REGIONAL INITIATIVES – AFRICA

A Case Study of ONA
EAST AFRICA ONE NETWORK AREA ROAMING INITIATIVE

Report

Telecommunication Development Sector

East Africa One Network Area roaming initiative

This report was prepared by International Telecommunication Union (ITU) Telecommunication Development Bureau (BDT) experts Robert Horvitz and Simon Forge (SCF Associates Ltd) under the guidance of the ITU Regional Office for Africa.

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Foreword

In 2015, ITU launched the *Let's roam the world* initiative to follow up on previous work in the area of international mobile roaming, and it is my pleasure to present this ITU report on the East Africa One Network Area (ONA) Roaming Initiative.

This report is a good example of a multi-country initiative for the creation of a harmonized enabling environment for the international mobile roaming market with the objective of having affordable access to roaming services for both voice and data. It shows that despite price reductions, and the emergence of a range of alternative technologies and calling solutions, prices are still high, and actions are still being taken to make this service affordable to all consumers.

This report also illustrates how important it is to have an inclusive dialogue so that together we can define appropriate solutions for business, regulation, and policy issues.

I trust that the findings of this report will serve as guidance to assist the East Africa countries and other regional economic communities in Africa in their discussions and decisions on international mobile roaming and that this initiative will contribute to bring the East Africa northern corridor states to work together on this issue.

I strongly believe that such work and collaboration will contribute to the drive for greater integrated regional economic development.

Brahima Sanou
Director, Telecommunication Development Bureau (BDT)

Executive Summary

The One Network Area (ONA) roaming initiative in East Africa aims to promote regional integration by bringing down the high cost of mobile roaming. ONA is based on a set of regulatory interventions, specifically:

- Eliminating charges for receiving voice calls while roaming in Kenya, Rwanda, South Sudan and Uganda if the call originates in one of these countries.
- A waiver of excise taxes and surcharges on incoming ONA voice traffic while establishing wholesale and retail price caps on outbound ONA traffic.
- Requiring mobile network operators (MNOs) to re-negotiate with their roaming partners to reduce wholesale tariffs.

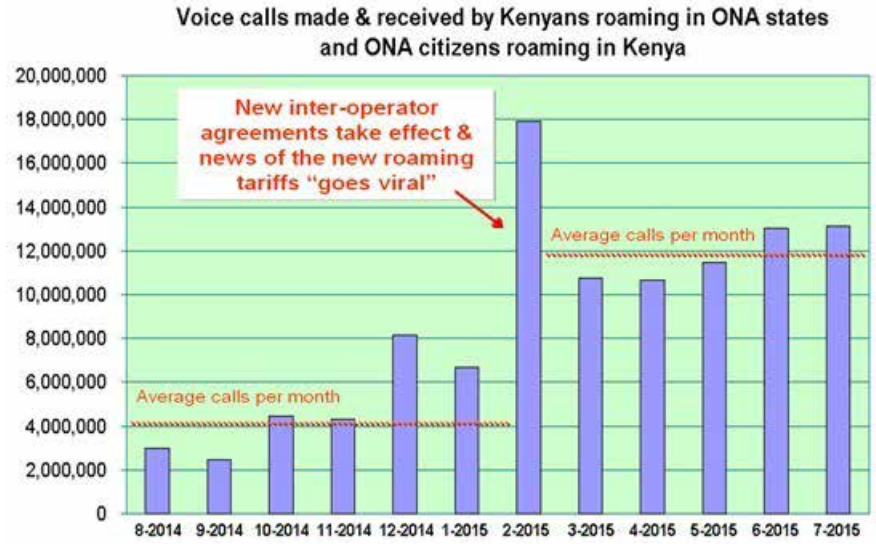
Similar regulatory efforts are emerging around the world, in ASEAN countries, Europe, other parts of Africa, etc. Thus, the East African initiative has global significance as an early test of regional regulation of roaming. Since there is international interest in the East Africa ONA experience, this case study describes its legal and regulatory framework and performance since inception, including:

- the effectiveness of operational arrangements among MNOs and governments;
- changes in cross border traffic;
- the derivation of regional price caps;
- potential abuse by permanent roamers and grey traffickers;
- the extension of ONA to data roaming; and
- pre-requisites for extending the ONA model to additional countries.

After five weeks of research, including a six day visit to countries in the region, the main conclusions of this study are:

1 **The ONA initiative is a worthwhile undertaking and should be extended to other countries in Africa and beyond**. It has brought the East African Community (EAC) Member States closer together and contributes strongly to the drive for integrated regional economic development. Regulators and mobile network operators have begun to solve problems more cooperatively. Most importantly, the public has benefitted from reduced tariffs for mobile roaming, reflected in the growth of cross-border traffic volumes as illustrated in Figure 1.

Figure 1: ONA tariff impact on voice roaming traffic: Kenya



Source: Data supplied by the Communications Authority of Kenya.

2 **The impact of lower tariffs on individual roamers is significant**. Cross border voice traffic has grown rapidly since ONA implementation, tripling in both Kenya and Uganda with a nearly five-fold increase in Rwanda and a thirty-fold increase in South Sudan. However, some reported growth may not be due to roaming and previously stifled demand but to the local re-origination of international calls to make them appear eligible for ONA preferential tariffs.

3 **A *wholesale* price cap of USD 7 cents/minute without surcharges lets all MNOs in the EAC offer roaming services profitably**, according to data collected by the EAC Sectoral Council before introducing ONA. Similarly the Council found that the regional average minimum retail price for roaming voice calls made in visited countries was USD 8.7 cents/minute. The Council analysis also found that the regional average for the lowest freely negotiated wholesale price for roaming was USD 7.63 cents/minute including surcharges. So a retail price cap of USD 10 cents/minute left room for further voluntary price reductions due to competition.

4 **In consequence, mobile network operator revenue loss thus far, from retail price caps and zero tariffs on received calls, is small** – less than a quarter of one per cent in the first year, according to the only MNO in the region that revealed revenue numbers in the survey. Roaming remains profitable under the price caps so long as wholesale tariffs are also capped. However, losses due to grey traffic are growing rapidly, as are efforts to detect and block re-originations of long distance calls.

5 **ONA highlights the problem of grey traffic but it is not the cause. The cause is the wide gap between domestic and international tariffs, which rewards call origin fraud**. This gap is further widened by the dissimilar tariff policies of Internet traffic and traditional telephony. As both sides recognise, solving the grey traffic problem requires cooperation between regulators and MNOs, as well as investment in traffic management and fraud detection systems.

6 **Aside from the grey traffic issue, ONA is working well**.

7 **ONA can be extended across Africa if pre-requisites for extending it to additional countries are satisfied, including**:

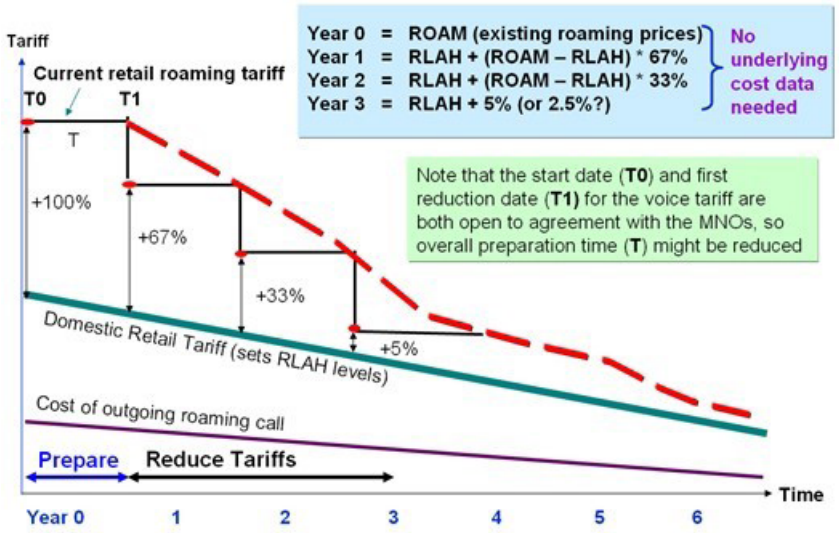
- A legal basis (treaty or regional agreement) that establishes institutions or a decision making mechanism to lead several countries in a common direction;
- Membership in a Regional Economic Community (REC) or similar alliance for cooperation in economic reform and development and as a shield against complaints that preferential regional tariffs violate the WTO General Agreement on Trade in Services.

- Early, regular and intensive consultations with mobile operators and national regulators on details of the plan.

8 **To make ONA (or its next formulation) *sustainable* requires**:

- A glide-path from low price caps down to no roaming-specific charges at all for a *Roam Like At Home* (RLAH) policy. This might take a few years to implement (as demonstrated in the EU) unless more rapid tariff reduction can be agreed with the MNOs. Glide-paths give the market time to adjust.
- Government surcharges on international incoming calls and other revenue raising taxes should be repealed, at least on calls originating in the region.
- Monopoly telecom gateways must be liberalised or dismantled. Regulators must be willing to issue international gateway licences to any individual MNO so they can avoid the costs of routing through a third party and the risks of relying on a competitor gateway for connectivity.

Figure 2: Glide path from price caps to *Roam Like At Home*



Source: Graphic by SCF Associates Ltd.

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1 The context for roaming in East Africa

It is widely recognised that mobile communication devices, services and networks are transforming the way we live, work, and play. We want to be able to access information resources and talk to friends, family and business partners wherever we are, even far from home. So we are becoming increasingly dependent on seamless wireless connectivity.[1]

The 145.5 million people in Burundi, Kenya, Rwanda, Tanzania and Uganda-the East African Community (EAC)- had nearly 96 million mobile phone subscriptions in 2014. The *Ericsson Mobility Report* predicts a further 55 per cent growth in mobile subscriptions by 2020 in Africa and the Middle East. This is likely to have a positive economic impact: "the contribution of mobile cellular phones to economic growth has been growing in importance in the region [and] the marginal impact of mobile telecommunication services is even greater wherever land-line phones are rare."

But wireless connectivity is not seamless. Different technologies and radio bands are used to implement cellular communication in different areas so not all handsets work on all networks. And because they are licensed by national regulators, the authorised coverage of all mobile networks is limited by national borders.

Even companies that own networks on both sides of a common border must build and operate those networks as separate entities. Before the liberalisations that began in Africa at the start of this century, these networks could only interconnect through state monopoly gateways, obliterating any cost savings from common ownership.

It was not until the governments of Tanzania, Uganda and Kenya issued international gateway licences to Celtel (purchased by Zain in 2005 then acquired by Airtel) that it became economic for Celtel/Zain to integrate its regional cellular coverage into a one network roaming area and offer its international customers services at domestic prices.[2] In Tanzania international mobile tariffs dropped 68 per cent after gateway de-monopolisation.[3] Thus, gateway liberalisation is a prerequisite for One Network Area roaming.

Unfortunately, gateway liberalisation also enlarges opportunities for practices like SIM boxing and traffic re-filing (see Chapter 6). Such practices threaten the sustainability of any ONA implementation. Therefore, more advanced traffic monitoring and fraud detection tools must be considered prerequisites for ONA.

Ten years ago, Celtel/Zain demonstrated that roaming services could be offered to the public at much less than the prevailing prices and still be profitable. In response, some Zain rivals (Safaricom, Vodacom, MTN, etc.) formed a partnership (Kama Kawaida) to offer customers a similar deal. Erosion of that partnership[4] made the East African Legislative Assembly call for the revival of one network areas for regional roaming[5] that the Heads of State of countries in the northern corridor answered in 2014.

However, there is no reason to believe that prior implementation of ONA as a voluntary commercial offering is a prerequisite for it to succeed as a regulatory norm.

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1 S. H. Lee, J. Levendis and L. Gutierrez, *Telecommunications and Economic Growth: An Empirical Analysis of Sub-Saharan Africa* (2009), ssrn.com/abstract=1567703

2 Micheal Omondi, *Kenya: Mobile Operators Granted Gateway Licences*, East Africa Standard (1 July 2006), allafrica.com/stories/200607010191.html

3 Vaiva Lazauskaite, *International gateway liberalization*, ITU WSIS Facilitation Meeting (8 May 2008), www.itu.int/net/wsis/c2/docs/2008-May-19/mdocs/C6-session4-Lazauskaite-IGL.pdf

4 The erosion has been attributed to the imposition of taxes and surcharges by some governments in the region, which undermined the competitive advantage of lower roaming tariffs.

5 Aileen Mallya, *House Adopts Two Resolutions and Report on ICTs*, EALA news release (25 November 2013)

Roaming basics

Roaming is a service provided by mobile radiotelephone networks enabling their customers to communicate through the networks of operators in visited areas. But to make that happen the customer home network needs inter-operator agreements to support call forwarding, account verification and cost/revenue sharing. The wholesale prices that network operators charge each other for such services are usually treated as confidential – although, as discussed below, regulators may demand the information to determine the real costs of roaming.[6]

The way international roaming is implemented for voice calls depends on the technology used, but this is a general summary of the process:[7]

- A visited network attempts to identify the subscriber home network. If there is no roaming agreement between the two network operators, international mobile roaming service is impossible…
- If an agreement exists, the visited network contacts subscriber home network and requests service information about the roaming device and whether or not it should be allowed to roam.
- If successful, the visited network creates a temporary subscriber record for the device. The home network updates its information to indicate that the subscriber is using the host network to ensure that any information sent to that device will be correctly routed.
- Demanded calls are routed by visited and/or international transit and/or any fixed or mobile and/or home networks, depending on the type of call.
- The visited network captures the details of all calls, which are used to calculate wholesale international mobile roaming charges.
- The home operator pays wholesale charges to the visited operator. The subscriber pays retail charges for international roaming services to its home operator.

The Zain One Network was based on the principle that roaming customers should only have to pay to use any Zain network what they would pay to use their home network. This is now known as roam like at home (RLAH). Another approach based on domestic tariffs is for visitors to pay what locals pay – roam like a local (RLAL). The ONA framework was originally based on RLAL so it appears in the policy guidelines gazetted by Uganda. RLAL is easy to grasp as a concept but complicated to implement, as shown in a study for SADC (Southern African Development Community).[8] So as the ONA framework evolved toward deployment, it was a positive change that price caps replaced RLAL as the base principle for regulation.[9]

Many people avoid or minimise their use of international roaming services due to the fear of bill shock (being charged much more than expected) or they find current price offers confusing or unacceptable. A common alternative is to buy a local SIM card with time credits in the visited country, to take advantage of domestic calling rates. Another alternative is to use a Voice-over-IP application through a Wi-Fi access point. The popularity of these options makes the statistics describing international roaming under-represent the actual time spent abroad and the amount of communication passing through traveller handsets. If cost barriers were to change in favour of demand satisfaction, mobile roaming scope for growth would be very large. ONA is based on that logic, which is especially true

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6 A strong case can be made for full transparency – for all inter-operator tariff agreements to be made public.

7 *International Mobile* Roaming *Regulation – An Incentive for Cooperation*, ITU Global Symposium for Regulators 2008, www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF.IMR-2013-PDF-E.pdf

8 SCF Associates Ltd., SADC Home and Away Roaming, Phase II and III: Cost-model based roaming and RLAL (Report for Tasks 3 and 4), ITU/CRASA (Communications regulators Association of Southern Africa)- September 2014.

9 The shift from RLAL to price caps may have been due to complaints from network operators that RLAL did not give them clear guidance as to what the new tariff should be, since the prices paid by locals vary from one network to another and from one service bundle to another.

in East Africa, with its long history of regional integration and current political goal of making the internal borders less obstructive:

- The East African Common Market Protocol was launched in 2010 to promote free movement of labour, capital, goods and services within the EAC.
- EAC citizens no longer need passports to cross borders within the region: a national identity card is enough.[10]
- Students from any EAC Member State are charged the same tuition as locals at more than a third of the universities in the region.[11]
- Border crossing times for trucks (a major hindrance to trade) were reduced from 48 hours in 2006 to four hours in 2012.[12]

Whether an ONA-like framework would be as beneficial to regions with less cross border traffic and trade is a question to consider in deciding if negotiating and implementing such an arrangement is worth the effort. It certainly is in the EAC and generally becomes the case as tourism and trade grow.

Today roaming is a minor revenue source for mobile network operators (MNOs) but with large margins that stifle cross-border use of mobile communications

Most mobile communications originate and terminate in the place where the customer home network is located. In all parts of the world, roaming is a relatively small contribution to the total traffic carried by mobile networks. This may change with data roaming, which is moving us toward frequent if not constant background connectivity to support on-demand nomadic use. By 2018, data traffic could contribute as much as 47 per cent to the global roaming bill of USD 42 billion, up from an estimated 36 per cent in 2013.[13]

Wholesale roaming in the EU generated inter-operator payments of EUR 1.253 billion in 2009, according to a BEREC (Body of European Regulators for Electronic Communications),[14] survey, indicating a retail mark-up for roaming services in the EU that year of more than 380 per cent.[15] Data from 2009 is cited because that was just before regionally mandated price caps established a common area for Eurotariffs and reduced Mobile Termination Rates (MTR) by more than 50 per cent.[16] Since then the tariff glide path continues downward until June 2017 when retail roaming charges will no longer differ from domestic mobile charges. Juniper forecasts a 28 per cent decline in roaming revenues in Europe in 2017.[17]

In East Africa, the latest statistics from Kenya Communications Authority show 41.2 million minutes of voice traffic originated by mobile network customers roaming abroad in the July to September 2015 time frame; 31.7 million minutes of that was due to roaming in the other EAC Member States. On the other hand, the Kenya total mobile-originated local voice minutes in that same period came

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10 John Mbanda and Eric Kabeera, *EAC presidents launch use of national IDs to cross borders*, The New Times (19 February 2014), www.newtimes.co.rw/section/article/2014-02-19/73260/

11 Wachira Kigotho, *High fees for East African foreign students scrapped*, University World News (31 October 2014), www.universityworldnews.com/article.php?story=20141030101245157

12 Mike Fitzmaurice and Olivier Hartmann, *Border Crossing Monitoring along the Northern Corridor,* Working Paper No. 96, Sub-Sahara Africa Transport Policy Program, World Bank (April 2013), www.ssatp.org/sites/ssatp/files/publications/SSATPWP96-border-crossing_1.pdf

13 Juniper Research (2014)

14 http://berec.europa.eu/eng/about_berec/what_is_berec/

15 European Commission Staff Working Paper: Impact assessment of policy options in relation to the Commission's review of the functioning of Regulation (EC) No 544/2009 of the European Parliament and of the Council of 18 June 2009 on roaming on public mobile telephone networks within the Community {COM(2011) 407 final} {SEC(2011) 871 final}, (6 July 2011), page 9, ec.europa.eu/information_society/activities/roaming/docs/roaming_report_11.pdf

16 Regulation (EC) No 717/2007 of the European Parliament and of the Council of 27 June 2007 on roaming on public mobile communications networks within the Community, eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2007R0717:20090702:EN:PDF

17 Nitin Bhas, *The Future of (EU) Mobile Roaming*, AnalystXpress (Juniper Research, 16 December 2015), www.juniperresearch.com/analystxpress/december-2015/the-future-of-(eu)-mobile-roaming

to nearly 10 877 million. So Kenyans roaming abroad generated less than 0.4 per cent of the Kenya mobile voice traffic, less than 0.3 per cent of that due to roaming in the EAC countries.[18]

The Rwanda Utilities Regulatory Authority (RURA) monitors the domestic mobile market. Its data shows that only about 10 per cent of Rwandans use international mobile roaming (IMR). But those that do generated 11.3 million minutes of voice traffic (originated by mobile network customers abroad from July to September 2015) versus 2 834 million mobile-originated domestic voice minutes. So roaming by subscribers from the smallest ONA country (Rwanda) was proportionally the same as in the largest (Kenya): roaming traffic amounts to less than 0.4 per cent of domestic traffic.[19]

Data from Uganda and South Sudan are not directly comparable to Kenya and Rwanda data, and do not enable calculations of traffic volume ratios. To manage one network areas transparently and sustainably, partner states may want to harmonise their regulatory requirements for mobile traffic data collection, the categories used by the regulators to analyse mobile market developments, and the formats for reporting these developments to the public.

The survey of MNOs in the region asked what percentage of their total annual revenue comes from international roaming. Unfortunately, only one firm answered that question and it is not possible to say how representative their answer is. But in 2014 (before ONA), roaming provided just 1.34 per cent of their revenue and they calculated the ratio of roaming costs to roaming revenue as 36.68 per cent, indicating a retail mark-up of 273 per cent. In 2015, roaming contributed 1.10 per cent to their total revenue and the ratio of roaming costs to revenue was 51.93 per cent, implying a retail mark-up of 193 per cent. So while this firm – like others in the region – say ONA has adversely affected their profits, a substantial mark-up on roaming services has been maintained and the impact on their revenue was a decrease of only 0.24 per cent (less than a quarter of one per cent).

Voice calling was the first issue addressed by the ONA framework, but it was only the start. In March 2015, it was announced that by 2016 the framework should expand to encompass SMS, data and mobile money transactions.[20] In September 2015, ONA countries agreed to harmonise cross border SIM card registration procedures using national IDs.[21] These extensions are likely to increase the use of roaming services and perhaps the revenue generated, so the impact of ONA thus far may not be indicative of the future.

Data from Rwanda and Kenya show that today's roaming statistics capture neither the full extent of in-region travel nor the need for communication felt by travellers because, even with ONA, most people still rely on alternatives like local SIM cards and Wi-Fi. Another conclusion is that the revenue impact thus far for mobile network operators in the EAC of mandatory price caps on in-region roaming is quite small.

However, the impact of lower tariffs on individual roamers is significant. Cross border voice traffic has grown rapidly since the ONA implementation, even though some reported growth may not be due to roaming and previously stifled demand but rather to local re-origination of international calls to make them appear qualified for ONA preferential tariffs.

Call re-origination can be done in several ways and is proving a challenge to control. If done on a large scale (as is starting to happen) it could undermine ONA long term sustainability. This is one reason

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18 Communications Authority of Kenya, *First Quarter Sector Statistics Report for the Financial Year 2015/2016 (July-September 2015),* pages 13-15, www.ca.go.ke/images/downloads/STATISTICS/Sector%20%20Statistics%20Report%20Q1%202015-16.pdf

19 Rwanda published statistics do not distinguish roaming within the EAC from roaming elsewhere. Rwanda Utilities Regulatory Authority, *Statistics and Tariff Information in Telecom Sector as of September 2015*, page 11, www.rura.rw/fileadmin/docs/Statistics_report_3rd_quarter___2015_for_publication.pdf

20 Tom Jackson, *East African countries to expand One-Network-Area to data, mobile money*, *BizTech Africa* (1 April 2015), www.biztechafrica.com/article/east-african-countries-expand-one-network-area-dat/9946/

21 Lilian Ochieng, *East Africa countries move closer to common SIM card registration*, The Daily Nation (24 September 2015), www.nation.co.ke/business/EA-countries-firm-up-common-SIM-card-registration/-/996/2883890/-/10dh5i7z/-/index.html

why the current ONA framework is considered a temporary solution that may need to be replaced by something more durable.

The cost of roaming within the region is an important economic variable even though the money involved is relatively minor from the network operator perspective and most travellers have found other, less convenient but more affordable, ways to communicate. The EAC believes high roaming fees interfere with the growth of regional trade and integration. As the East Africa economy develops, such impediments may well become a more serious problem.

2 ONA legal/regulatory framework

There is a growing global consensus that the prices charged by most mobile operators for IMR exceed the real cost of service provision by a wide margin. This has been blamed on limited regulatory oversight and a lack of price discipline resulting from weak competition at both the wholesale and retail levels. Taxes and government surcharges further increase the cost of roaming in some countries.

> "There is also widespread agreement that a major reason for the high international mobile roaming retail prices are the underlying wholesale prices in visited countries… [However] *national authorities in the country of origin of international travellers have no authority to control and regulate the wholesale prices set for international mobile roaming in a visited country."*[22]

High wholesale prices for IMR can only be curbed by a transnational authority because international roaming is – and will always be – a cross-border transaction.

In May 2014, a Northern Corridor Integration Projects Summit concluded that the high cost of intra-regional roaming was detrimental to the EAC integration agenda. Therefore they agreed to fast-track the implementation of a one network area in East Africa by 31 December 2014. The original concept was for roamers to pay only the local domestic tariffs of the visited network. Eliminating all charges and surcharges for calls received while roaming was another part of the concept.[23] Kenya, Rwanda and Uganda were the first to commit to ONA; South Sudan joined in January 2015; Burundi and Tanzania indicated that they were considering joining, too.

Heads of State Summits in East Africa can set policy directions which reshape national laws and regulations because of Article 8 of the Treaty for the Establishment of the East African Community. Paragraph 4 of Article 8 states: "Community organs, institutions and laws shall take precedence over similar national ones on matters pertaining to the implementation of this Treaty." (The definition of 'Community organs' includes Heads of State Summits.) In addition, Article 16 of the Treaty makes the regulations, directives, decisions and recommendations of the Council of Ministers binding on the partner states. Regional cooperation in the telecom sector is mandated by Article 99, which notes in sub-paragraph (c) that the "Partner States shall… agree on preferential tariff treatment applicable within the Community…"[24]

Therefore, an important part of the legal framework that fast-tracked ONA implementation and the regional harmonisation of international mobile roaming charges comes from the EAC Treaty.[25] In general, national authorities without the backing of a regional alliance for economic cooperation are constrained in regulating IMR prices since they cannot regulate services performed outside their national territory and their citizens' IMR always occurs in other countries. Such alliances also help

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22 ITU: International Mobile Roaming Services: Facilitating Competition and Protecting Users: www.itu.int/en/ITU-D/Regulatory-Market/Pages/Events2013/GE_Roaming/Document/Roaming%20Study%20EV4.pdf

23 Discussion with Uganda Communications Commission (14 January 2016).

24 www.eac.int/treaty/

25 South Sudan is a special case in that it is not yet an EAC member but is included in the northern corridor infrastructure integration framework. Kenya has offered assistance to South Sudan in creating a new telecom regulatory authority and drafting a national law governing telecom services. These are both preconditions for joining EAC and ONA.

address concerns about regional price preferences violating WTO obligations, as discussed in the next chapter.

Regulators can of course control prices for IMR services within their national boundaries. But the beneficiaries of that control will be visitors from abroad, who are not the main regulator constituency. At the same time, domestically licensed operators will bear the brunt of in-country roaming price regulation. This combination of domestic burden-bearing and foreign beneficiaries tends to discourage IMR interventions by regulators acting alone.

Implementing ONA in EAC partner states

The Heads of State at the Northern Corridor Integration Projects Summit tasked the EAC Sectoral Council on Transport, Communications and Meteorology with responsibility of transforming the basic ONA decision into specific proposals for implementation. In June 2014, the Council directed the EAC Secretariat to convene a meeting of the Committee of the Heads of Communications Regulatory Authorities (the Committee) to develop a work plan and guidelines for establishing ONA.[26]

But before the first Committee meeting on this topic, the Uganda ICT Minister issued a preliminary set of "Policy Guidelines for the Implementation of a One Network Area within the Northern Corridor Region." Dated 23 July 2014, this appeared as Public Notice 534 in *The Uganda Gazette* of 29 August 2014. Section 7 of the Uganda Communications Act No. 1 of 2013 was cited as a legal basis for these Ministerial Policy Guidelines, which came into effect on 1 September 2014:

> "1) Exemption of regional calls from surcharges which are applied on international incoming calls;
>
> 2) Removal of additional charges to subscribers on account of roaming within the region;
>
> 3) Removal of charges for receiving calls while roaming within the region;
>
> 4) Subscribers travelling within the region will be charged as local subscribers in the visited country network. The subscriber will, therefore, only incur prevailing calling rates of the visited network similar to that local subscribers pay; and
>
> 5) Operators within the region shall be required to re-negotiate their bilateral agreements to ensure full implementation of the One-Network Area by 1 September, 2014, for Kenya, Rwanda and Uganda, and 31 December for South Sudan."

Adjusting to these policies took the network operators about three months. Uganda implemented the ONA voice framework on 2 January 2015.

Kenya followed a somewhat different procedure. On 1 September 2014, the Cabinet Secretary for ICT had a Press Release published in *The Kenya Gazette* that contained a corrigenda (correcting amendment) to tariff policy guidelines issued in 2006.[27] This cited section 5C of the Kenya Information and Communications Act (1998) as the legal authority. The corrigenda contained the following "Guidelines for the Implementation of Regional Roaming Tariffs within the 'One Network Area'":

> "5.19.1 The regional framework, which only applies to telecommunications traffic originating and terminating within the One Network Area, is such that:
>
> (i) Surcharges on International Incoming Traffic (SIIT) do not apply;
>
> (ii) There are no additional charges to subscribers on account of roaming within the region;
>
> (iii) There are no charges for subscribers within the One Network Area for receiving calls while roaming;

[26] ONA developed as a northern corridor integration project. It will become an EAC project if and when the other EAC members join it.

[27] Gazette Notice No. 6109, *The Kenya Gazette*, Vol. CXVI, No. 104 (1 September 2014), page 2351, kenyalaw.org/kenya_gazette/gazette/volume/MTE0Nw--/Vol.CXVI-No.104

(iv) The Communications Authority of Kenya shall from time to time prescribe the maximum retail and wholesale (also referred to as Inter-Operator Tariff) rates for calling within the One Network Areas. These rates shall initially be capped at USD 0.10 and USD 0.07 per minute for retail and wholesale respectively; and

(v) Subscribers using telecommunications services while traveling within the One Network Area will be charged as domestic subscribers in the visited country network. The subscriber will therefore only incur prevailing domestic rates of the visited network similar to what domestic subscribers pay.

5.19.2 Mobile communications network Operators within the One Network Area shall be required to re-negotiate their bilateral agreements to ensure the full implementation of the One-Network Area. The effective date of this policy is 1st September 2014."

The guidelines issued by Uganda and Kenya are quite similar, with one important difference: the Kenya guidelines include wholesale and retail price caps, despite the fact that the Committee of the Heads of Communications Regulatory Authorities had not yet begun meeting to discuss such issues formally. In this instance, price caps, use of the United States Dollar (USD) as a reference currency and even the specific wholesale price, emerged from negotiations between Kenya and Rwanda aimed at eliminating Rwanda surcharges on EAC roamers' inbound international voice calls. Agreement was announced on 1 October 2014, affirmed by the Cabinet of Ministers on 3 October, and a week later Kenya and Rwanda began implementing ONA with an 84 per cent reduction in roaming tariffs in Rwanda. South Sudan implemented ONA early in January 2015, with phase-in progressing through the rest of the year.

Much of the EAC Sectoral Council on Transport, Communications and Meteorology work involved collecting and analysing data from the mobile network operators to establish an empirical understanding of roaming costs so that harmonised price caps could be set which did not make in-region roaming a non-viable business proposition.

Since price caps are the focus of the next chapter, the other Sectoral Council efforts are reviewed here. Aside from comparing the highest and lowest wholesale (inter-operator) tariffs in each northern corridor partner state, the Council reviewed:

- the tax burdens on MNOs on a country by country basis;
- the 2005-2014 history of international incoming call termination rates charged by the northern corridor states MNOs, irrespective of call origin; and
- the MNO network topology and architecture for handling international inbound and outbound traffic.

Principles for determining roaming charges

Based on analysis of operator tariffs, principles were proposed to determine harmonised EAC roaming charges:

- Roaming charges should be cost oriented – that is, reflective of real costs but not mechanically derived from them.
- The harmonised EAC roaming framework only applies to traffic originating and terminating within EAC Partner countries.
- Traffic originating and terminating within the EAC should be exempt from international traffic surcharges.
- Mobile telecommunication taxes (excise, VAT, etc.) should be regionally harmonised.
- Partner states should establish systems to prevent traffic re-filing, tariff fraud, and illegal call termination.

ONA implementation activities

The EAC Sectoral Council agreed on these activities to implement ONA:

- Partner states should undertake consultations with operators within their jurisdictions to gather their comments and responses to the above principles, methodology and proposed roaming framework.
- The Committee to consider the outcome of these consultations and incorporate suggestions improving the roaming framework before presenting it to the EAC Council of Ministers.
- The Council to consider and approve the framework by November 2014.
- Partner states to start implementing the proposed roaming charges by 31 December 2014.
- The Committee to meet every three months, during implementation of the harmonised EAC roaming framework, to review the implementation process.

Stakeholder consultations

The partner states consulted with the mobile network operators in their jurisdictions between 30 October and 6 November 2014. The consultation findings were considered at a Sectoral Council meeting, which noted the following points:

- A fair use policy is needed to discourage subscribers from abusing the ONA framework. Such a policy would impose usage limits above which tariffs higher than the abused cap would apply.
- There is a need to clarify if the USD 10 cents per minute cap on retail tariffs includes or excludes taxes.
- Flexibility should be allowed for negotiated rates within the caps.
- The cap on wholesale tariffs may encourage traffic re-filing and illegal traffic termination.
- The time allowed for amending existing inter-operator agreements might not be enough to meet the 31 December 2014 deadline.
- Consideration is needed for the handling of charges arising from inadvertent roaming (when handsets automatically connect to foreign networks whose signals spill across borders).
- Some partner states might need more time than the 31 December deadline allows to amend their laws to remove surcharges.
- There is a need to establish a legal framework for the long term implementation of the EAC roaming framework.

Recommendations adopted by the EAC Multi-sectoral Coordination Committee

With these comments in mind, the EAC Sectoral Council recommended that:

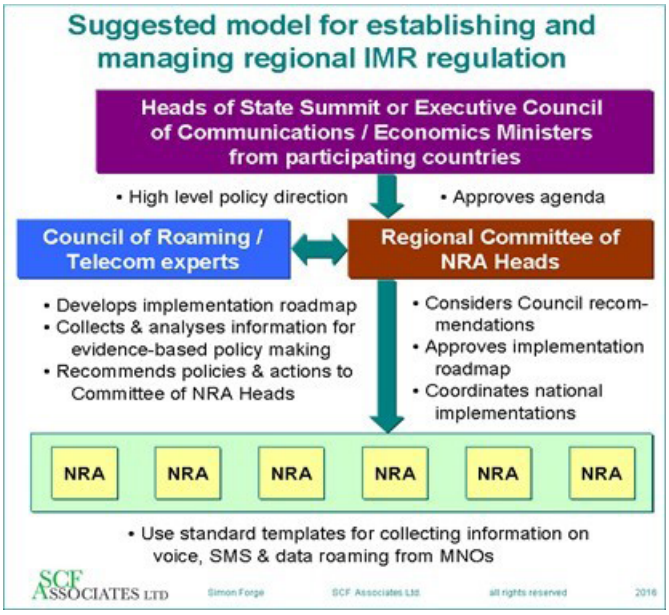
- Wholesale (inter-operator) tariffs should be capped at USD 7 cents/minute for traffic originating and terminating within EAC.
- The retail tariff cap should be USD 10 cents/minute, including taxes, for traffic originating and terminating within EAC.
- There should be no charge for receiving calls while roaming within the EAC.
- Existing inter-operator agreements should be amended by 31 January 2015.
- Systems should be established to prevent traffic re-filing, fraud and illegal termination of traffic.
- Partner states should harmonise taxes on telecommunication traffic and remove international surcharges for traffic originating and terminating within the EAC.
- The Committee of Heads of Communications Regulatory Authorities should meet every three months to review the ONA framework implementation.
- The Committee should consider in detail inclusion of a fair use policy in the ONA framework.

There are lessons to be learned from this efficient yet thorough process. Most importantly, to maximise mobile roaming contributions to regional social integration and economic development, a regional framework for roaming regulation needs to be established, along with competent and accountable entities for implementing the framework. East Africa demonstrates that a workable set of policies can be formulated in a matter of months by a committee composed of the heads of national regulatory authorities supported by their respective Heads of State. The regulator role was to gather and analyse market information to make proposals and recommendations to the Meeting of Ministers, taking into account input from the MNOs. The Meeting of Ministers then advised the Heads of State on what policy directives would be appropriate. This arrangement was sufficient to start the process. But for regional roaming regulation to be sustainable, persistent oversight and periodic course corrections are required. For that, more permanent processes are needed.

In East Africa, the Heads of State from countries in the northern corridor catalysed and directed the ONA initiative. In other regions, a similar group of national leaders could guide the process. Alternatively, since changes in ICT development policies and telecom laws may be necessary, and tax revenues affected, an executive council of communications and finance ministers from the participating countries would strengthen links between national and regional policy making, as shown in the diagram below.

Roaming regulation at the regional level should aim to maximise social benefits and harmonise national policies without jeopardising the survival of any mobile operator, while accommodating essential national requirements and differences. Larger groupings of partner states may need more time to navigate this path.

Figure 3: Framework for regional regulation of roaming



Source: Graphic by SCF Associates Ltd.

Price caps and the General Agreement on Trade in Services (GATS)

A different kind of problem arises in countries that signed the World Trade Organisation GATS Agreement. This includes all Smart Africa members except South Sudan. GATS signatories have to consider that price caps and preferential roaming tariffs for the citizens of nearby countries may violate GATS most favoured nation (MFN) principles. This issue needs further clarification but countries that can add their IMR regulations to a trade-liberalising regional agreement (like the EAC treaty) are in

a stronger position to argue that regional roaming discounts are allowable exceptions to their MFN obligations.[28]

A waterbed effect?

The GSM Association argued strongly against the burden of regulation being imposed on IMR in Africa, warning that limiting network earnings from roaming will reduce the "funds available for other greater needs for the local population, such as subsidised handsets, or it may result in removing roaming services altogether."[29] Their argument seems to be that forcing down one set of tariffs will cause companies to cut subsidised services or push other tariffs up to compensate. This is called the waterbed effect because in a waterbed, pushing down at one location makes the water level everywhere else go up.

During a visit to East Africa in January 2016 to gather information for this report, regulators and network operators were asked if they had observed – or implemented – any tariff increases, service closures or subsidy cuts in other mobile business segments in response to the imposition of ONA price caps. Their unanimous answer was *no*. One regulator noted that "voice call prices have actually come down (an average of 45 per cent for off-net voice traffic across all MNOs). There has been a slight increment in off-net SMS prices but this has to be viewed within the context of a depreciating local currency…"

This is consistent with BEREC findings: after 15 rounds of data collection to monitor changes in the Europe market for intra-region roaming services, they conclude that: "There are no indications that operators have in general tended to raise the prices of unregulated 'Rest of World' roaming calls to make up for loss of revenue due to lower regulated price caps."[30]

One might think that MNOs would object to any plan that imposed price caps on their retail roaming offers. But ONA seems to have had the support of many operators in the EAC from the start. A possible explanation is that they saw it as a way to get rid of the taxes and surcharges that some governments impose on inbound international calls. These more than double the cost of roaming, in some cases, so operators consider them a higher barrier to the uptake of roaming services than inter-operator tariffs.[31] In the end, exempting international calls that originate and terminate in the One Network Area from excise taxes and surcharges became a key ONA principle.

ONA in the short and long term

Chapter 2 began with the observation that high roaming prices have often been blamed on "limited regulatory oversight and a lack of price discipline resulting from weak competition at both the wholesale and retail levels." ONA does extend regulatory oversight, mainly through retail and wholesale price regulation, harmonisation efforts, frequent consultations between regulators and network operators, and the deployment of new traffic monitoring and fraud detection tools, with the results increasingly shared among regulators and MNOs.

Harmonised price caps and the elimination of tax surcharges are intended to promote regional integration. But they do not address the core problem of inadequate competition in the market for roaming services. Indeed, it can be argued that price caps are anti-competitive. In any case it

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28 ITU, Regulatory analysis of international mobile roaming services, www.itu.int/en/ITU-D/Regulatory-Market/Documents/Roaming/Roaming%20Guide-E.pdf

29 GSM Association, *International Roaming Explained* (August 2012), page 11, www.gsma.com/publicpolicy/wp-content/uploads/2012/09/Africa-International-roaming-explained-English.pdf

30 International Roaming: BEREC Benchmark Data Report, October 2014 – March 2015, BoR (15) 134, page 8, http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5440-international-roaming-berec-benchmark-data-report-october-2014-8211-march-2015

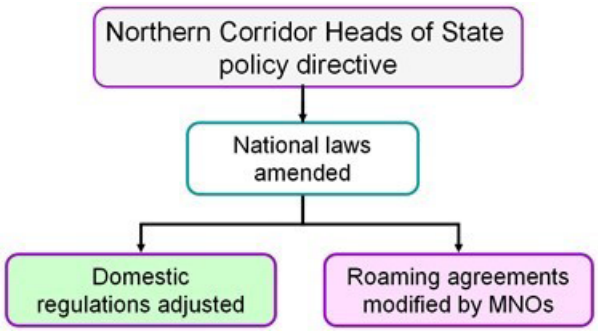
31 The Global Voice Group, a commercial subcontractor for many governments in Africa (which incidentally supplied the Rwanda International Gateway Traffic Verification System), claims to have delivered USD 1 billion to its Sub-Sahara clients from telecom surcharges collected in the past five years. See www.globalvoicegroup.com/en/news/item/125-who-is-global-voice-group

is not obvious that more vigorous competition *can* take root in this market, or the extent to which competition would bring prices down to local or domestic levels without regulatory intervention. Europe is just starting to experiment with ideas like unbundling roaming and domestic services, so a customer might contract with one service provider for access to a domestic network and another for the provision of roaming services.[32] There may also be ways to encourage competition among third party traffic aggregators, to expand alternatives for interconnecting cellular networks in different countries. This is already starting to happen with SMS hubs.

The current ONA framework, which is the focus of this report, is the result of a fast-track initiative which relied on policy intervention rather than (slower acting) market forces. The EAC actually adopted a two track strategy, with one track for the rapid introduction of short-term fixes – the framework in place today – while a second, concurrent track aimed to lay the foundation for a longer term solution. The second track was initially planned to support a feasibility study by consultants for implementing ONA. But events overtook that idea as ONA implementation by some EAC Member States under the Northern Corridor Integration Projects began before consultants could be chosen. New terms of reference were then drafted for an in depth study of roaming in the EAC region. The tender was advertised and bids received but no contract was awarded. Now, new terms of reference are being drafted for an impact assessment of ONA, including its implications for the roaming market in East Africa along with a review of options for a sustainable long term regulatory framework.

3 Effectiveness of operational arrangements adopted between governments and operators (Survey responses: MNOs and regulators on ONA)

Figure 4: Implementing regional policy domestically



Source: SCF Associates Ltd.

Creation of ONA in East Africa was envisioned as a process of translating a regional-level policy position into a directive then into adjustments of national laws and then into domestic (in-country) regulations and amended inter-operator agreements. This is what in fact happened. But it may not have been clear from the start that *market monitoring* and *enforcement* would also be needed for successful implementation.

Mobile operators provide tariff information to current and prospective customers through brochures and public websites so it is comparatively easy for governments to check advertised prices. It is not so easy to spot missing information that could allow for covert cost augmentation, such as per-minute rather than per-second billing, or the misconfiguration of switching equipment so that billing starts

[32] BEREC, Roaming Regulation – Choice of Decoupling Method, BoR (12) 68 (June 2012), http://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/256-roaming-regulation-choice-of-decoupling-_0.pdf

when the distant phone rings, even if the called party does not answer. It is also not unknown for mobile network billing systems to lag a few weeks behind announced tariff changes.

To detect these and other faults, regulators rely primarily on complaints from the public as a market monitoring tool. But One Network Area roaming, with the accompanying price caps, requires more active co-operation between regulators and service providers as well as sophisticated traffic and market monitoring tools to detect fraud and abuse. Operational arrangements concerning the collection of normal traffic statistics, market shares, revenues, and tariff information are addressed in Chapter 6, and billing misbehaviour is discussed in Chapter 7.

A range of regulator and operator interactions are considered in this section, which highlights results from a survey of regulators in East Africa and extracts from interviews with MNO roaming managers in light of ONA.

Written questionnaires were distributed and meetings with regulators and carriers in the region were conducted in January 2016 under non-disclosure of attribution rules.

The survey questions are quoted below in italics, and responses from the regulators and noteworthy comments made in the interviews are in quotation marks.

Survey responses: MNOs and regulators on ONA

What regulation, rules, authorisations or agreements had to be changed for your country to participate in ONA?

- "Exempting all calls originating from within northern corridor partner states… from the USD 0.09 per minute Excise Duty for incoming international calls."
- "None. A policy framework underpinning the guiding principles of the ONA was developed and gazetted by the Ministry of ICT. Inter-operator roaming agreements also had to be varied to accommodate ONA."

What is your opinion of the ONA framework?

- "It is well intentioned and practicable… it is working [and] benefits far outweigh the costs."
- "It is working with several issues that must be resolved…"
- "Good. It helped resolve the issue of high and discriminatory roaming charges that were as a result of preferential arrangements between operators. Moreover, it has brought predictability by eliminating bill shock when roaming on networks that were once non-preferential."

What would you change about it?

- "Change the call charges faced by inbound roamers to be equivalent or equal to those faced/incurred by local subscribers in the visited country."
- "[Establish and enforce] a broadly agreeable Fair Use Policy for traffic received by inbound roamers, especially those with more or less permanent visitor profiles on their visited networks."
- "Putting safeguards against abuse of the framework such as permanent roaming. We are already exploring ways of dealing with this issue."
- "ONA retail tariff plan adjustment should be in line with the market forex rates: [take for example the] case of South Sudan and the devaluation from 3.16 to 18.55 of the United States Dollar… [After devaluation the] standard ONA tariff of 60 Piasters/min didn't cover the USD 0.04/min interconnection cost… Operators were operating at a loss on all international calls, ONA included… In our opinion a different strategy needs to be considered, whereby a special deal and contract would be negotiated with different DCH/FCH [data/financial clearing house] companies who can provide roaming clearing services to all operators in this region with discounted charges

in line with the TAP files volume increase observed during the past period, in order to reduce the indirect cost incurred by all operators as a result of the ONA roaming."

- Raise the retail SMS price cap because of the "additional cost paid to the SMS-hub carriers responsible to manage the SMS traffic between operators, as almost all ONA operators have routed the SMS traffic in transit via the hub of the SMS carriers due to fraud attempts and spam SMS campaigns."

Are the current operational arrangements between governments and operators for regulating ONA effective?

- "Currently they are, but there is room for improvement."
- "None in place at the moment."
- "It's clearer now that carriers and regulators need to invest in systems for managing ONA."

What problems have been encountered with the ONA framework?

- "The short timeline for ONA start-up was the biggest challenge. No time to figure out and implement the best routing. Biggest challenge now is that not all partners have direct interconnections. Some are forced to use transit arrangements and in that case you cannot be sure that all the traffic you receive is actually intended for you. On busy routes it's impractical to check all the line IDs and country origins. That makes it possible to misuse the arrangement."
- "Problems encountered in ONA framework are derived from the differences in the taxation regimes for telecommunication services amongst northern corridor partner states. These differences together with incomplete contracting between roaming partners have led to rise in 'grey traffic'."
- "Permanent roaming."
- "Collection of information from the different operators and harmonizing them in a common format."
- "Delay in implementation of ONA due to technological issues, as was the case in implementation of the ONA for SMS services, due to SMS hubbing…"
- "Delays in the implementation of ONA in other countries, which have elements like SIIT [surcharges on incoming international traffic] engrained in their financial acts which had to be amended first."

Have these problems been solved?

- "Yes, with the exception of the issues surrounding permanent roamers. We are exploring developing a Fair Use Policy to curb permanent roaming."
- "Almost all recommendations in respect to solving identified problems are still under discussion with regulators."

Has ONA affected the market shares or competitiveness of the MNOs in your country?

- "No."
- "ONA has not affected market shares of individual operators… However, the high taxation burden on operators… has had some impact on their competitiveness vis-à-vis their northern corridor counterparts. International incoming traffic… tends to [be] routed first through other lower tax northern corridor partner states, before being terminated… as traffic local to the northern corridor."
- "The market dynamics… indicate clear additional advantages in favour of operators with regional presence and subsidiaries in different ONA countries."

Has it affected the MNOs international partnerships?

- "Yes. All the MNOs benefitted by developing relationships with other regional MNOs."

- "There is no noticeable or discernible impact. However [the] operators have started revising the provisions in their roaming agreement[s] with regards to how 'grey traffic' is treated."

What data do you collect to monitor the international roaming market in your country?

- "Every quarter, the MNOs submit [international direct dialling] and roaming traffic for inbound and outbound roaming. This data is aggregated for each quarter and is reported in the Authority's Sector Statistical Report."
- "UCC collects, on a quarterly basis, IMR traffic that is disaggregated between that for northern corridor partner states vis-à-vis that for the rest of the world. Specifically, the data is collected on incoming and outgoing traffic minutes and SMS."
- "The ONA framework is continuously monitored and updated."

What additional data do you need to monitor?

- "Data on ONA traffic should be disaggregated by MNO, northern corridor partner state, inbound/outbound… and northern corridor interstate traffic."
  - "a) Inbound roamers received and originated traffic per network (Voice and SMS)
  - "b) Outbound roamers received and originated traffic per network (Voice and SMS)
  - "c) The two above categories of data on at least a monthly periodicity."

Is further data needed from MNOs?

- "None at the moment."
- "More data is needed for complete transparency."
- "…different types of voice and SMS traffic patterns for international services between operators in the other three ONA member states would be useful. The analysis of such data will shed the light on the ONA business profitability in other countries, best practices, and provide more insight on how to develop the regulation framework leading to fair practice across all operators in the region…"

Is new legislation needed to authorise collection of that new information?

- "In Uganda, we need revised Regulations and in some cases licence agreements to be able to collect the new and extra information…"

What percentage of mobile carriers' total revenue does IMR represent in your country?

- "Revenue reporting is done according to revenue streams arising from provision of services according to the licences held. No distinction is made between local and international voice traffic revenues."

Has total spending on IMR in your country increased, decreased or remained the same since ONA was introduced?

- "After the introduction of ONA, IMR traffic has risen by an average of threefold, but since the ONA pricing was on average 50 per cent less than what pertained before, IMR spending or revenues have grown but not by as much."
- "A household survey would have to be carried out by the National Bureau of Statistics in order to obtain this information."

Have you observed abuse of the new IMR regulations by "permanent roamers"?

- "Yes."

- "Potential abuse of IMR by 'permanent roamers' has been reported by MNOs… the evidence lies in the exponential growth of the traffic received by inbound roamers…"

What can be done to solve this problem?

- "Adoption of a Fair Use Policy."

In your opinion are these price caps sustainable?

- "Yes, they are sustainable. In actual fact, there is room for a downward revision."
- "In the short run, yes. But this may be revised upwards or downwards depending on technological changes, environment and economic (forex) contexts. Additionally, a situation may arise where market maturity will render pricing independent of regulatory oversight."
- "Some wholesale rates are not sustainable, especially for the MT free calls while roaming… when taking into consideration the high fraud activities with the absence of strict measures on the regulatory side to…stop illegal traffic by-pass and refiling."

Do different IMR price caps for voice, SMS and data create regulatory problems?

- "No they do not."
- "No. Each has a different cost driver."

How are taxation and currency conversion handled for IMR now?

- "Billing is done in USD as a common currency and the conversion into local currency is done at a national level."
- "Current IMR caps already account for country differences in taxation regimes. The IMR caps are in USD, the issue and burden of currency conversion is equally borne by individual MNOs within the northern corridor region."

Does ONA increase customer loyalty and retention?

- "From an operator side, no significant impact was observed with respect to subscribers' churn rate and loyalty as the same ONA offer is provided by all operators…"

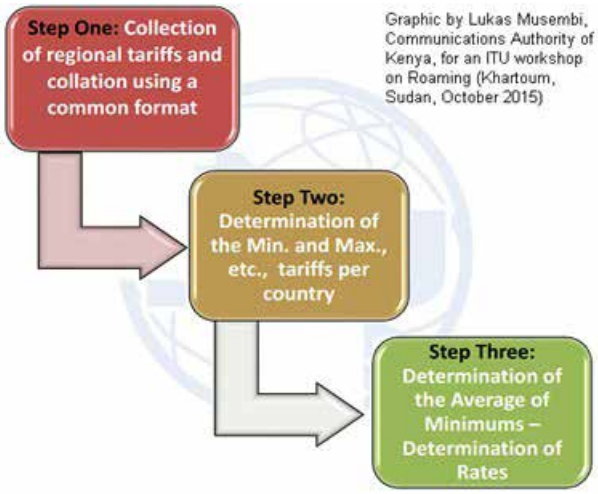
4 Regional price caps

It was previously noted that price caps appeared the first published ONA guidelines in Kenya but there was no such mention in the Uganda guidelines. The difference can be traced to the Kenya negotiations with Rwanda to exempt ONA roaming traffic from international surcharges. However, ONA price caps have a longer history: in November 2013, the East Africa Legislative Assembly asked the Council of Ministers "to push for the introduction of uniform price cap regulation for roaming mobile costs within the EAC…"[33]

Setting uniform price caps is a challenge, given the wide disparities in economic development, tax structures, disposable incomes and network operating costs across the region – not to mention currency fluctuations and variable rates of inflation. To accomplish anything in a limited amount of time, scientific rigor must give way to heuristic methods based on best estimates, approximations and judgments about what is fair and acceptable to a range of stakeholders with conflicting interests.

[33] Aileen Mallya, *House Adopts Two Resolutions and Report on ICTs*, EALA news release (25 November 2013), www.eac.int/index.php?option=com_content&view=article&id=1433&Itemid=1

Figure 5: Voice price caps based on tariff data



Source: ITU

The previous chapter mentioned that mobile network operators in all EAC partner states were asked to provide information about their wholesale and retail tariff agreements with preferred and non-preferred roaming partners. A brief summary of the process of deriving price caps from the data collected is given here.[34]

Most but not all MNOs responded to this information request in a timely manner. After determining that the missing data would not significantly affect the calculation of price caps, maximum and minimum wholesale and retail roaming prices were identified in each country – with and without taxes and surcharges.

The principal finding was that variations in tariff levels were much too large to be explained by the costs of service provision. In Tanzania, for example, the highest retail price for calling another country within the EAC was about 60 times more than the lowest retail price for the same service from a different operator.

Another finding was that government surcharges on wholesale terminations were a significant burden; 86 per cent of the tariff in one situation and adding USD 1.19 to a 0.70 per minute service charge in another.

But the most important finding was the regional average of each country's lowest freely negotiated *wholesale* price for roaming services: USD 7.63 cents per minute including surcharges. This amount implied that a USD 7 cents/minute wholesale price cap without surcharges (the surcharges being a large fraction of the total price) would permit roaming to remain a viable service offering for MNOs in all the EAC countries.

Voice roaming tariffs (EAC averages in USD/minute)	Average Minimum	Average Maximum
Wholesale with surcharge	0.0763	0.9775
Wholesale without surcharge	0.0588	0.4042
Retail – voice call within visited country	0.0870	0.9944
Retail – voice call back home	0.1435	2.1982

[34] Most information in this chapter comes from interviews with Dr. Twinemanzi Tumubweinee, UCC Head of Competition and Consumer Affairs; Lukas Musembi, CAK Assistant Manager for Interconnection and Tariff Regulation; and from the publications of EACO Working Group 8 (Communication Services Pricing and Industry Analysis).

Voice roaming tariffs (EAC averages in USD/minute)	Average Minimum	Average Maximum
Retail – voice call to other countries within EAC	1.0455	3.6238

Data from EACO analysis (2014)

The data also showed that the regional average of each country's minimum *retail* price for roaming voice calls made in visited countries was USD 8.7 cents/minute, suggesting that a price cap of USD 10 cents/minute would be acceptable to most MNOs while leaving room for further voluntary price reductions.

This exercise showed that it is possible to identify the actual and essential costs of roaming with MNO cooperation. In addition, candour about the costs of service provision encouraged a regulatory response appropriate to real market conditions. Withholding such information would have increased the risk of price caps being set at inappropriate levels. It would not have prevented the setting of price caps.

No charges for calls received while roaming: is this policy sustainable?

Probably the most controversial ONA price cap is on receiving voice calls at no cost while roaming, even though there are obvious precedents for this sender pays policy in wire telephony, traditional mail, broadcasting, etc. The controversy seems to stem from the different perspectives of customers and network operators. Customers, fearing bill shock feel they must limit mobile communications while roaming but they cannot control when someone calls them. Incoming calls thus carry a risk of unforeseen charges – unless they are free. Operators, on the other hand, feel that routing calls to roamers generates costs which should be reflected in the tariff. They are also concerned that a zero tariff for received calls may invite abuse as a customer can spend hours talking without paying for use of the network. This incentivizes permanent roaming, they claim.

The most common answers from mobile network operators on how to best improve the ONA framework included getting rid of zero tariffs for incoming calls. No end-user said that, while regulators seem to see both sides' perspective. Many cited the need for a fair use policy.[35] One interviewee pointed out that a *small* tariff would not cause bill shock but would eliminate the free riding that makes permanent roaming objectionable. However in that case, subscriber fears of overcharging would continue, limiting ONA benefits.

A slow shift is underway from voice-centric to data-centric handsets and communication sessions. Real-time voice communication will undoubtedly survive as a useful service, but Voice-over-IP makes it just another data session. Data tariffs might then apply. That could result in a phase-out of tariffs based on call destination as those do not apply to Internet data. However, MNOs are likely to resist the phase-out of charges based on call duration since their current business models are based on that paradigm. Ultimately, per-second and per-minute voice charges may give way to the gigabytes-per-month fees used in many data plans.

SMS price caps

As noted above, voice calling was the first issue addressed by the ONA framework but by 2016 the framework should also encompass SMS, data and mobile money transactions. A recent investigation in Southern Africa showed wide variance in the per-message prices that different network operators charge retail SMS customers (both roaming and domestic), with no apparent link to the underlying costs and generally high mark-ups.[36] This suggests that if care is taken to identify an appropriate level for tariffs, SMS price caps could be set for the benefit of roamers at levels which only reduce excessive profit margins without forcing operators to offer the service at a loss. The recommendation to SADC

[35] Airtel, for example, instituted a Fair Use Policy for receiving calls while roaming on its networks even before ONA was established: calls were free up to 100 mins/month, after which charges applied. Today, for business subscribers from Kenya roaming in Rwanda, the first 100 incoming calls are free, after which a charge of KES 44/minute applies.

[36] This investigation is cited and discussed in more detail in Chapter 5.

was "flat SMS pricing, at a single rate across the whole SADC community to send an SMS anywhere in the Region, plus free reception of an SMS (the current case largely)."

As the first step in Phase 2 of ONA, the northern corridor Heads of State directed the MNOs in Kenya, Uganda and Rwanda to implement a One Network Area for SMS services by 1 September 2015 according to these principles:

- The maximum wholesale price (inter-operator tariff) within the northern corridor Member States should be USD 3 cents per message.
- The maximum retail price within the Member States should be USD 6 cents/SMS including all applicable taxes.
- These rates also apply to roaming and cross border SMS traffic within the northern corridor.[37]

A check of current prices advertised online for SMS messages across the region shows that these caps are above the current prices charged by most operators, except for a few that are inexplicably high (Chapter 6).

5 Extending the ONA framework to data products and services

In markets without price caps imposed by regulators, wholesale and retail tariffs for broadband data vary widely, with volume discounts for large users and premium pricing for those with special requirements, like high bandwidth/low latency channels for multimedia streaming. The cost of connectivity also varies widely, with South Sudan, for example, suffering from the need to use satellite links.[38] That poses an even bigger challenge than voice in setting harmonized price caps for data. Data roaming typically involves checking email, browsing news stories, catching up on social media or watching online videos. Some of these activities are more sensitive to delays and interruptions than voice dialogues, but others are less sensitive. That affects willingness to pay for content and link quality. Circuit-switched voice calling is not a relevant model.

It is hard to ascribe the costs of maintaining and operating an Internet access network to particular data sessions. Yet operators need signalling and billing systems that work in near-real-time to support data roaming for pre-paid customers, to avoid exceeding their currently available credit levels. This requires rapid signalling for subscriber authentication and roaming authorisation. Continuing the build-out of microwave and optical fibre backhaul infrastructures is thus necessary to keep mobile data affordable as demand grows explosively.

It may be necessary to operate separate voice and data networks for some years: East Africa voice calls are primarily routed through GSM networks, and this is likely to remain true for the next decade and probably longer outside cities. But GSM does not support broadband. LTE is the technology of choice for mobile Internet access now. While it is technically possible to support both GSM and LTE with the same antenna towers, backhaul links, power supplies, etc., only very new radio equipment can transmit and receive both standards simultaneously. That implies replacing still operational GSM equipment: not all firms will rush to do that.

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[37] Lukas Musembi, *One-Network Area Roaming Initiatives within East Africa*, ITU Arab Regional Workshop on Mobile Roaming: National and International Practices, Khartoum, Sudan (27-29 October 2015), www.itu.int/en/ITU-D/Regional-Presence/ArabStates/Documents/events/2015/RM/Presentations/Session9/One-Network%20Area%20Roaming%20Initiatives%20within%20East%20Africa.pdf

[38] As well as joining the One Network Area, Undersecretary Juma Stephen Lugga noted that the South Sudan cellular networks were forming partnerships with networks in neighbouring countries to implement direct terrestrial links. However, not all of mobile networks in South Sudan are connected to each other, so a call from one network to another might go by an (expensive) international route. Ejulu Denis, *Telecoms to join regional One Network Area*, The Corporate Weekly (11 March 2015): www.thecorporate-weekly.com/index.php/16-news-business/480-telecoms-to-join-regional-one-network-area

Maintaining separate networks for data and voice is obviously more expensive than a single network. But current cellular procedures for data roaming also impose the added expense (and time delay) of routing data traffic back through the roamer home network for billing and other purposes. This makes little sense technically but is an entrenched practice that requires system replacement to alter.[39] It also imposes the cost of service under agreed inter-operator tariffs. The positive interpretation of these negative circumstances is that data roaming could become cheaper in the future.

The fact that Wi-Fi Internet access points (hotspots) are spreading across Africa – as they have in the rest of the world – and are usually much cheaper than cellular – or free – is another reason for optimism: Wi-Fi is actually a better option than cellular when the user is not moving quickly and hand-offs are unnecessary. Unless mobile operators take control of the hand-off process to keep customers on their networks, competition between cellular and Wi-Fi is likely to bring down cellular data roaming prices – as might the spread of longer range wireless networks operating in TV white spaces.[40]

Issues related to data roaming in Southern Africa have been looked at carefully for the SADC and some results can probably be extrapolated to East Africa. Table 1 shows findings regarding the ratios of revenues to costs due to roaming for voice, SMS and data. The extent to which MNOs in South Africa overcharge roamers for data traffic is particularly striking. The same might be true in East Africa, though that is only speculation as the necessary research has not been done.

As mentioned earlier, Europe is starting to experiment with decoupling user relations with home and visited networks, aiming to create more competition. A similar thing is happening in the decoupling of voice and data contracts. It remains to be seen if these changes in market structure can unleash forces that will eliminate the need for price caps.

Price caps for data roaming

Phase 3 of ONA addresses data roaming, a difficult market for setting price caps because there are so many different use cases. Therefore, experts and stakeholders have not yet achieved consensus on a cost-oriented or flat-rate tariff as the solution. As with received calls, there is a difference in perspective between operators and end-users: the latter prefer flat rates while the former prefer cost-based. This topic is explored in more depth in the next chapter.

Analysing retail vs. wholesale data roaming charges shows that high wholesale charges often result in high retail roaming charges. Data sessions carried over mobile networks may impose costs beyond voice carriage.[41] However, data *roaming* requires few resources beyond what is needed for domestic data sessions, so large tariff differences between roaming and home-network access are normally not cost-justified.

Table 1: Ratio of revenue to cost

Revenue-to-cost ratio (2 year average)	Voice	Data	SMS
Visiting subscribers	10.96	44.11	7.49
Own subscribers roaming	13.32	67.24	9.88
Average of both	12.14	55.68	8.68

Table from SCF Associates Ltd., SADC Home and Away Roaming Phase II and III: Cost-model based roaming and RLAL – Report for Tasks 3 and 4 (2014), page 74

[39] Edward Kayiwa, *Infrastructure bottlenecks choking data roaming on EAC One Area Network*, *New Vision* (21 December 2015): http://africanewswire.za.com/infrastructure-bottlenecks-choking-data-roaming-in-east-africa/

[40] Ermanno Pietrosemoli and Marco Zennaro: *TV White Spaces: A Pragmatic Approach*, ICTP (2013): http://wireless.ictp.it/tvws/book/

[41] Such as additional base stations for higher downlink speeds using new protocols or new frequency bands (e.g. 1452-1492 MHz for Supplementary Downlinks). These can serve domestic customers as well.

Implementing data roaming at the retail and wholesale levels

Given the cross-border nature of roaming, no single national regulatory authority (NRA) is able to regulate these services on its own, end to end, for any class of medium – voice, data or SMS – at retail and wholesale levels. NRAs can only regulate wholesale arrangements in their respective countries. This means any initiative aimed at reducing data roaming charges within one Member State would only serve to benefit operators and visiting subscribers from other Member States. Instead, concerted action by all NRAs is required so that consumers of roaming services from Member States with regulated wholesale arrangements will receive the same benefit when they travel to other countries in the region and all MNOs enjoy the same wholesale tariff advantages.

Thus regionally coordinated EAC action is needed to ensure reciprocal benefits for all mobile customers in the region. This points to the need for an EAC regional data roaming policy with common principles and implementation. Policies adopted in other regions (e.g. Europe) can point the way, although the SADC (Box 6 as expressed by CRASA- Communications Regulators Association of Southern Africa) is most relevant as a model.

In principle, this extends ONA to data after analysing wholesale and retail charges, by capping the roaming tariffs on a glide-path towards *roam like at home* (RLAH) that progressively reduces to zero. The glide-path would start within six months, giving MNOs time to implement changes to billing systems and inter-operator agreements. After the six month preparation window, the cap glide-path to RLAH continues with 18 months of progressive reductions, so that in two years, all consumers in the region have the same price landscape for data roaming.

Guiding principles for implementing data roaming

The following guiding principles are recommended for data roaming in the EAC:

- Prices for data roaming services should be transparent, fair and non-discriminatory.
- Consumers must be provided with adequate information regarding retail prices and billing cycles related to the provision of roaming services, especially to near-border areas where inadvertent data roaming occurs.
- Prices for regional roaming services should be cost based and not be excessive in comparison with prices charged for the same services at national level.
- Any roaming network connection shall be only established with user consent.
- Quality of service parameters for roaming services should at least be equivalent to those approved by the NRA of each Member State.
- Competitive conditions among MNOs in the EAC region should be maintained. Prices charged, and other obligations imposed on, MNOs should not distort that competition.
- Glide-paths for the progressive capping of data roaming service prices will need to be based on cost models applying to both retail and wholesale tariffs, the latter requiring inter-MNO agreements.

Powers for national regulatory authorities

A body such as the Committee of the Heads of Communication Regulatory Authorities will have to define the regulatory tools needed to implement the EAC Regional Data Roaming Policy. However, NRAs have different lawful authorities and powers, so legislative amendments may be needed in each partner state to ensure NRA powers are all at the level of a common NRA Roaming Charter for data, voice and SMS. EACO and ministers should ensure the following measures are enacted:

- Empower NRAs to implement the regional regulatory tools on data roaming services, as for voice at the national level, pursuant to the EAC NRA Roaming Charter.

- Enable and encourage NRAs to adopt harmonized EAC costing and pricing models for data roaming services.
- Enable and encourage NRAs to co-operate through treaties and agreements with other NRAs in the region.
- Empower NRAs to obtain relevant information from network operators and relevant roaming exchange enterprises for the purpose of implementing this policy.
- Authorize NRAs to share information collected from operators with other NRAs in the region.

Requirements for mobile network operators

NRAs should require MNOs to perform the following:

- Provide all requested information concerning roaming services to NRAs.
- Enter into bilateral agreements for postpaid and prepaid roaming services with all MNOs in the EAC region.

6 Changes in cross border traffic volumes and tariffs since ONA adoption

A preliminary report on changes in voice traffic roaming among states that implemented ONA was prepared for the 10th Northern Corridor Integration Projects Summit in June 2015 by Tumubweinee Twinemanzi[42]. It showed fast and dramatic upswings, made all the more significant by the fact that only a small number of EAC citizens yet understood what ONA meant in practice, including:

- Before January 2015, when South Sudan implemented ONA, roaming traffic between South Sudan and Rwanda rarely exceeded 15 000 minutes/month in either direction. But in the first three months after ONA implementation, outgoing traffic from Rwanda to South Sudan rose 5 300 per cent before settling back to a still impressive 3 314 per cent by May 2015.
- Before Uganda implemented the ONA voice framework, outgoing traffic between Uganda and Rwanda averaged about 1.15 million minutes/month in each direction. From January to May 2015, voice traffic from Rwanda to Uganda grew by 529 per cent (to 7 million minutes/month) while traffic from Uganda to Rwanda reached 2.4 million minutes/month, an 86 per cent gain.
- Between January and April 2015, traffic from South Sudan to Kenya grew by 370 per cent, while traffic from Kenya to South Sudan grew by 201 per cent.
- From January to April 2015, voice traffic from South Sudan to Uganda grew by 324 per cent while voice traffic from Uganda to South Sudan rose by 108 per cent.
- Between October 2014 and May 2015, outgoing traffic from Kenya to Rwanda grew by 109 per cent while traffic from Rwanda to Kenya grew by 85 per cent.

A recent World Bank Development Note shows the impact of the Rwanda and Kenya agreement (completed in the first week of October 2014), which exempted Kenyan roamers from the surcharges that Rwanda imposed on incoming international calls: voice roaming traffic increased from a bi-directional average of about 10 000 minutes/day to an average of nearly 25 000 minutes/day a week later (see Figure 6).

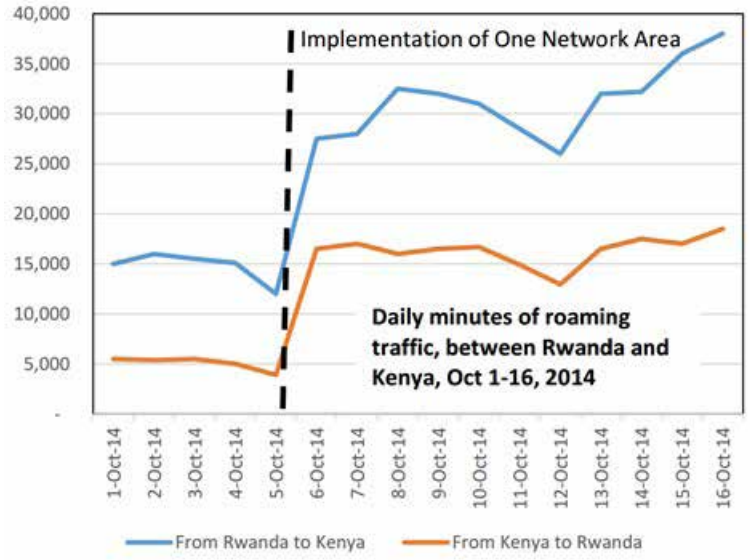
The *Post, Broadcasting and Telecommunications Market and Industry Report*[43] for the first quarter of 2015, produced by the Uganda Communications Commission, shows that voice roaming in Uganda by

[42] T. Tumubweinee: *Voice Traffic Analysis for Northern Corridor Partner States since the Implementation of the One Network Area*, (May 2015)

[43] www.ucc.co.ug/files/downloads/Q1-Market%20Report%202015.pdf

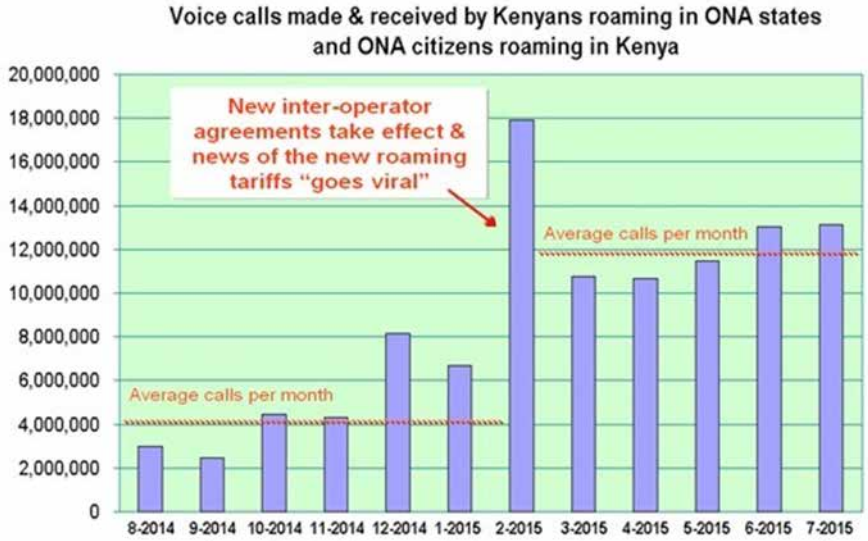
foreign network subscribers increased 88.5 per cent between the fourth quarter of 2014 and the first quarter of 2015, while the voice traffic from Uganda registered users roaming on foreign networks increased 40.9 per cent during the same period. Unfortunately, the report does not distinguish ONA roaming from the rest of the world. However, it is difficult to explain such rapid growth without linking it to ONA introduction.

Figure 6: ONA tariff impact on voice roaming traffic: Rwanda



Source: The World Bank[44]

Figure 7: ONA tariff impact on voice roaming traffic: Kenya



Source: Communications Authority of Kenya

The Communications Authority of Kenya also supplied data for this study, showing the number of calls originated and received each month by Kenyans roaming in the other ONA states and by citizens of other ONA Member States roaming in Kenya. Converting it to a chart (Figure 7) makes the trend clear: there was steady year-long growth around the adoption of ONA, from an average of about 4 million calls/month before February 2015, when new inter-operator agreements were finalised and

[44] Tim Kelly and Christopher Kemei. One Network Area in East Africa: http://pubdocs.worldbank.org/pubdocs/publicdoc/2016/1/499731452529894303/WDR16-BN-One-Network-Area-in-East-Africa-Kelly-Kemei.pdf

awareness of the new tariffs went viral, to an average of about 12 million calls/month afterwards. The Kenya average monthly roaming traffic thus tripled between November 2014 and March 2015.

The Uganda Communication Commission also reports a tripling of roaming traffic after ONA introduction.[45] Data from Rwanda is harder to interpret but if it is assumed that network operator traffic reports are correct, then Rwanda voice roaming increased 472.5 per cent from September 2014 to September 2015 (from 5 755 244 to 27 193 852 minutes/quarter).

Unfortunately, as noted earlier, not all the reported increase in voice traffic can be attributed to roaming. An as yet unpublished report (*Update on the Operationalisation of One Network Area*) jointly produced by MTN, Airtel and Uganda Telecom[46] claims that "*variances in the termination rates resulted in simbox operations setting up in Kenya and refiling Uganda-bound traffic from international origins as Kenya-originating traffic with huge margins to make.*"

Data provided by the operators shows a large shift of inbound international traffic to ONA-originated traffic between January 2014 and July 2015 (accompanied by a decrease in operator wholesale revenue from USD 167 061 to USD 39 027). International traffic declined from about 26 million minutes/month in January 2014 to 16 million minutes in July 2015 while ONA-originating traffic grew from about 6 million minutes to about 30 million minutes in the same period. These trends suggest that a growing proportion of inbound international traffic is being re-filed as locally originated. But correlation alone does not prove causality, so UCC responded by inviting the submission of specific evidence of re-filing and the operators responded with a large amount of data indicating the scale of the problem (see Chapter 7).

Changes in tariffs

Because there are 17 MNOs in the countries implementing ONA, and comparing tariffs required price information from two different time periods for voice and for SMS, with each tariff category having multiple variations, depending on the visited country and the carrier network chosen, the data is extensive enough to require a separate chapter (Annex A). Current tariffs are taken from operator websites. These are compared with tariffs from the months just before ONA was formerly launched. In some cases, the before and after ONA changes are surprisingly modest because several mobile operators with networks in multiple countries had already adopted their own versions of One Area Network roaming voluntarily.

Table 2: Rwanda: Incoming and outgoing voice roaming traffic per operator

Minutes per quarter as of September 2015				
	MTN	**Tigo**	**Airtel**	**TOTAL**
Incoming	4 882 015	1 694 937	4 753 708	11 330 660
Outgoing	1 250 362	4 216 951	10 395 879	15 863 192
Minutes per quarter as of September 2014				
Incoming	482 879	229 548	3 315 228	4 027 655
Outgoing	567 378	53 940	1 106 271	1 727 589

Data from Rwanda Utilities Regulatory Authority, *Statistics and Tariff Information in the Telecom Sector*: www.rura.rw/index.php?id=83

[45] Survey response.
[46] Prepared for a regulatory consultation (28 August 2015).

7 The issue of permanent roaming

The issue of *permanent roaming* is a concern voiced often by both regulators and network operators, and if roaming prices eventually converge toward domestic prices for all mobile services, permanent roamers will become indistinguishable from non-roamers.

An early hint that the sector is heading in that direction came from the Kenya Communications Authority which has proposed "new rules that would mandate the sharing of the national infrastructure and facilities by the country's mobile networks… What it will mean is that *a customer in any part of the country will automatically use any network available, where their primary mobile services provider is unavailable*,' the director-general Francis Wangusi said…"[47]

That makes sense where infrastructure is sparse and coverage by only one MNO is common. It is a direction that some EU Member States are also considering, and one large MNO has suggested separating service from a common shared network infrastructure.

However the phrase 'permanent roaming' is used in a somewhat different sense today. Two use cases illustrate why:

- A mobile customer buys a SIM card in another country where the tariffs are lower for one or more services that the customer wants to use regularly in their home country. An example would be someone who wants to take advantage of ONA zero tariff for receiving calls from abroad while roaming – even when they are not actually roaming.
- A mobile customer might plan to stay for a long time in another country with a SIM card affiliating him with a mobile network in his home country. Refugees, guest workers, and other displaced persons sometimes do this to maintain frequent (and cheaper) contacts with distant family members or their ethnic community.

So there are situations where permanent roaming is an understandable personal strategy and not necessarily illegal, unless the permanent roamer used a false address or identity card when registering the SIM. Nevertheless, mobile operators consider this unfair use, a scam to benefit from services meant for a different class of customer. It is relevant to ONA because preferential tariffs create price gaps (arbitrage opportunities) that can be exploited, potentially on the scale of organised crime.

Although permanent roaming gets a lot of attention – perhaps because it shades into fair use like the refugee example above – it is probably a less serious problem than *traffic re-filing* or *re-origination*. Those techniques suggest the involvement of telecom professionals, which increases mistrust among business partners. Several people have suggested that some re-filing is done by MNOs[48].

Grey routes are arrangements where the disguising or falsification of call origins can occur on route, so that calls arrive from what looks like a legitimate source but one that is not the true origin. An example might be changing the calling line identity (CLI) so it appears to originate within the ONA region (and thus is entitled to a lower tariff), when it actually arrived via Internet from another part of the world. This is called bypass or re-origination. It can be hard to detect and suppress even when it occurs on a large scale, particularly when third party transit networks are involved. This survey response from a roaming manager in Kenya explains:

> "Roaming traffic has increased substantially since ONA but distinguishing between traffic due to other carriers' bypass strategies and actual roaming traffic is difficult, as is distinguishing between traffic generated by one's own roamers and traffic carried for other networks' roamers. This is because the carriers had to start implementing ONA in two weeks – before they had

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47 Caroline Vutagwa, *Kenya's Telcom Regulator Wants National Roaming Between Mobile Networks*, *Techmoran* (14 April 2014), techmoran.com/kenyas-telcom-regulator-wants-national-roaming-between-mobile-networks/

48 One survey response suggested that ONA has increased suspicions between partners, and that to be sure about origins and destinations separate trunk routes should be created, however even where direct interconnection is technically possible, it may not make economic sense, if there is too little traffic to justify the cost of the bandwidth.

> installed new switches and set up routing to segregate traffic by origin and destination. They had to start offering services even before their billing systems were fully reprogrammed. Billing is accurate now… but the task of separating traffic streams is still unfinished… And of course, not all carriers have direct separate connections with all their roaming partners. That creates an opportunity for undetected bypass. And for that reason some carriers refuse to relay traffic for certain others… Regulators do not have full control over what businesses do to each other, particularly at the wholesale level…"

SIM boxing is a related technique in which a GSM radio switch with multiple prepaid SIM cards relays international calls that have arrived through a VoIP gateway, bypassing normal phone routes into a country to terminate through a local number. This is a way to avoid international call tariffs and government imposed surcharges. SIM boxes are now being produced in factories and advertised on the Internet. Some even come with warranties and offers of business development assistance.

Figure 8: Web page promoting call re-file products

Source: en.antrax.mobi/products/

A Uganda major mobile operators told the UCC that in the first ten months of 2015 it had:

> "detected and blocked 82 411 simboxes that landed 13 million minutes on our network, of which 63 per cent of the minutes (7 455 simboxes) came from ONA sources [that is, from SIM boxes in countries that adopted the ONA framework.] Our systems for dealing with on-net simboxes are well automated, and… an on-net simbox is blocked, on average, before 45 minutes of traffic are landed… However, ONA simboxes are much more difficult to block and, on average, land 1 127 minutes of traffic on our network before blocking. Bearing in mind that our systems can't possibly detect all simboxes, we consider the above statistics to be the potential 'tip of the iceberg'…"[49]

This MNO estimated the total amount of voice traffic re-filed via Kenya and South Sudan into Uganda in 2015 at just over 41.5 million minutes, representing about USD 4.8 million in lost revenue for Uganda and a net gain for grey operators in Kenya and South Sudan of nearly USD 2.5 million. The apparent shift in traffic origination from international to ONA resulted in the following impacts for Uganda (the trends are all too clear).

[49] Private correspondence protected by Chatham House rules.

Cash inflow (USD)	Q1-2015	Q2-2015	Q3-2015	Q4-2015 (est.)
International call revenue	3 683 989	2 837 345	2 329 785	1 213 329
ONA revenue	1 789 244	2 269 436	2 610 714	3 012 983
Excise duty payable	2 139 090	1 647 491	1 352 778	704 514
Total inflows	7 612 323	6 754 271	6 293 277	4 930 826

It is important to note that *SIM boxing per se is not illegal* in the ONA region. Apparently the court cases brought to trial so far have all been based on charges of offering a telecommunication service to the public without a licence. However, some SIM boxers actually are licensed – for other telecom services – and started SIM boxing when they realized that if they got caught their licence would protect them.

Grey routes, *SIM boxes* and *traffic re-filing* became hot topics with the introduction of ONA. But they actually result from the development of professional quality interface equipment connecting VoIP and GSM, in the case of SIM boxes. That in turn has been stimulated by differences between domestic and international telephone tariffs, differences in national surcharges and taxation on mobile communication, and the dissimilar business models of the Internet and traditional telephony. It would be unfortunate if ONA were to be blamed for all that when it might actually motivate stakeholders to tackle the problem.

ONA is only viable to the extent that *in-region* and *rest-of-world* communications can be clearly differentiated, because the former are entitled to preferential tariffs while the latter are not. This has brought the problem of geography- and category-transcending communication interfaces into focus, and encouraged both regulators and mobile network operators to support the procurement and installation of sophisticated traffic monitoring and fraud detection systems. So far Rwanda, Burundi and Tanzania have installed telecom traffic monitoring systems. Kenya, Uganda and South Sudan are still in the procurement phase.[50]

In any case, the emerging SIM box/grey route industries demonstrate the risk of completely de-regulating international gateways. However, the opposite extreme, requiring everyone to use a national monopoly gateway, is also sub-optimal. A balance between liberalisation and regulation is clearly the best option.

The situation may escalate for a while, with traffic monitoring systems improving their grey route detection capabilities and grey route promoters responding with new *anti-anti-detection* tools. But closing the gaps between domestic and international telecom tariffs would remove incentives to keep this contest going. The future of ONA might depend on that.

To sum up, SIM boxing and call re-origination have been cited as problems with ONA current implementation. In fact they are due to entrepeneurs exploiting the gaps between domestic and international call tariffs, not to ONA. Some of these entrepeneurs could even be licensed carriers. Until the gap between domestic and international tariffs closes, the only way this development can be controlled is by detecting and penalising the fraudulent re-designation of call origins. Unfortunately, preventing such practice is easier said than done.

[50] This is according to the Northern Corridor Integration Projects website and the WG8 report to the 21st EACO Congress (May 2015), www.nciprojects.org/project/ict-infrastructure; eaco.int/docs/WGsReports/WG08_REPORT_TO_THE_21st_CONGRESS_28th_May_2015.docx

Figure 9: Police photograph from a raid on a SIM boxing portal

Source: Jeanette Oloo, *5 827 SIM cards recovered from the local mobile service providers on the second SIMBOX raid, CIO East Africa* (7 January 2016): www.cio.co.ke/news/main-stories/5,827-sim-cards-recovered-from-the-local-mobile-service-providers-on-the-second-simbox-raid

8 Conclusions, recommendations, and requirements for extending the ONA model to other Smart Africa Initiative Members

This case study of the ONA initiative has led to the firm conviction that it is a worthwhile undertaking and should be extended to other countries in Africa and beyond.

ONA has benefitted the public directly by reducing the cost of communication. Warnings that it could destabilise the industry or lead to higher prices for other mobile services now seem alarmist.

As part of an ambitious multifaceted drive toward regional integration and economic development, it has brought the EAC states closer together. Regulators and mobile network operators have begun to solve problems more cooperatively.

In identifying requirements for the implementation of ONA in additional countries, it is important to distinguish between what is needed to enable *introduction* of the framework and what is needed to *sustain* the framework after it is in place. To introduce ONA successfully one needs:

- A legal basis (treaty or regional agreement) that establishes institutions or a decision making mechanism to lead several countries in a common direction. Africa is fortunate in having many regional economic communities, like EAC, because these are suited to the task. ONA is by nature a transnational undertaking. It makes no sense for one country to pursue international roaming reform on its own. As the ITU *Guide for NRAs on International Mobile Roaming Cost Analysis* states:

  > *Perhaps the primary condition for success is… the use of a community of countries with NRAs working in concert, over a set of geographic roaming areas, so that reciprocal roaming data gathering can be set up. Thus a regional approach is probably required. However, it must be backed eventually by common regulation, probably set in legislation – and therefore by*

a group of governments in the region with the communal will to act together in order to stimulate the economy and protect the citizen.[51]

- Membership is needed in a Regional Economic Community (REC) – or similar alliance for cooperation in economic reform and development – as a shield against complaints that preferential regional tariffs violate the WTO General Agreement on Trade in Services.
- Looking at the same issue from a different perspective, it was essential to consult with the mobile operators and national regulators on details of the plan, intensively, regularly and early in the process.
- The REC also needs a large enough population of roamers, or potential roamers, including those who were unable to afford roaming services under earlier conditions, to justify implementation.
- Most roaming is still between neighbouring countries, so geography and the cost of travel must be taken into account in organising a roaming area. The region needs to have enough travelling traders that mobile roaming grows the real economy.

To make ONA or its successor sustainable:

- Monopoly telecom gateways are too costly to co-exist with below- market price caps. Such gateways must be liberalised or dismantled. In addition, regulators must be willing to issue international gateway licences to any individual MNO so they can avoid the costs of routing through a third party and the risks of relying on a competitor gateway for connectivity.
- Similarly, government surcharges on international incoming calls and other revenue raising taxes must be repealed, at least on calls originating within the region. That is an essential part of the ONA framework.
- The elimination of international roaming tariffs is a realistic and socially desirable goal. But a total removal through a common regional tariff is not necessarily useful as a *first* step – as ONA leaders discovered when they moved from conception to implementation. A glide-path from low price caps down to no roaming-specific charges could take several years, but it would give the market time to adjust.
- Receiving roaming voice calls at no cost is the right strategy as customers fear *bill shock* and they will limit mobile communications whenever incoming calls carry a risk of unforeseen charges – that is, unless they are free. However, costs are incurred to service roamers. How those costs are recovered requires further discussion.
- To maximise revenue under reduced tariffs, the table of charges for international roaming should be stable, understandable and easy to remember (the ultimate simplification, of course, is to eliminate all charges for IMR services).
- Migrating from circuit-switched to packet-switched (IP-based) networks makes it cheaper and easier to accommodate roamers. Most operators are doing this anyway as LTE spreads. A by-product of this is the facilitation of data roaming.
- If the connectivity between mobile networks in the implementing region is incomplete or inefficient it should be improved. This implies regional level infrastructure planning as the northern corridor states have been doing for years.
- It is unclear if fast tracking is necessary for successful implementation of something like ONA. Some would argue that this approach produces additional problems. Others say a slower process would never achieve the momentum needed to overcome organised opposition. There was no organised opposition to ONA in East Africa, so it is difficult to say what would have happened if there was such opposition.
- Governments will need to invest in traffic monitoring and fraud detection systems to control activities like SIM boxing, traffic re-filing, grey routing, etc.

[51] www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-ROAMING-2015-03-PDF-E.pdf

- However, the treatment of over-the-top (OTT) services requires far more careful consideration than simple banning. These services will become a useful source of market competition as mobile data services take off.
- Countries interested in developing or participating in a regional framework for the regulation of cross-border roaming should join the ITU Global Dialogue on International Mobile Roaming (IMR). A series of high-level IMR workshops began in 2013 under the general rubric "Let's Roam the World". These bring together industry, regulators, policy makers, regional associations and consumer organizations to discuss best practice guidelines and cost analysis tools. The next ITU-BDT International Mobile Roaming Round-Table is planned for 15-16 September 2016 in Geneva, Switzerland[52].

[52] See also ITU IMR Resources Portal www.itu.int/en/ITU-D/Regulatory-Market/Pages/Roaming_info.aspx

Annex A: Roaming tariffs before and after introduction of the One Network Area

The East Africa Community One Network Area initiative was developed to reduce the cost of roaming within the region, so a necessary part of this study was collecting tariff information from the period before and after ONA was launched, to see if that goal was achieved.

Mobile phone networks usually put service descriptions and prices on their websites for the benefit of current and prospective customers. The most recent information in this annex thus comes mainly from operator websites.

But most of the tariff information from before 2015 was taken from the Internet Archive, which strives to preserve web pages containing information of historical interest which are updated from time to time. Unfortunately, because of the vast scale of the Internet and the high rate of turnover for information-rich pages, the Archive only captures a small percentage of the potentially useful data that is put online temporarily and then removed. Consequently, tariff information was unavailable from before ONA for Orange Kenya, Airtel Rwanda, and Vivacell in South Sudan.

Nevertheless, enough older data was available to show that ONA has indeed brought tariffs down across the region. However, the effect has been less than one might expect because a number of MNOs launched their own one network plans voluntarily, before the regional political leadership mandated such plans for all mobile networks in Kenya, Rwanda, South Sudan and Uganda. As it is unknown how many people have been affected by each tariff change, totalling up the changes is not very meaningful. But change is evident in the data collected below, as is the need to extend ONA to data roaming.

KENYA

MNO market shares, third quarter 2015 (based on the number of active subscribers):

- Safaricom (25.1 million) = 66 per cent
- Airtel Kenya (7.2 million) = 19 per cent
- Orange Kenya = (4.4 million) = 12 per cent
- Equitel[53] (1 million) = 3 per cent

TOTAL = 37 865 207

Every quarter, the Communications Authority of Kenya provides a detailed breakdown of roaming traffic by country and medium:[54]

Kenya roaming traffic, third quarter 2015

Country	Roaming-out (home subscribers)			Roaming-in (foreign subscribers)		
	Voice	SMS	Data Mbit/s	Voice	SMS	Data Mbit/s
Uganda	22 834 153	2 773 668	578 735	8 821 243	523 193	274 302
Tanzania	5 486 743	1 649 657	812 250	5 474 059	1 676 325	586 822
Rwanda	2 437 670	310 328	161 223	4 373 459	141 781	161 854
Burundi	24 461	31 334	221	33 723	5 542	1

[53] Equitel is a recently licensed MVNO specialising in financial services

[54] Communications Authority of Kenya, First Quarter Sector Statistics Report for the Financial Year 2015/2016 (July-September 2015), http://kenyahub.co.ke/?p=4241

Country	Roaming-out (home subscribers)			Roaming-in (foreign subscribers)		
	Voice	SMS	Data Mbit/s	Voice	SMS	Data Mbit/s
S. Sudan	921 525	456 379	5 364	3 961 825	86 041	233
Sub-totals	**31 704 552**	**5 221 366**	**1 557 793**	**22 664 309**	**2 432 882**	**1 023 212**
Others	9 277 145	4 849 134	1 471 773	14 784 361	5 035 979	5 870 475
TOTALS	**41 212 404**	**9 922 165**	**3 034 477**	**37 668 991**	**7 769 351**	**6 639 582**

MNO tariffs

Kenya: Airtel	September 2013	December 2015
Local calls in visited country	12.80 KES/min. (Rwanda) 21.95 KES/min. (Uganda)	4-10 KES/min. depends on country and network
Calling back home	21.95 KES/min. from Uganda 24.69 KES/min. from Rwanda	9-10 KES/min. depending on country
Calling the rest of the world	153.56 KES/min. (from Uganda) 209.45 KES/min. (from Rwanda) 64.02-662.1 KES/min. (depends on country)	
Receiving calls	45.73 KES (after 100 free minutes under One Network plan)	0 KES
Per SMS	13.72 KES per message	6 KES/160 characters
Data rates per MB	46 KES (GPRS)	10 KES (no service in South Sudan)

Kenya: Orange		December 2015
Local calls in visited country	Pre-ONA rates not available	8.98 KES/min. in Rwanda 26.30-48.22 KES/min. in Uganda 58.67-66.00 KES/min. in South Sudan
Calling back home		8.98 KES/min. from Rwanda 102.28 KES/min. from Uganda 199.50 KES/min. from South Sudan
Calling the rest of the world		199.50 KES/min. from South Sudan 239.12 KES/min. from Rwanda 255.69 KES/min. from Uganda
Receiving calls		0 KES
Per SMS		21.92 KES per message from Uganda 22.60 KES per message from Rwanda 33.22 KES per message from South Sudan
Data rates per MB (No service in South Sudan)		598.64 KES in Uganda (GPRS) 1197.29 KES in Rwanda (GPRS)

Kenya: Safaricom	November 2013	December 2015
Local calls in visited country	40 KES/min. in Rwanda 50 KES/min. in Uganda	10 KES/min. (65 KES/min. in South Sudan to Gemtel and Vivacell customers)
Calling back home	85 KES/min. from Uganda 90 KES/min. from Rwanda	10 KES/min. (in South Sudan 195 KES/min. except via Gemtel and Vivacell)
Calling the rest of the world		37-180 KES/min. (190 KES/min. from South Sudan)
Receiving calls	25 KES/min. in Uganda and Rwanda	0 KES (30 KES in South Sudan except for Gemtel and Vivacell)
Per SMS	20 KES	10-20 KES (35 KES from South Sudan)
Data rates per MB	35 KES/MB in Rwanda 65 KES/MB in Uganda	14-750 KES (1000 KES from South Sudan)

RWANDA

MNO market shares, third quarter 2015 (based on the number of active subscribers):

- MTN Rwanda (4 010 311) = 47 per cent
- Tigo Rwanda (2 990 335) = 35 per cent
- Airtel Rwanda (1 510 304) = 18 per cent

TOTAL = 8 510 950

However, the market shares of these companies are different when measured by their roaming customers:

- MTN Rwanda = 328 763 (38 per cent)
- Tigo Rwanda = 364 027 (42 per cent)
- Airtel Rwanda = 164 092 (19 per cent)

TOTAL = 856 882

In other words, 10 per cent of mobile customers in Rwanda are roamers.

MNO tariffs

Rwanda: Airtel		December 2015
Local calls in visited country	Pre-ONA rates not available	68 Rwf/min.
Calling back home		68 Rwf/min.
Calling the rest of the world		
Receiving calls		0 Rwf (up to 100 minutes)
Per SMS		131.71 Rwf
Data rates per MB		391 Rwf

Rwanda: MTN*	January 2013 (depending on network)	December 2015 (depending on network)
Local calls in visited country	123-250 Rwf/min.	128-202 Rwf/min.
Calling back home	291 Rwf/min.	291 Rwf/min.
Calling the rest of the world	175-405 Rwf/min.	285-356 Rwf/min.
Receiving calls	0-1.94 Rwf/min.	51-183 Rwf/min.
Per SMS	25-71 Rwf	25-71 Rwf
Data rates per MB	408 Rwf	408-418 Rwf

* Prices quoted here are for MTN Rwanda Home and Away service for East Africa, launched before the EAC One Network Area and still in effect.

Rwanda: Tigo	November 2013 (depending on network)	December 2015
Local calls in visited country	125-410 Rwf/min.	70 Rwf/min.
Calling back home	125-2 200 Rwf/min.	70 Rwf/min.
Calling the rest of the world	356-3 700 Rwf./min.	879 Rwf/min.
Receiving calls	80-100 Rwf/min.	0 Rwf/min.
Per SMS	75-320 Rwf/min.	45 Rwf/min.
Data rates per MB	300-4 600 Rwf/min.	440 Rwf/min.

SOUTH SUDAN

According to Paul Budde, mobile penetration has reached about 22 per cent, with four networks sharing the market:[55] Zain (41 per cent), Vivacell (34 per cent), MTN (21 per cent) and Gemtel (4 per cent)

South Sudan: Gemtel	
Local calls in visited country	Gemtel is in the process of establishing roaming services for its customers.
Calling back home	
Receiving calls	
Per SMS	
Data rates per MB	

[55] South Sudan telco market holds a mirror to the embattled nation: Red Herring (7 January 2015), www.redherring.com/mobile/south-sudans-telco-market-holds-mirror-embattled-nation/

South Sudan: MTN*	November 2013 (depending on network)	December 2015
Local calls in visited country	125-410 SSP/min.	70 SSP/min.
Calling back home	125-2 200 SSP/min.	70 SSP/min.
Calling the rest of the world	356-3 700 SSP/min.	879 SSP/min.
Receiving calls	80-100 SSP/min.	0 SSP/min.
Per SMS	75-320 SSP/min.	45 SSP/min.
Data rates per MB	300-4 600 SSP/min.	440 SSP/min.

* Note: MTN South Sudan is currently excluded from MTN OneWorld and not on the same call rate

South Sudan: Vivacell		December 2015
Local calls in visited country	No earlier tariff information	0.6 SSP/min.
Calling back home		
Calling the rest of the world		
Receiving calls		0 SSP
Per SMS		
Data rates per MB		

South Sudan: Zain	December 2015 (to ONA countries)	December 2015 (to non-ONA countries)
Local calls in visited country	0.6 SSP/min.	1.5 SSP/min.
Calling back home		4 SSP/min.
Calling the rest of the world		15 SSP/min.
Receiving calls	0 SSP	0.6 SSP
Per SMS		0.5 SSP

UGANDA

Uganda had about 22 million mobile subscriptions at end of the 2015 fiscal year. MNO market shares were, as of third quarter 2014:

- MTN (10 050 782) = 51 per cent
- Airtel (7 562 729) = 39 per cent
- UT Mobile (1 016 385) = 5 per cent
- Orange (683 153) = 3.5 per cent

The rest of the customers subscribe to the other MNOs.[56]

MNO tariffs

Uganda: Airtel	One Airtel	December 2015
Local calls in visited country	Tariffs comparable to One Network Area	150 sh./min. in Rwanda 164.2 sh./min. in Kenya
Calling back home		682.5 sh./min. from Kenya 846.3 sh./min. from Rwanda
Receiving calls		0 sh./min.
Per SMS		409.5 sh. from Kenya and Rwanda
Data per MB		1365 sh.in Kenya and Rwanda

Uganda: MTN	August 2013	December 2015
Calls to the visited network	450 sh.	360 sh.
Calls to other networks in visited country	1000 sh.	360 sh.
Calls back to home network	600 sh.	360 sh.
SMS to home network	150 sh.	130 sh.
SMS to East Africa, rest of world	300 sh.	130-1900 sh.
Data roaming	50 sh. for 10 kbit/s	8-400 sh. for 10 kbit/s

Uganda: Orange (now Africell)	August 2013	December 2015
Calls to the visited network	360-1690 sh.	360 sh.
Calls to other networks in visited country	360-600 sh.	360 sh.
Calls back to home network	360-2210 sh.	360 sh.
Calls to other East African countries	6500 sh.	360 sh. (2200 sh. to Burundi and Tanzania)
SMS to home network	280-780 sh.	280 sh.
SMS to East Africa, rest of world	280-780 sh.	780 sh.
Data roaming (GPRS) in ONA	9-325 sh. for 10 kbit/s	585 sh. for 10 kbit/s
Data roaming elsewhere in EAC	325 sh. for 10 kbit/s	325 sh. for 10 kbit/s

[56] Cartesian, *Mobile Network Access for MVNOs: Market Assessment*, prepared for UCC (January 2015): www.ucc.co.ug/files/downloads/SMP_Report_Mobile%20Network%20Access_April%202015.pdf

Uganda: Smart Telecom		December 2015*
Calls to the visited network	Network launched just before ONA tariffs came into effect	2500 TZS/min.
Calls to other networks in visited country		2500 TZS/min.
Calls back to home network		6300 TZS/min.
Receiving calls		1200 TZS/min.
International calls		9500 TZS/min.
SMS to any SMART network		850 TZS
Data roaming (per MB)		35000 TZS

*Roaming prices between SMART networks in Uganda, Tanzania, Burundi: tz.smarteastafrica.com/wp-content/uploads/2015/08/PRICE-in-Tsh1.pdf

Uganda: Smile Telecoms	
Calls to the visited network	Founded in 2007 and incorporated in Mauritius, Smile Telecoms Holdings Ltd operates LTE networks at 800 MHz in Nigeria, Tanzania and Uganda. In Uganda it is positioning itself primarily as a broadband company and is still in the process of adding Voice over LTE. Consequently it does not yet offer its customers voice roaming options.
Calls to other networks in visited country	
Calls back to home network	
Calls to other East African countries	
SMS to home network	
SMS to East Africa, rest of world	
Data roaming	

Uganda: UT Mobile		December 2015
Calls to the visited network	A deal struck between UT Mobile and Safaricom in 2007 resulting in something very much like the One Network Area but roaming on other networks remained expensive.	The UT Mobile website does not list current prices for roaming services.
Calls to other networks in visited country		
Calls back to home network		
Receiving calls from East Africa		
Calls to other East African countries		
SMS		
Data roaming		

Uganda: Vodafone Afrimax	
Calls to the visited network	Afrimax is an LTE broadband company just acquiring Voice over LTE capability and roaming partners. Although Vodafone announced that Afrimax customers would get preferential roaming rates in Uganda, the Afrimax website has no information at all about roaming or roaming tariffs.
Calls to other networks in visited country	
Calls back to home network	
Calls to other East African countries	
SMS to home network	
SMS to East Africa, rest of world	
Data roaming (GPRS) in ONA	
Data roaming elsewhere in EAC	

Note: The Uganda Communications Commission accredited two firms to develop and maintain mobile price comparison websites – www.price-check.co.ug and www.kompare.ug. Unfortunately, neither gives any information about international roaming.

Annex B: Interviewees for this case study

Charles Lwanga Auk	Assistant Commissioner for Telecommunications and Posts, Ministry of ICT, Uganda
Emmanuel Dusenge	Senior Engineer, ICT Infrastructure Development, Ministry of Youth and ICT, Rwanda
Gabriel Ewalu	Director, Roaming, Interconnection and International Carriers, Uganda Telecom
Steve Gasana	Roaming and Interconnect Manager, Airtel Rwanda
Samah Hassan	Project Director, Vivacell, South Sudan
Rabeeh Hijaz	Core Network Manager, Africell Uganda
Moses Kaahwa	Legal and Regulatory Advisor, Airtel Uganda
Oscar Kabata	Regulatory and Competition Affairs Advisor, Uganda Telecom
Fiona Kamikazi	Network Planning Engineer, Uganda Communications Commission
Pierre Kayitana	Regional Government Relations Manager, Tigo Rwanda
Christopher K. Kemel	Director of Licensing Compliance and Standards, Communications Authority of Kenya
Godliving J. Kessy	Regulatory Affairs Laison Manager, EACO
Humphrey V. Kobel	Head of Networks, Smile Uganda
Caroline Kuech	Liaison Manager, EACO
William Kibet Langa	Head of Sales and Communication Carrier Services, Orange (Telkom Kenya)
Ganson Lewela	Head of Regulatory, Airtel Kenya
Lukas Musembi	Assistant Manager, Interconnect and Tariffs Regulation, Communications Authority of Kenya
Abdul Musoke	Tariff and Interconnection Specialist, Uganda Communications Commission
Godfrey Mutabazi	Executive Director, Uganda Communications Commission
Zachariah K. Mutai	Head of Traffic and Coordination, Carrier Services Dept., Orange (Telkom Kenya)
Edwin Muwanga	Business Support Officer, K2 Telecom, Uganda
Doris Mvano	Business Analyst, Africell Uganda
Kezias Mwale	Radiocommunication Coordinator, African Telecommunications Union
Patrick Mwesigwa	Director, Technology, Networks and Services, Uganda Communications Commission
Jimmy Mwesigye	Roaming and International Manager, Tigo Rwanda

Peter Ngambi	Regulatory Manager/Technical, Orange (Telecom Kenya)
Mathieu Ntegano	Coordinator, International Gateway Traffic Verification System, RURA
Martin N. Nzengi	Roaming Manager/Marketing and Strategy, Orange (Telkom Kenya)
Sam Okiring	Manager, Strategy Development, MTN Uganda
Jacok Okoth	Head of Sales and Marketing, Smile Uganda
Emma Ann Otieno	Manager, Corporate Planning, Communications Authority of Kenya
Ali Rudahunga	Market Analysis Officer, RURA
Robert Rwakabogo	Senior Manager/Marketing Operations, MTN Rwanda
Meriem Slimani	Standardization and Development Coordinator, African Telecommunications Union
Abdoulkarim Soumaila	Secretary General, African Telecommunications Union
Mohamed Ssesaga	RF and BSS Planning and Optimization Manager, Airtel Uganda
Mbaga Tuzinde	Economist, Uganda Communications Commission
Kenneth Tweheyo	Head, International Business, Airtel Uganda Tumubweinee Twinemanzi Head, Competition and Consumer Affairs, Uganda Communications Commission
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