. Drawing on their expertise, ICT regulators may assist in developing policies to meet this objective.

Except for electromagnetic field (EMF) and radiofrequency field (RF) emissions from broadcasting and mobile communications towers or from handheld mobile devices, ICT regulators have not traditionally been involved in environmental policies. However, the growth of "green ICT" initiatives may prompt new levels of cooperation between the ICT and environmental regulators in order to accomplish ambitious cross-sector goals. For example, Egypt is implementing its Green ICT Strategy jointly through a Memorandum of Understanding (MoU) signed in February 2010 by both the Ministry of Communications and Information Technology (MCIT) and the Ministry of Environmental Affairs (MEA). The framework of the MoU between the MCIT and the MEA aims at achieving several goals, including:1

- Raising community awareness about green ICT challenges and opportunities,
- Setting national policies for green ICTs
- Adopting a multi-stakeholder approach to address how to use ICTs to reduce environmental impacts;
- Reducing the adverse environmental effects resulting from the expansion in the use of ICT; and
- Supporting the use of ICTs as an effective tool to reduce GHG emissions resulting from other sectors.

Other countries have begun cross-sector coordination efforts in order to take a more holistic approach to meeting environmental and ICT policy objectives. In Singapore, for example, multiple agencies have begun to collaborate more frequently on new cross-sector initiatives.2 In November 2009, the Singapore Government announced the launch of the pilot project "Intelligent Energy System" (IES) that tests a range of smart grid technologies. The IES project requires the cooperation of several agencies, including the ICT regulator and the various regulators in charge of energy; the environment; economic development; science and technology research; and housing and development. More recently, the Singapore Government established the Energy Efficiency Programme Office (E2PO), which is a multi-agency committee led by the National Environment Agency (NEA) and the Energy Market Authority (EMA) and includes Singapore's ICT regulator, the Infocomm Development Authority (IDA). The goals of the E2PO include promoting the adoption of energy efficient technologies and developing local knowledge expertise in energy management, as well as supporting research and development in green ICTs.

Since cross-sector initiatives to promote green ICTs are relatively novel, it is unclear whether they represent a new type of policy implementation. There is great potential to capture the high-level expertise from multiple agencies; however, these collaborative efforts may also result in new challenges, such as jurisdictional conflicts or funding issues. As ICTs continue to become an integral part of climate change challenges and solutions, policymakers will be increasingly presented with the opportunity to involve regulators of the ICT, environment and energy sectors in collaborative projects that can help to guide high-level legislation as well as sector-specific regulation in order to fully harness the potential benefits and efficiencies that ICTs can bring to society.

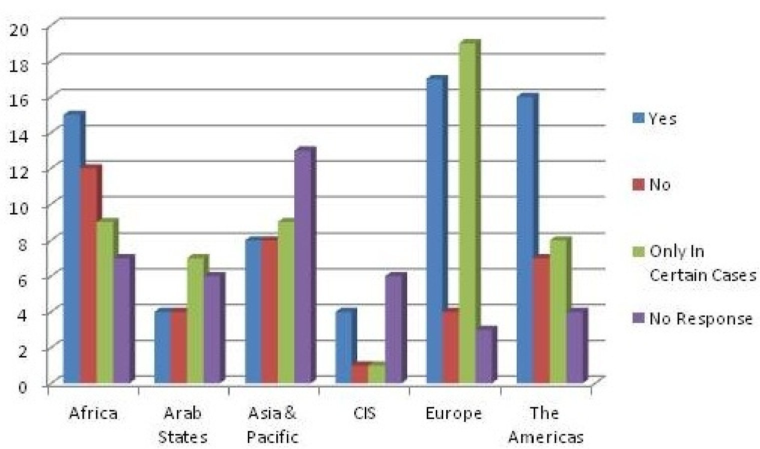
6.6.4.3 ICTS AND FINANCIAL SERVICES

6.6.5 DECISION-MAKING PROCESS AND CONSTITUTIONAL FRAMEWORK

Since regulations should be developed in an open and transparent fashion, with appropriate and well publicized procedures for effective and timely inputs from interested stakeholders, including domestic and foreign businesses, public interest groups and consumers, a public consultation helps to improve the quality of rules and programs, as well as improves compliance.1 Holding public consultations are not required in all countries, but most regulators have adopted some form of consultation process (Figure 6-C),

e.g.,

before adopting policies, creating regulations or issuing licences.2 See, for example, the consultation procedures for **Hong Kong (SAR)**, **St. Vincent and the Grenadines**, and the **United Kingdom** (in the online practice notes), which are illustrative of the public consultation procedures adopted by regulators in many countries.



◂ Percentage of Regulators Worldwide that Must Conduct a Public Consultation before Regulatory Decisions are Made

Source: ITU World Telecommunications Regulatory Database 2010.3

In some cases, public consultations are not undertaken due to lack of resources or other immediate constraints that make it difficult to hold them. In Botswana, for example, when the Telecommunications Regulations were promulgated in 1997, the regulator did not include public consultations because it did not have sufficient staff resources to conduct consultations and it had a tight timetable. In subsequent years, however, the regulator added extra staff and developed more expertise, so that in 2000, the Botswana Telecommunications Authority (BTA) prepared its first consultation document on telecommunications services pricing.4

Other countries mandate public consultations in certain occasions. In Bahrain, the Telecommunications Law requires that, except in emergency cases, the Telecommunications Regulatory Authority (TRA) must provide interested parties the opportunity to present their opinions within a reasonable period on measures having a material effect on the telecommunications market. Procedurally, the TRA issues a bylaw regarding such consultations ensuring that the public is informed from a single information source of the ongoing consultations, excluding confidential information.5 The EU Framework Directive mandates national regulatory authorities of member states to publish their consultation procedures and the subsequent results when they intend to take measures in accordance with the Directive or other directives that have significant impact on the relevant market. This is intended to ensure that interested parties are given the opportunity to comment on the draft measure within a reasonable period.6

Where the requirements for holding public consultations are mandatory, the legislation typically specifies the particular instances when public consultations are compulsory and must be held by the regulator. For example, in Portugal, the Electronic Communications Law specifies that the regulator, the Autoridade Nacional de Comunicações (ICP-ANACOM), has discretion to determine matters that are subject to formal written public consultations, except for the following:7

§ Change in the conditions, rights and procedures applicable to the exercise of the activity;

§ Limitations on the rights to use frequency;

§ Allocation of rights to use numbers that are exceptionally valuable through competitive or comparative selection procedures;

§ Definition of quality of service parameters;

§ Release from the obligation to offer additional resources;

§ Definition of portability regulations;

§ Definition of the relevant markets for products and services, determination of a relevant market as being effectively competitive or not, identification of companies with significant market power in the relevant markets, and the imposition, maintenance, change or elimination of obligations by companies with or without significant market power;

§ Definition of carrier selection and pre-selection regulations;

§ Definition of obligation pertaining to the universal service providers applicable to the offer of public telephones;

§ Definition of the terms and conditions of the service offers specifically for people with disabilities;

§ Definition of the performance objectives applicable to universal service obligations.

Although public consultation procedures can vary from country to country, minimum procedural safeguards are generally instituted to make sure that there is maximum participation in the decision-making process, such as: issuing public notice of consultations; allowing for a proper comment and reply comment period; and publishing the consultation results and final decisions.

Practice Notes

- **Box 6-4: OECD Guidelines on Dealing with Conflict of Interest Situations [6.5]**
- **Case Study: Conflict of Interest Regulations in Bahrain [6.5]**

Reference Documents

- **Hong Kong Civil Servants' Guide to Good Practices**

6.6.5.1 NATURAL JUSTICE/PROCEDURAL FAIRNESS

Aside from the substance of the decision that a regulator ultimately reaches, it is important that stakeholders are confident that the process used to reach that decision was fair. As such, procedural fairness (also referred to as natural justice) is concerned with the procedures used by a decision maker, rather than the actual outcome reached, although it is also understood that a decision maker following a clear, objective set of procedures is more likely to reach a fair and correct decision. To ensure procedural fairness, several elements are necessary:1

- A competent, independent and impartial regulatory authority oversees the process and makes the ultimate decision;
- The regulatory authority exercises its authority within the scope permitted by its legal powers;
- Clear, published rules of procedure are available and consistently applied;
- Proceedings are open to the public, except where confidentiality is necessary to protect proprietary information or other confidential information;
- All parties are treated in a non-discriminatory manner; and
- The decision-making body uses evidence and arguments presented during the proceedings to justify its ultimate decision.

Procedural fairness provides the foundation of the public consultation process by offering authorities a better understanding of the facts and helping to improve the quality of evidence and reasoning on which the agency bases its enforcement actions and decisions.2 For parties to the decision, procedural fairness bolsters confidence and belief in a fair legal system and in those applying the law.

6.6.5.2 TRANSPARENCY

The principles of good regulatory decision-making are universal: (a) transparency; (b) objectivity; (c) professionalism; (d) efficiency; and (e) independence.1 Although all of these principles are necessary for successful regulation, transparency is particularly critical, as it provides accountability and legitimacy to regulatory decisions. In the context of telecommunications regulation, transparency refers to the openness of the process of exercising regulatory power, which, in turn, ensures the fairness, accountability and credibility of the results.**2** Box 6-9 below provides a summary of the benefits of transparent regulation.

1. ***Efficiency and Effectiveness*** – Open processes enhance consensus and create confidence in the regulator. Increased public participation promotes diverse ideas in decision-making and increases support for rules and policies, making implementation easier. In addition, transparency can lead to greater efficiency by ensuring that duplication of functions is avoided.

2. ***Certainty and Reliability*** – Regulatory credibility and legitimacy builds stability, essential for attracting investment. This is particularly important in newly liberalized markets, where potential entrants need to trust that their investments are protected from arbitrary action and that further commercial development will not be thwarted by sudden changes to "the rules of the game."

3. ***Accountability and Independence*** – Openness promotes accountability and legitimacy, reinforcing regulatory independence and reducing political and industry interference. Stakeholders will have confidence that their views will be heard, without bias, by the regulator. Where regulatory actions are exposed to public view, regulators are more likely to engage in careful and reflective decision-making.

4. ***Continuity*** – A stable set of rules governing transparency will transcend political changes and outlast political appointments, ensuring a continuous regulatory record regardless of who is in charge of the regulatory agency or which political party is in office.

◂ **Box 6-9 Benefits of Transparent Regulation**

Source: ITU – Trends in Telecommunication Reform 2002, Chapter 6.

6.6.5.3 AVOIDING PERCEPTIONS OF BIAS

Regulators should ensure that there is a consistent policy in place addressing its role and functions in the decision-making process in order to provide greater confidence that its decisions are made on an objective, impartial and consistent basis, and avoid the risks of conflict of interest, bias or improper influence. The rule against bias is a principle of procedural fairness that requires the decision maker to not have an interest in the matter being decided, as well as to decide the issue in a fair and equitable manner, taking into account only the merits of the matter, and respecting the rights of affected citizens.

In addition, decision makers should avoid the *appearance* of any bias or interest in the outcome. As such, both actual and apparent bias should be avoided. In Australia, for example, the test of whether actual or apparent bias exists is "whether a fair-minded observer might reasonably apprehend that the decision-maker might not bring an impartial mind to the resolution of the question."5 Overall, avoiding the perception of bias is necessary to instill confidence in the process, as well as in the regulatory authority itself.

6.6.6 OVERVIEW OF THE PUBLIC CONSULTATION PROCESS

Public consultations can take different forms depending on: the nature of the issue being consulted; the number of people that could be affected by the decision; the impact on the market; and whether a formal written consultation process is mandated by legislation. Public consultations can range from informal meetings to more formalized and structured written consultations. Some of the forms of public consultations used by regulators are:**1**

- Formal invitations for written submissions;
- Individual meetings with one or more interested parties;
- Meetings, seminars, and workshops with representative groups and other interested parties;
- Issuing draft documents containing the preliminary view of the regulator and soliciting comments from the public at large before taking a final decision;
- Public hearings;
- Surveys;
- Consultation with independent advisers; and
- Discussions and consultation with regulatory professionals and regulatory institutions in other jurisdictions.
    - The discussion time lasts a maximum of two hours.
    - Participants must register before entering the meeting, providing their company name or the institution that they are representing.
    - The participants speak according to the order on the registration list. Each participant has a maximum of three minutes to speak. In

the case of companies or associations, only one representative (the first registered participant) is allowed to speak, unless the moderator permits additional representatives to do so and sufficient time is available.

- The number of rounds or times that participants are allowed to speak depends on the number of participants who have registered.
- Comments or objections must address the specific subject of discussion.
- The moderator has the right to preserve the orderly development of the discussion, and may interrupt a participant if the commentary is not related to the topic of discussion or the participant's time has passed.
- The public hearing is filmed and transcribed.
- The public hearing concludes once all registered participants have spoken or the scheduled time has expired.

Generally, regulators use formal written consultation procedures as a minimum safeguard to ensure public participation in its decision-making process, but often supplement this process with informal consultation methods such as public hearings or surveys. (Box 6-10 summarizes the objectives for holding public consultations.) For example, in Peru, the Board of Directors of the regulator, Organismo Supervisor de Inversíon Privada en Telecomunicaciones (OSIPTEL), may form ad hoc consultative committees, composed of experts who, due to their authority, knowledge, and representation on the consultation issue can assist in the discussion or treatment of the regulatory initiative. Similarly, Hong Kong's (SAR) Office of the Telecommunications Authority (OFTA) has formed various advisory committees composed of members of the public, industry professionals and representatives of other government departments, from whom it can seek opinions during public consultations. Additionally, OFTA will also form ad hoc work groups and committees to discuss specific issues from time to time that fall outside of the purview of the advisory committees.2

Many regulators find the written consultation process to be the most efficient means of conducting a public consultation. The U.K. regulator, The Office of Communications (Ofcom), will usually engage in a formal consultation process to seek written views of the public. However, recognizing that formal consultation has its limits in reaching smaller businesses or community groups or individuals who lack time and specialist skills, Ofcom supplements the formal written consultation with other methods of gathering information, such as running road shows, open meetings, online bulletin boards, or organizing focused discussion groups.3

- To obtain input, information and feedback from persons affected by the proposed decision, other stakeholders and the public so as to ensure that consumers have the best telecommunication services possible in terms of choice, quality and value for their money.
- To acquire substantive information and knowledge from stakeholders, regulatory and industry professionals and other regulatory institutions so as to effect an orderly transition to a fully liberalized and competitive marketplace.
- To ensure that the Commission has investigated all aspects of an issue; and
- To ensure transparency of decisions of the Commission.

◂ **BoxObjectives of a Public Consultation**

Source: *Anguilla, Administrative Procedures Regulation, 2004.*

The general public consultation process is based on a three-stage process, which can incorporate both informal and formal procedures depending on the nature of the proceeding.4 (See Figure 6-D.) In the first stage, an issue is identified and the regulator issues a formal consultation document soliciting public comment. This is followed by a comment period in the second stage. In addition to the receipt of written comments, the regulator may use the comment period to engage in informal consultations as well, such as public hearings, to gather additional information or clarify information that it receives. In the last stage, the regulator makes a decision based on public policy and the information received.

1. Public Notice of Consultations

In the first stage, the regulator issues a formal consultation paper after identifying and formulating an issue. The decision-making process is typically initiated by either the regulator or by an interested person requesting a formal consultation.5 For example, in the United States, the Federal Communications Commission (FCC) allows interested members of the public to file a Petition for Rulemaking requesting the FCC to amend an existing rule or to develop a new rule.6

The regulator can use this initial stage to conduct informal consultations on more complex issues to help it formulate the issue for the finalized consultation document. For example, in Hong Kong (SAR), prior to the OFTA consultation proceeding on the Interconnection and Related Competition Issues, OFTA provided written notice to all local fixed network operators informing them of its intent to initiate the review and inviting them to raise additional issues related to interconnection so that they could all be resolved in a single proceeding. Only after reviewing the responses received did OFTA issue a formal consultation paper outlining the specific issues and its own preliminary views on the issues.7 In the United Kingdom, Ofcom may hold informal talks with individuals and organizations before announcing a formal consultation. If Ofcom does not have enough time for the informal talks, it may hold an open meeting to explain its proposal and gather comments before announcing the consultation.8 The FCC in the United States sometimes initiates a Notice of Inquiry (NOI) to invite public comments and information about specific topics when it is interested in a particular issue but has not formulated a specific rule change proposal. NOIs are used by the FCC to gather information about a broad subject or as a means of generating ideas on a specific issue.

Publication of the Consultation Notice

Today, most regulators post consultation documents on their websites, in addition to publishing them in a government gazette or other official publication, or disseminating the documents through other forms of media such as newspapers, television or radio. In South Africa, the Telecommunications Act requires a three-month notice of the proposed adoption of a regulation, which must be published in the national Gazette.9 In Bahrain, the TRA publishes public consultation documents on its website, and may use other means to keep the public informed of ongoing consultations, including publication in the national or international media and/or sending individual notices to potentially interested parties.10 Some regulators, such as the Canadian Radio-television and Telecommunications Commission (CRTC), also maintain a mailing list of individuals who wish to be contacted when certain activities occur, such as when licence applications are filed. The regulator will inform those on the mailing list where they can inspect the filings and submit comments.11 Box 6-11 provides an example from the CRTC illustrating the different methods that regulators use to inform stakeholders regarding public consultation proceedings.

The different ways that one can find out about CRTC public proceedings are:

1. ***Official CRTC announcement*** – These are available from any CRTC office and the CRTC website. Official announcements about broadcasting applications or issues also appear in the Canada Gazette.

2. ***Information sheets*** – The CRTC sends these to target groups and, in rural communities, ensures they are posted in rural post offices.

3. ***Newspaper advertisements*** – In affected communities, the CRTC places advertisements in newspapers of general circulation as well as community papers.

4. ***Public Service Announcements*** – These are made on the cable community channel serving the affected area.

5. ***Billing Inserts*** – These allow telephone companies to inform subscribers about CRTC public processes that involve them.

6. ***Tariff Notices*** – These are filed by telephone companies and are available from any CRTC office and the CRTC website.

◂ BoxFinding Out about Canadian Radio-television and Telecommunications Commission Public Processes

Source: *Adapted from the Canadian Radio-television and Telecommunications Commission. Content of the Consultation Document.*

At a minimum, the public consultation document should contain the following information: (a) purpose of the consultation and substance of the proposed decision or description of the subjects and issues involved; (b) consultation timeframe and deadline for submitting comments; (c) contact name and details of how and where to submit comments; (d) reference to the authority under which the consultation matter is proposed; and (e) information on the regulator's next steps following the consultation and/or where and how to obtain further information.

For example, in the United States, the FCC is required to provide the following information in a Notice of Proposed Rulemaking (NPRM): (a) statement of the time, nature, and place of any public rulemaking proceeding to be held; (b) reference to the authority under which the issuance, amendment or repeal of a rule is proposed; (c) either the terms or substance of proposed rule or a description of subjects and issues involved; (d) docket number assigned to the proceeding; and (e) statement of the time for filing comments and replies.12 The FCC requirements are typical of the contents of a consultation document issued by regulators worldwide.

2. Consultation Period

In the second stage, interested parties submit comments on the issue under consultation. The regulator's goal is to gather as much relevant information as possible so that it can make an informed decision, taking into account the information provided by interested parties. To make the consultation more efficient, the regulator should establish a schedule for submissions of comments in the consultation document. Timeframes for submission of comments can vary depending on the complexity or urgency of the issue, and the overall effect of the proposal on the market. For instance, in Bahrain, parties are allowed at least 28 days from the date of publication of the consultation to submit comments. In Portugal, the comment period cannot be less than 20 days. In the United Kingdom, 10 weeks are usually allowed for responses on more complex issues and five weeks for shorter consultations. If Ofcom conducts shorter consultations, it will issue an explanation (*e.g.*, the issue or community involved is small or only affects a particular group, the proposal is a limited amendment to existing policy, an issue requires urgent review, or it is the second consultation on the same issue.)13

When deciding how long a consultation period should last, regulators should balance the need to deal with an issue as quickly as possible with the need to allow enough time for the public to prepare and their responses. If the consultation period is too short, the public may not have enough time to prepare their submissions. On the other hand, if the consultation period is too long, the relevant market may have changed significantly from the time the issue under consultation was identified.

Some regulators, such as the TRA in Bahrain, will not accept unsolicited comments. They will only accept comments in response to a notice of consultation. In the absence of a notice of consultation, however, an interested party may submit comments where such party can show that the particular measure that forms the subject matter of the comments will have a material effect on a particular telecommunications market.14 In addition to initial comments, some regulators, such as the FCC in the United States and the NTRC in St. Vincent and the Grenadines, specifically allow for reply comments15 while other regulators, such as the TRA in Bahrain usually only invite a single round of comments per consultation.16 The benefits of allowing replies to comments are that it allows interested parties to challenge the comments made by others, and also provides the regulator with additional information regarding the issue under consultation.

Submission of Comments

The goal of the consultation process is to gather as much information as possible; therefore, the regulator should make it easy for the public to submit their comments. Most regulators encourage the use of the Internet for electronic submissions, as well as submissions in writing by fax and standard mail.17 Some regulators specify the particular format for written submissions.

Publication and Confidentiality of Information

To maintain transparency throughout the consultation process, regulators should publish comments so that they are publicly accessible either online or at the regulator's office. This assures the public that their submissions have been received and allows them to view the comments of other parties. It also facilitates "buy-in" or "consensus building" within the industry, thereby facilitating compliance with the proposed rule.[18] In Brazil, Anatel's consultation documents and related public comments are available on the regulator's website, where it maintains a virtual library of all of its regulatory proceedings.

Regulators, however, need to maintain a just balance between the requirement for a transparent public record and the need to respect confidential information from parties. Most regulators will post public comments received in a consultation process, or summaries of such comments on their websites, omitting any confidential information. Recognizing that companies may be reluctant to submit information considered commercially confidential, most regulators, including **Singapore19** and **Bahrain20**, have implemented regulations regarding treatment of confidential information. Usually, regulators will require persons requesting confidential treatment of information to submit an abridged version to be circulated publicly. In some cases, such as the NTRC in St. Vincent and the Grenadines, the regulator will allow for anonymous respondents, provided that such persons employ the services of a lawyer to respond on their behalf.

Many regulators also have rules regarding *ex parte* (private) communications during a pending proceeding. Regulators should maintain transparency and fairness in the regulatory proceedings by giving equal access to all stakeholders and preventing any one single person from having an advantage in influencing the regulator's decision through secret or private contacts. *Ex parte* rules can ensure transparency in the decision-making process by requiring all communication made by the public to the regulator to be published and accessible to other stakeholders, and ensuring that all stakeholders are informed whenever one party has an undisclosed meeting with the regulator. Regulators also may exempt certain communication from *ex parte* rules, such as inquiries about the status of a decision (as opposed to arguments for or against a certain action or decision), inquiries about procedural rules (so long as the rules are not themselves the subject of the proceeding) and statements that are inadvertently or casually made about a pending issue.[21]

Public Hearings

During the consultation period, the regulator has the flexibility to use other informal means of gathering additional information or clarifying the information it receives, such as seminars and workshops, visits by or to representative groups and interested parties, Internet discussions, surveys, and public hearings. A common informal consultation procedure is the public hearing, which is open to all interested parties so that they may express their views in person. The CRTC in Canada generally relies on the public hearing process when dealing with applications for new broadcasting licences and when considering a major policy issue or amendment to its regulations.[22]

Before holding a public hearing, the regulator should make the details of such meetings publicly available on their website or published in a newspaper, or announced on television or radio. In addition, in order to enhance transparency in the consultation procedure, if possible, public hearings should be recorded and transcribed so that they are publicly available. Brazil's regulator, Anatel, and the FCC in the United States both post the agendas, schedules and subsequent minutes of public hearings on their websites. The FCC also "webcasts" its hearings and meetings on the Internet. On the other hand, the Telecommunications Authority of Turkey does not usually keep the minutes of the public hearings because "it causes a formal mood preventing a sincere and efficient discussion."[23]

In Peru, OSIPTEL organizes public hearings before adopting normative and regulatory decisions. The procedure for public hearings is summarized as follows:[24]

3. Publication of Final Decision

After the conclusion of the consultation period, the regulator should publish a final decision. It is important that a final decision is issued within a reasonable period of time upon conclusion of the consultation period to ensure credibility and effectiveness of the decision-making process. An important measure of a truly transparent decision-making process is the publication of the regulator's justification for its decision, as well as a summary and response to the comments and reply comments received during the consultation proceeding. This demonstrates to the public that the regulator has taken into account the input received during the public consultation process. For example, in the United Kingdom, Ofcom will provide reasons for its decisions and give an account of how the view of the interested parties shaped their decisions.[25] Furthermore, requiring that the regulator provide reasons for their decisions forces them to engage in rational decision-making, gives parties the ability to analyse the decision and decide whether there may be grounds for review or appeal, and ensures the legitimacy and accountability of the regulator.

Today, many regulators post their regulatory instruments on their websites, as well as in the official government publication or gazette. For example, in Brazil, laws, decrees, decisions, regulations and other regulatory instruments related to Anatel's competencies are published in the Official Gazette and posted on its website. In Venezuela, the telecommunications law mandates that the regulator establish and maintain a register of all administrative acts. Additionally, in various countries regulatory decisions are made public in national newspapers, television or radio and through postal mailings or e-mails to parties affected by the decision.[26] Publishing decisions online also makes it easier for regulators to publish all comments, reply comments and documentation supporting commenters' positions, which further improves transparency and credibility of the decision-making process.

As regulators institute public consultations, the following questions can serve as a quick reference for regulators to consider in assessing whether the most appropriate and effective mode of consultation has been adopted. Some of the questions to consider are:

- What resources are available for the consultation?
- Given the regulator's financial and human resources, what form of consultation should be used to achieve the desired outcome? (*e.g.*, formal published documents and written responses, individual meetings between interested parties and the regulator, public hearings, working groups of representatives of service providers and/or consumers to address particular questions, internet discussions on the regulator's website etc.)
- Has sufficient and adequate time been allocated for the public consultation process?
- Is the consultation presented in a language/mode that the targeted stakeholders can readily understand and respond to?
- Does the consultation cover all the issues and questions that need to be addressed for the regulator to make an informed decision?
- Has the consultation been published in the relevant media so that it reaches the widest audience and ensures that all interested parties have access to the consultation?
- Does the consultation provide clear directions regarding submission of comments?
- Does the consultation provide for transparency? (*e.g.*, publication of the consultation document, comments received, and the regulator's final decision with reasoning)
- Has the regulator provided for treatment of submissions that contain confidential information?
- Has the regulator been providing adequate information to the media regarding its activities? (*i.e.*, are stakeholders aware of its activities?)

◂ Box Quick Reference List for Public Consultations

Online Public Consultations

One of the many benefits of increased Internet availability and use is that it allows regulators to conduct public consultations online, which allows for greater civic participation in the decision-making process. In response to the growing number of countries offering online public consultations, the OECD has published some basic guidelines for regulators to follow, as shown in the Box below.

◂ Box OECD Guidelines for Online Public Consultation: The Dos and Don’ts of Seeking Public Opinion via the Web

- Begin the consultation process long before the consultation:
- Advertise upcoming online consultations several months in advance of the actual consultation so that stakeholders expect and prepare for it.
- Request relevant public interest groups to help circulate the information.
- Identify the international newsletters that treat the subject and ask them to advertise the consultation.
- Relay the information via communication channels through news releases and public notices.
- On the regulator’s website, explain the consultation procedure and how you will treat responses.
- Explain who will use the responses and for what purpose.
- Explicitly state to whom to respond to direct queries to, giving a name, address, telephone number and e-mail address (the project manager), and highlight the information.
- Clearly state the deadline for responses, any alternative ways of contributing and the language(s) in which responses are preferred.
- Make it clear that responses, including the names and addresses of respondents, may be made public unless confidentiality is specifically requested.
- State the date when and the web address where the summary of responses will be published.
- Simplify the process and provide all relevant documentation.
- Include relevant documents on the subject along with the online consultation document. Not only does this lead to a more informed consultation exercise, but it also ensures that stakeholders have a better understanding of the issues.
- Provide a well-written executive summary that covers the main points so that consultees can decide whether the consultation is relevant to them or not.
- Provide material on previous consultation(s) on the same topic, if any.
- Avoid jargon and only use technical terms where absolutely necessary. Explain complicated concepts as clearly as possible and, where there are technical terms, provide a glossary.
- Ask focused questions, and be clear about the specific points on which you are seeking views. Encourage respondents to provide evidence, where appropriate, to support their responses. Make it clear if there are particular areas where their input would be especially valuable. Responses are likely to be more useful and focused if the respondents know where to concentrate their efforts.
- Allow adequate time for responses.
- Allow 8 to 12 weeks for responses and reply comments.
- Allow enough time between the end of the consultation and the formal discussion of the results to distil the responses and summarize them in a way that is can easily comprehensible.
- Once the public comment period is over, analyze and summarize responses for formal discussion and publication on the website.
- Compile and analyze the comments, then draw up a short summary, emphasizing the main points. This should be presented for formal discussion and posted on the website at the end of the process.
- Do not simply count votes when analyzing responses. Particular attention should be paid to possible new approaches to the question consulted on; further evidence of the impact of the proposals; and strength of feeling among similar pressure groups.
- Make every effort to ensure that discussion takes the public input into account.
- Report back to the public via the website and other channels.
- It is not enough to simply publish the responses on the website. It is also important to present the final product under debate, and, where possible, any impact that the public input may have had on the discussion.
- Aim to publish the summary of public responses on the website at the end of the process. Other forms of feedback might also be considered, such as a note expressing appreciation for the public input and offering any information possible about its impact for publication on the website.
- Information should also be provided on themes that came out of the consultation which were not covered by the questions.
- Wherever possible, a summary of the next steps for the project should also be included.
- Consider sending any or all of the above elements to the organizations that helped circulate the information about the public consultation on their websites.
- Monitor your effectiveness.
- Invite respondents to comment on the consultation process and suggest ways of further improving it.
- Explicitly state whom to contact if respondents have comments or complaints about the consultation process. This should be someone outside the team running the consultation.
- Look at usefulness, scope and coverage, numbers and types of comments received for future reference.

6.6.7 MEDIA RELATIONS

Managing media relations is an important aspect of being a transparent regulator and ensuring that the public is informed about the regulator’s activities. Although the development of information and communications technology has made the Internet the prevalent means by which regulators interact with the public, the Internet may not be easily accessible in some developing countries. Therefore, regulators still need to rely on broadcasting and print media, such as newspapers, television and radio to ensure that the public has access to important information.

Other means of disseminating information include holding press conferences, issuing press releases, industry briefings, holding seminars and workshops or submitting articles and advertisement directly to trade magazines and newspapers. Some regulators also maintain a press office to manage relations with the media, and ensure that the media reporting of the regulator's activities is accurate.

In Brazil, Anatel has instituted various mechanisms to foster public outreach in addition to publication of its decisions in the Official Gazette and posting on its website. Anatel has created "citizen rooms" throughout the country, which are public spaces equipped with computers, printers, faxes, telephones, scanners, televisions and VCRs that provide a means for the public to interact with Anatel and for Anatel to provide information relating to its activities to the general public. Anyone can conduct online searches of Anatel 's regulations and decisions in the citizen rooms, which are also staffed with attendants to answer questions.[1] In addition, Anatel conducts institutional campaigns periodically to inform the general public in specific cases when the society as a whole needs to be made aware of matters of interest to the broader community. In 1999, for example, Anatel sponsored a campaign to educate the public regarding the implementation of new procedures for domestic and international long distance phone calls. As part of the campaign, the Postal Service distributed thousands of brochures explaining the new procedures throughout the country. To complement this, Anatel's chairman and members of the Board of Directors also granted numerous interviews on the subject.[2]

In Romania, the National Regulatory Authority for Communications (ANRC) relies on the media to communicate with the industry. It has accredited 74 journalists as of 2003, and has dedicated time to educate them regarding its activities. Shortly after its establishment, the ANRC organized a seminar in December 2002 to familiarize journalists with ANRC's specific attributions and competencies. The ANRC held another seminar in October 2003 after the liberalization of the market in the beginning of 2003 to answer specific questions from journalists regarding the liberalization process and the new regulatory framework.[3]

Use of the media is particularly important for regulators that do not have the staff, resources, or legislative mandate to conduct public decision-making procedures. In Botswana, for example, no rules govern due process or transparency in decision-making, such as public consultation procedures or the publication of decisions in an official gazette. However, in an effort to increase transparency, the Botswana Telecommunications Authority (BTA) has used the media to publicize some of its decisions, such as holding a press conference to announce its mobile licence awards and publishing its leased capacity decision and justifications for it in major Botswana newspapers. As the BTA has increased its staff, it has issued more press releases and conducted more public consultations, which are also posted on the regulator's website.[4]

Next: 6.7.2.2 Media Relations ➡