OTT - threat or opportunity for African Telcos?

Working paper 1[1]: Broadband 4 Africa

March 2016

Prepared by**:** Christoph Stork, Steve Esselaar, Chenai Chair and Safia Kahn

Keywords: Telecommunication Regulation, Mobile Broadband, Over The Top services, Mobile operators

For further information, contact: Dr Christoph Stork

Research Associate

www.researchICTafrica.net

cstork@researchICTafrica.net

+27214476332

[1]This is a working paper, not for citation. For alerts on policy paper publication or feedback to authors please contact: cchair@researchictafrica.net

Introduction

Mobile broadband and declining smart phone prices have lead to a rapid increase in Internet use. Computer based Internet access was and still is the privilege of the few in Africa, mostly those with formal jobs, students and those that access it in Internet cafes (Stork et al 2013). Mobile Internet requires less skills than computer based access, it does not require electricity at home and is prepaid, all important conditions for use by low income groups in Africa. Mobile Internet is expensive for the poor at the same time as it is a cost saving tool. It is expensive when using the full Internet including media streaming. It is cheap when Over The Top (OTT) services are used instead of voice and text messages.

African operators have adopted various strategies to defend their revenues against OTT services such as Facebook, WhatsApp and Skype. One strategy is bundling voice, text and data together in top-up products.

The operator sets the price of the top-up so that it receives the desired ARPU and in exchange provides close to unlimited voice call and text messages. Another strategy is a regulatory one to prevent customers using OTTs in the first place. Some countries have banned Skype, for example, to protect international voice revenues. A third strategy is to use OTTs to gain market share. In markets with entrenched incumbents and high mobile termination charges, zero rated Facebook and WhatsApp may sway users to switch to a smaller operator.

This paper analyses quarterly prices for prepaid user baskets across 44 African countries and introduces alternative approaches to user baskets in order to measure and compare top-up bundles. Prepaid voice, prepaid data and top-ups are analysed together with postpaid offerings to demonstrate the various strategies operators in Africa have adopted and uses case studies to highlight which strategies have successfully defended or increased their revenues.

Dominant operators and new entrants from South Africa, Kenya and Namibia will be analysed in more detail including key performance indicators as well as pricing strategies and response to OTTs.

Background

Research ICT Africa conducted nationally representative household surveys in 2012 in 12 African countries and identified a trend towards mobile Internet as either complementary to fixed Internet or as the primary or only form of Internet access (Stork et al, 2013). The Internet was first used on a mobile phone by half the Internet users in Nigeria, Namibia, Uganda, Tanzania and Ethiopia. In Namibia, Nigeria, Kenya, Uganda, Tanzania, and Ethiopia three fourths of Internet users used it on a mobile phone in 2012.

Table 1: Individual Internet use (RIA 2012 survey)										
	15+ that use the Internet			Where the Internet was first used		Where did you use the Internet in the last 12 months?				
	2008	2012	Diff.	Computer	Mobile phone	Mobile phone	Work	Place of education	Another persons home	Internet Cafe
South Africa	15%	33.7%	18.7%	65.1%	34.9%	**70.6%**	35.8%	20.9%	14.3%	32.4%
Botswana	5.8%	29%	23.2%	70.6%	29.4%	**64.1%**	51.1%	32.2%	43.7%	58.3%
Kenya	15%	26.3%	11.3%	68.9%	31.1%	**77.8%**	31.4%	38.8%	38.9%	72.4%
Nigeria		18.4%		45.2%	**54.8%**	**74.9%**	29.3%	19.6%	30.3%	45.1%
Namibia*	8.8%	16.2%	7.4%	50.1%	**49.9%**	**87.3%**	48.4%	36%	32.6%	22.5%
Cameroon	13%	14.1%	1.1%	82.1%	17.9%	29.7%	9.8%	20.1%	18.7%	80%
Ghana	5.6%	12.7%	7.1%	70.5%	29.5%	**61.2%**	34.6%	50.9%	34.5%	84.7%
Uganda	2.4%	7.9%	5.5%	28.2%	**71.8%**	**81.3%**	55%	51.2%	54%	74%
Rwanda	2%	6%	4%	70.8%	29.2%	**70.9%**	52.1%	30.7%	24.9%	50.2%
Tanzania	2.2%	3.5%	1.3%	45.8%	**54.2%**	**74.7%**	44.6%	24.4%	23.9%	62.8%
Ethiopia	0.7%	2.7%	2%	33.3%	**66.7%**	**80.9%**	17.4%	20.9%	3.5%	42.2%
* The surveys in Namibia were conducted in 2007 and 2011 respectively										

Since the surveys were conducted in 2012 the trend towards mobile broadband has accelerated due to faster mobile networks (4G rollout), more affordable and more capable smartphones and explosive increase in social media use. Social media in particular has driven Internet uptake with Facebook reaching the one billion daily users mark (Zuckerberg, 2015). VoIP services have also gained in popularity in their use with WhatsApp reaching the 1 billion user milestone (Whatsapp, 2016).

Mobile Internet is expensive for the poor at the same time as it is a cost saving tool. It is expensive when using the full Internet including media streaming. Using Over The Top (OTT) services instead of voice and text messages is more affordable for consumers. A voice call for many minutes may not use up a single MB of data. Also, thousands of text messages can be sent for a MB.

Prices in Africa do not yet reflect this. A voice minute or SMS frequently costs more than a MB of data when topping up using a data bundle. A MB data is of much more use for voice and texting when using for VoIP and instant messaging and other OTTs.

Table 2 displays the prices for a voice minute a SMS and 1 MB data (topped up) in US cents for selected African countries. Even plain SMS cost often a multiple of 1 MB data. This imbalance between value for an end user and actual cost will mean a strong push towards OTTs with the result that mobile operators will turn into mere Internet access providers charging flat fees for connectivity and leaving communication services to OTTs.

Table 2: Lowest average prices for a 1 minute voice call, 1 SMS and 1 MB data in US cents for Q1 2016							
	1 Mb out of bundle	1 SMS	1 Minute	1 Mb based on 1 GB top up	1 Mb Top up as % of 1 MB out of bundle	1 Mb Top up as % of 1 SMS	1 Mb Top up as % of 1 voice minute
Malawi	0.89	3.78	9.30	0.67	75%	18%	7%
Sudan	1.08	0.71	0.71	0.43	40%	61%	61%

Table 2: Lowest average prices for a 1 minute voice call, 1 SMS and 1 MB data in US cents for Q1 2016							
	1 Mb out of bundle	1 SMS	1 Minute	1 Mb based on 1 GB top up	1 Mb Top up as % of 1 MB out of bundle	1 Mb Top up as % of 1 SMS	1 Mb Top up as % of 1 voice minute
Ethiopia	1.76	1.76	3.37	0.96	55%	55%	28%
Tanzania	1.88	1.47	5.29	0.60	32%	41%	11%
Egypt	1.97	1.97	1.97	0.32	16%	16%	16%
South Africa	2.50	2.50	5.14	0.70	28%	28%	14%
Botswana	2.65	2.12	7.04	1.79	68%	84%	25%
Tunisia	2.74	1.37	1.70	0.50	18%	36%	29%
Cote d'Ivoire	3.81	3.81	8.95	0.82	22%	22%	9%
Kenya	5.65	1.13	3.01	0.50	9%	44%	17%
Namibia	7.76	3.02	12.50	0.55	7%	18%	4%
Mozambique	7.93	3.81	10.84	0.36	5%	9%	3%
D.R Congo	9.00	4.00	8.44	1.30	14%	33%	15%
Angola	9.01	9.01	20.03	1.86	21%	21%	9%
Lesotho	11.15	4.46	10.70	0.84	8%	19%	8%
Zambia	16.66	3.28	13.54	0.90	5%	27%	7%

Traditional voices and sms revenues are shrinking already while there is strong growth in data revenue across Africa. Figure 1 shows the revenue trends for four dominant operators in Kenya, South Africa and Namibia.

Data revenues as share of total revenues in each case is on the increase and passed 20% in Namibia and South Africa. Safaricom's data revenue as share of total revenue patly does not increase at the same speed due to a wider revenue base in the form of substantial MPESA revenues.

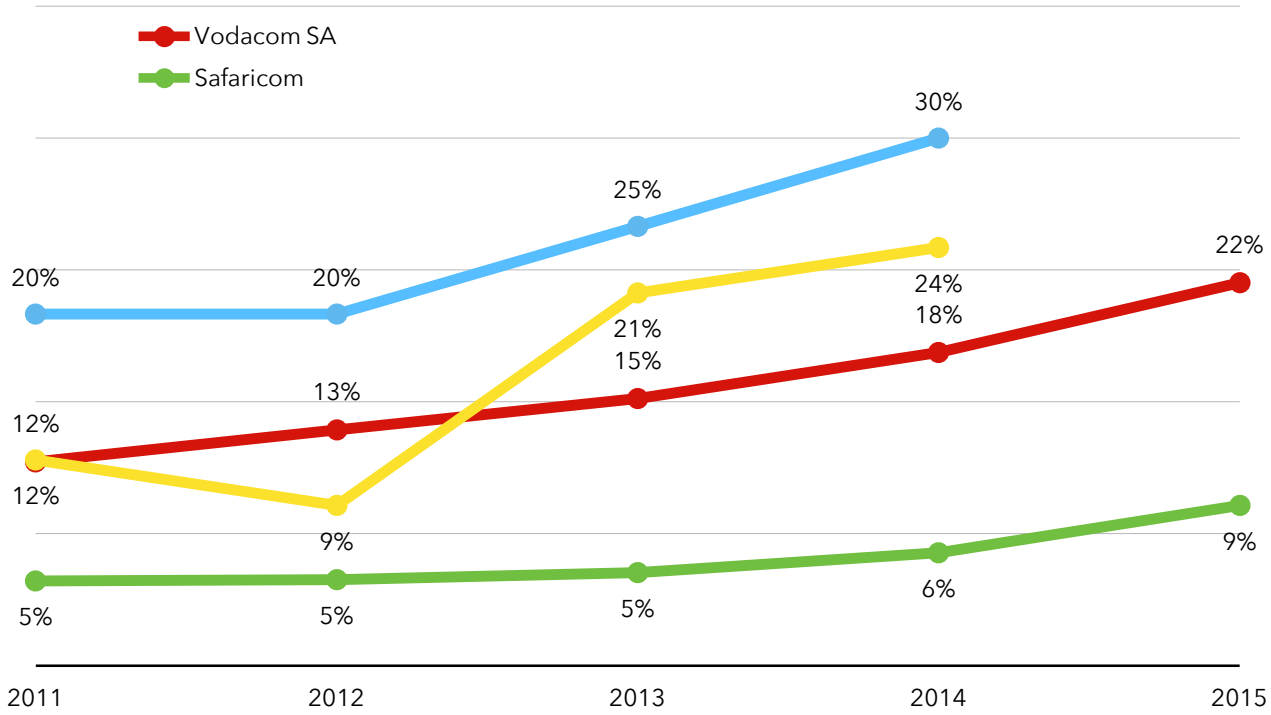


Figure 1: Data revenues as share of total revenues (MTC as share of service revenue)

Regulatory interventions such as cost based termination rates have impacted positively in driving down retail prices as in the case of South Africa, Kenya and Namibia (Stork & Chair, 2015) and consumers now expect continued declines in prices. Thus operators cannot resort to raising prepaid prices to increase voice and SMS revenues but have to find other ways to generate the Average Revenue Per User (APRU) to maintain or expand its network operation profitably. One such approach is bundling data, voice and SMS together as a product and include even dedicated social media (OTT) use.

Operator Responses to OTTs

OTTs present a threat to mobile network operator's (MNO) traditional sources of revenue - voice and SMS. As OTT services evolve from instant messaging to all forms of communication, some mobile operators feel increasingly threatened while others use it as an opportunity to gain market share.

Operators have responded by offering vertically bundled services; developing their own applications that compete directly with OTT services; blocking or throttling competitive services or applying a fair use policy that imposes data limits (RIA, 2015; Seixas, 2015).

An operator launching their own OTT application is probably the least successful strategy unless it is part of a data access only strategy. This approach has not yet been encountered in Africa. The other responses to OTTS are discussed in the following sections.

Blocking OTTs

In Europe, the initial response by mobile operators had been to block or throttle peer-to-peer traffic or VoIP (BEREC, 2012). The study found that blocking or throttling was a practice that occurred more in mobile network traffic than in fixed line networks. At least 21% of mobile Internet users in Europe has experience of some form of blocking or throttling of service (BEREC, 2012). Blocking, however, directly violates the idea of net neutrality, an open Internet accessible to all.

Consumers and regulators have scrutinised the practice of blocking, even if not on grounds of net neutrality. The European Commission in 2013 raided telecom operators on grounds of throttling concerns (Seixas, 2015). The commission conducted inspections of Deutsche Telekom, Orange and Telefonica over concerns they abused their dominant position in the market by throttling data heavy services such as Youtube and Skype (Fontanella-Khan). AT&T blocked mobile VoIP following the release of the iPhone but soon faced consumer and regulatory pressure and backed down, allowing users to make Skype calls using its mobile data network (Singel, 2009).

Regulating OTTs

Regulatory intervention has been sought to either to prevent customers using OTTs in the first place or to protect operators from market erosion. The regulation of OTT services has been argued from different perspectives including the net neutrality principle by open Internet activists as well as by regulators.

The regulatory agency in India banned zero rated services under the "Prohibition of discriminatory tariffs for data services regulations" (Vincent, 2016). The argument was based on the net neutrality principle arguing that there shall be no discriminatory pricing of data services which would limit what people could access. In Morocco, the operators blocked Voice over IP services - Viber, WhatsApp and Skype without subscribers knowledge (Southwood, 2016). The regulator supported this on the grounds of protecting revenue streams of operators and the need for public communication service providers to meet legal and regulatory obligations covering the sector and the terms of their licensing agreements (Southwood, 2016). While in Egypt, the zero rated OTT service Free Basics was banned without formal explanation by the regulator (Lelinwalla, 2016).

In South Africa, operators have been seeking regulatory intervention on the grounds of creating an equal play field and have argued that OTTs have no licence or tax obligations (Alfreds, 2016). Dominant operators (Vodacom and MTN) as well as the smallest operator in the market (Telkom Mobile) have been publicly campaigning for government to address the issue of OTT services (van Zyl, 2016). In a recent parliamentary discussion on whether there is a need to deal with OTTs, operators argued for the need for regulatory intervention on the grounds of national security, anonymity for consumers, lack of taxation of big corporates and investment within the country (Claasen, 2016; McCloud, 2016). Cell C has been the only operator to use and defend the presence of OTTs. Cell C offers a ZAR 5 WhatsApp bundle for the month for all its consumers as well as zero rated WhatsApp for those who are subscribed to its Trace mobile package (Cell C, 2015).

Embracing OTTs

A number of African operators have opted to use OTT services to increase or defend their market share. Operators that embrace OTTs offer it without charging for data services either by bundling

dedicated data for social media (MTC in Namibia) or by offering the Free Basics package from internet.org (Cell C in South Africa and Airtel in Kenya).[2]

OTTs provide a competitive opportunity through various mechanisms:

- In markets with entrenched incumbents and high mobile termination charges, zero rated or discounted Facebook and WhatsApp services may sway users to switch to a smaller operator. On-net / Off-net discrimination does not apply to OTT services and the size of the subscriber base doesn't provide a competitive advantage.[3]
- Dominant operators may embrace OTTs to defend their market share and discourage market entry. A new operator would need several years to break even while building a network. A new operator would have to build a business case around flat access pricing rather than traditional mobile business model in a market with wide spread OTT use.
- OTTs stimulate data use through social networks in exponential form. An operator may seek to boost its market share in data revenues rather then mobile subscribers as a niche strategy.

Operators in 21 African countries have partnered with Facebook to offer zero rated Free Basics on their platforms (Internet.org, 2016). Interestingly, in nine of the African countries it is being driven by Airtel despite despite the head of Airtel Africa calling for regulation of OTT services (www.itnewsafrica.com (b)). Malawi and the Democratic republic of Congo are the only countries in which the service is being offered by two operators.

Simulate OTTs through bundling

The third strategy in which operators have responded to OTT services is to bundle voice, SMS and data into packages that provides OTT like services. The number of SMS's included in the bundles is high enough to be unlimited for most users and thus resembles free OTT texting. MTC Namibia is offering these types of bundles for several years in an effort to defend market share and keep new competition out. MTC's aim for constant ARPU and competitive pressure leads not to lower ARPUs but to more bundled value. This strategy is simulating flat rate pricing for unlimited voice and SMS.

Operators in 24 African countries offered bundling voice, text and data together in 2015 (RIA, 2015). The operator sets the price of the top-up so that it receives the desired ARPU and in exchange provides close to unlimited voice call and text messages. In Namibia and South Africa dominant and smaller operators adopted bundling as part of their pricing strategies - MTN and Cell C in South Africa and MTC and TN Mobile in Namibia. In Kenya, it is only smaller operators Airtel and Orange that have adopted bundling as part of their pricing strategies. Safaricom has a very strong market position as well as the MPESA mobile money service to ward off competition.

For dominant or effective monopoly operators facing limited competition in their domestic markets, bundled packages provides a stable income stream and is a defensive strategy against OTT players.

Offering Non Telco OTT

Operators in Europe were also seen to partner with OTTs to enhance their product offering with the most popular being streaming music and videos (Seixas, 2015). Revenue stream arrangements are

[2] https://en.wikipedia.org/wiki/Internet.org
[3] Mobile network coverage still does.

negotiated with OTT streaming music services which help to differentiate their services while enabling increased uptake of the OTT service (Seixas, 2015). T-Mobile (US) partnered with iHeart radio and iTunes, Telefonica South America partnered with Napster based on an equity stake. In South Africa, Vodacom partnered with Deezer, a music streaming service, offering first two months free and then consumers pay ZAR59 for unlimited music access with online and offline listening options. MTN offered its own video streaming service - MTN Vu formerly known as MTN Front Row.[4] MTN customers on prepaid or contract SIM on a supported device receive free streaming data when using Max Vu and subscribers cannot use free data for any other service such as Facebook. Offering of Video on Demand (VoD) services shows MTN seeking to diversify its products offering while tapping into the growing video streaming market that moves away from traditional satellite broadcasters. MTN offered the service as "part of…strategic intent of offering distinct customer experience and enhancing…current VOD services" (McLeod, 2015).

Offering own OTT

An operator could develop a own OTT service. Deutsche Telekom offers a WhatsApp alternative with its immmr service.[5] Such a strategy would facilitate the transition to a flat rate access model.

Price Analysis

Due to the wider use of OTTs and other platforms entering the competition space products are designed differently to adjust to consumer demands. One such change is to focus on competing with bundled top-ups.

Bundled top-ups are being used by new entrants and dominant operators to increase market share, retain customers or to defend against losing revenues to OTTs. Bundles exist in various forms combining voice, SMS and data in varies denominations and validity periods.

Research ICT Africa used OECD (OECD, 2010) user baskets to track mobile prices across Africa since 2011. The basket methodology sets rules for use of calls and text messages (SMS) across networks (on-net, off-net and fixed-lines) and times (peak, off-peak, weekends). The distribution across time and call distribution as well as call duration is somewhat arbitrary. The OECD baskets are outdated for several reasons:

- In an OTT environment off-net and on-net and also peak and off-peak no longer plays a role since calls and SMS are free.
- The OECD baskets do not take mobile data into account.
- The basket approach cannot accommodate bundles, top up products and promotions

We developed two measurement tools to complement the OECD basket that allows comparisons between bundled top-ups and mobile broadband: the Bundled Value Index (BVI) and the 1 GB Data Basket. The BVI captures the value of bundles that combine data, SMS and voice as a top-up package. The 1GB Data Basket is the value of 1GB of prepaid mobile broadband data based on top ups. These measures do not replace the OECD basket but rather complement it and provide unique insight into

[4] (www.mtnfrontrow.discoverdigital.co.za)
[5] http://www.telekom.com/medien/konzern/302092

the transition towards new business models - especially as the transition means that business models will incorporate varying degrees of the old and new approaches.

OECD 30 calls and 100 SMS Prepaid Basket

The OECD user basket is used to track mobile prices across Africa. In Figure 3, the lowest price of a 30 call and 100 SMS basket is provided for each country. The three countries that are the subject of the case studies - Kenya, Namibia and South Africa - are 4, 21 and 13th place respectively.

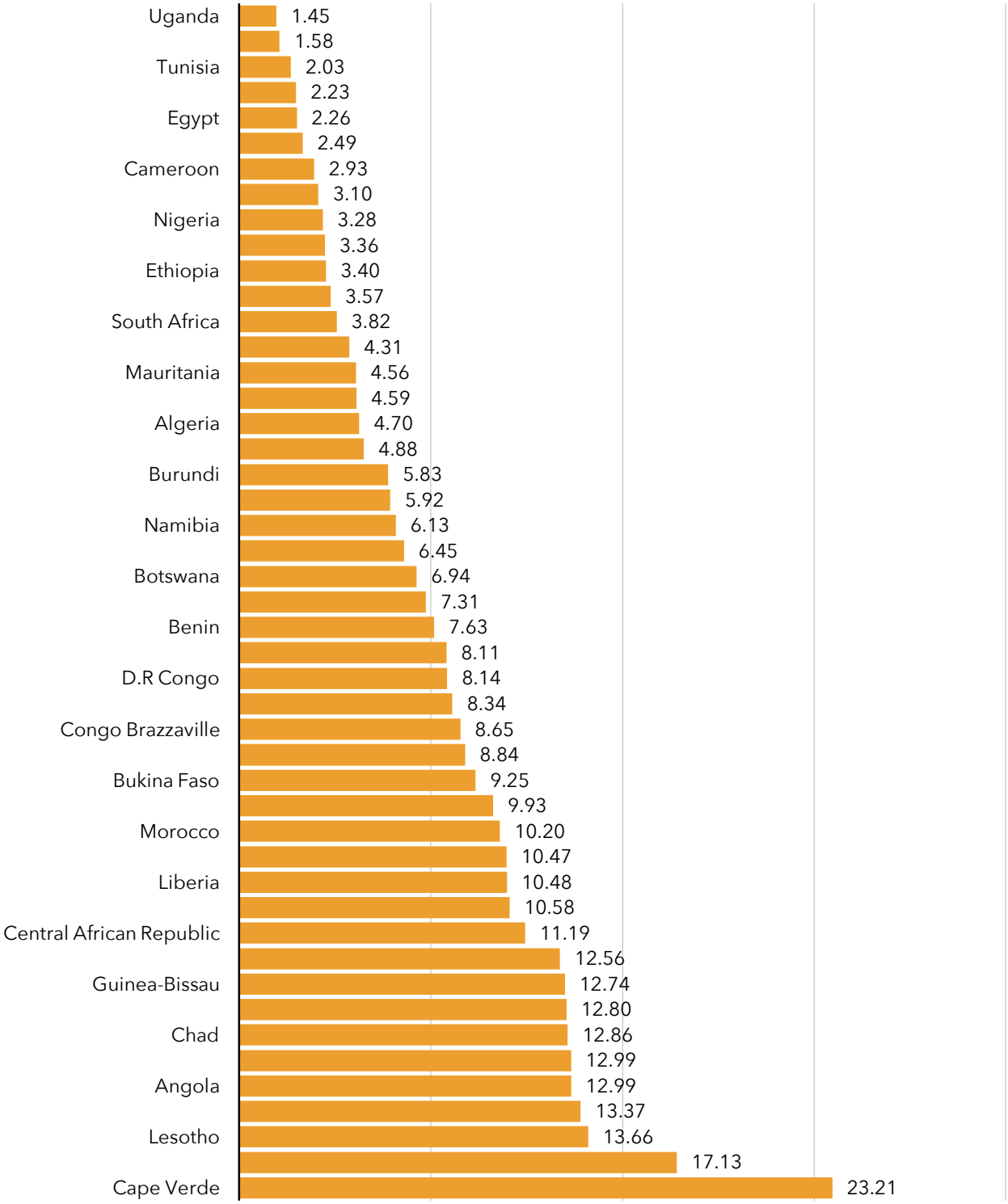


Figure 3: Lowest cost in USD for OECD 30 call and 100 SMS basket, Q1 2016

A simple example illustrates the shortcomings of the OECD user basket approach: In Namibia, the cheapest product is Aweh Gig and it offers not only the 100 SMS and 30 calls that make up the OECD user basket but an additional 2800 SMS, 400 minutes and 4 GB data. The Aweh Gig top-up qualifies for the OECD user basket but offers so much more that is not captured and therefore the need for a new methodology to capture the value of these sorts of top-ups.

Bundled Value Index (BVI)

The Bundled Value Index (BVI) captures the value of bundles that combine data, SMS and voice as a top-up package. It does not make any assumptions about the average usage pattern as user baskets do. It simply expresses what a consumer gets in terms what the consumer has to pay. The BVI complements the basket approach allowing a different view on affordability and allows comparison between top-up bundles across any validity.

The BVI adds the value of bundled voice minutes, SMSs and data and divides it by the price. The value of bundled minutes is derived by multiplying the number of minutes with a fixed USD value inclusive of tax. The BMI is constructed from the perspective of a smartphone / OTT user. One MB of data is more valuable than 1 minute voice call or a single SMS. One minute is valued at 0.2 US cents, 1 SMS at 0.1 US cent, and 1 MB data at 1 US cents and 1 MB dedicated to Social Media at 0.5 US cents. An offering with 50 minutes, 500 SMSs and 1000MB data bundled, with a price of 10 US$ will then have the following BVI:

BVI =(50*0.002+500*0.001+1000*0.01)/10 = 1.06

This means that the consumer gets 1.06 times the value of the bundle offering. The higher the score in the index, the higher the value. We used the same USD values across all operators and countries for comparative purposes. Unlimited calls, SMSs or data contracts were made comparable to capped packages by applying the following rules:

- Unlimited minutes = 240 minutes per day or 7200 minutes per month
- Uncapped SMS = 240 SMSs a day or 7200 per month.
- Uncapped data = the smaller value out of the fair terms of use policy limit and 30 GB.

Figure 4 displays the BVI for Africa countries with operators that offered bundles including voice, SMS and data. Below some observations from this data:

- Operators in Ghana are at the bottom of this list since their bundles only include very low data amounts (20MB e.g.).
- MTN Cameroon bundles 200 MB regular data with 30 days of free browsing on Google, Facebook, Twitter, and WhatsApp and unlimited SMS. The 30 days free OTTs were translated as 2 GB of data use.
- The product with the highest BVI is Telecom Namibia's Jiva Plus. N$30 (US$ 2.1) per week gives the user 1.3 GB data, 500 MB social media data, 100 minutes of airtime and 700 SMS.
- The second highest BVI is a very different type of top-up. Uganda Telecom offers a daily top-up with 100 MB data and 20 SMS for a very low price of 500 Uganda Shilling, which is about US cents 14.3.
- The most expensive top-up is from MTN South Africa and costs US$ 120.5 for 12,000 SMS and 4500 minutes and 1 GB data.

- The cheapest top-up is from Orange Kenya and costs US cents 10 and offers nearly twice the value of the most expensive product from MTN South Africa (BVI of 1.92 compared to 1.1). It is a daily top-up that includes free on-net calls and SMS, 20 off-net SMS and 10 MB data.

The BVI compares the value that a user gets for the money he or she pays independent of validity or type of top-up. Case studies of OTT bundles in Namibia, Kenya and South Africa provide more insight into the pricing strategies of operators.

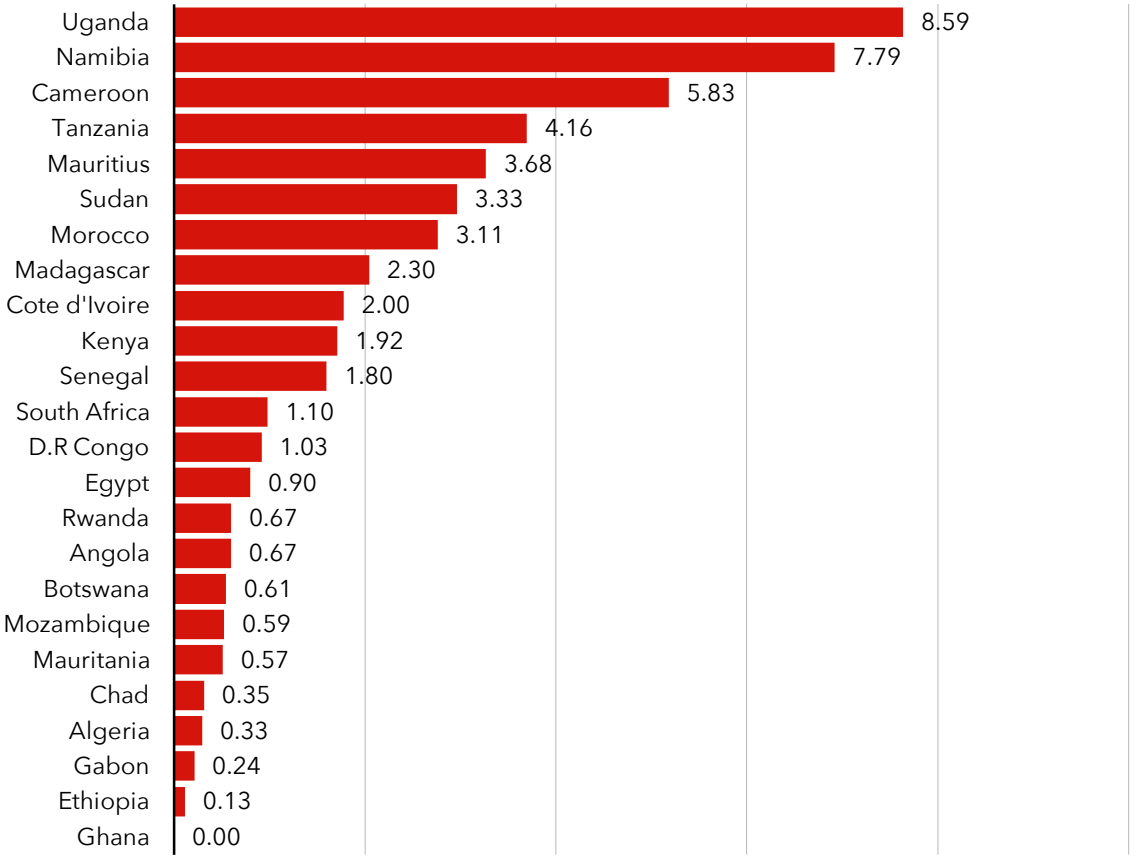


Figure 4: Highest BVI per country for prepaid Top up product, Q1 2016

Mobile Broadband 1GB basket

As Figure 2 showed, data represents an increasing percentage of overall revenues. Mobile data is also the basis for OTT services: subscribers usually have a data package to make use of OTT services such as Skype or WhatsApp. In order to compare data packages between operators and countries, the prices of 1GB prepaid data was collected.

The price of 1GB data was based on prepaid data top-ups or bundled top-ups. The out of bundle prices of regular prepaid packages can be an order of magnitude more expensive compared to the top-up prices.

An alternative approach is to capture data prices for 1MB of data (instead of 1GB of data) by dividing the price of top-ups of different nomination by the nomination. 1 GB at US$10 would then result in a MB price of 10/1000= US$0.01. However, the validity of the data package impacts on the price: the shorter the validity period, such as 1 day, the lower the data volume and the higher the per MB price.

The longer the validity period, such as 30 days, the higher the data volume and the lower the per MB price. Prices for 1MB of data have a bias towards short validities and purchasing multiple top-ups which may not be a fair representation of user preferences.

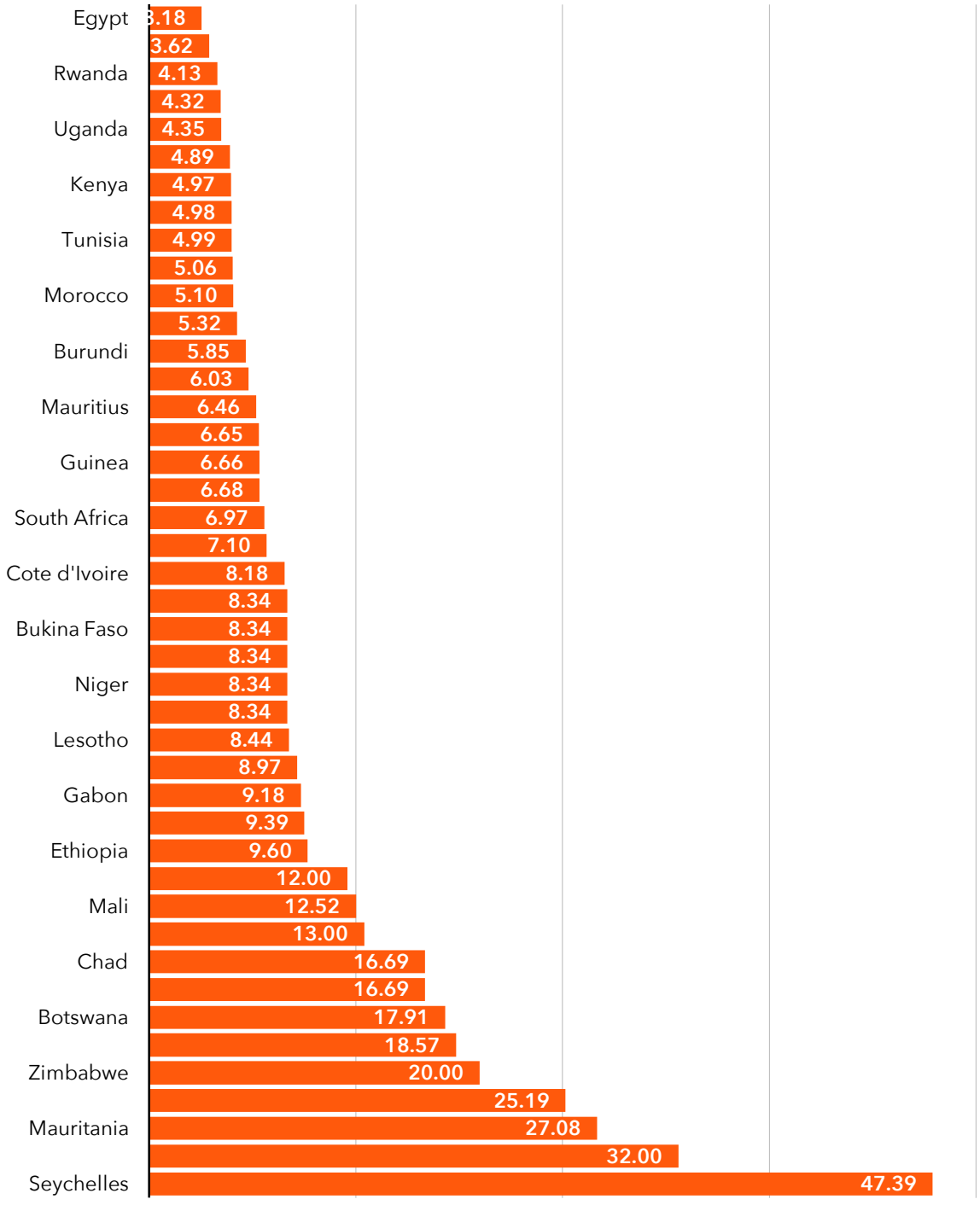


Figure 5: Lowest prepaid data top up for 1 GB per month, Q1 2016

Data packages enable a user to bypass SMS or mobile voice calls altogether, and users are likely to choose higher volume data packages that are valid for longer periods. As a result, we chose data packages that were valid for at least a month and for at least 1GB - in those instances where an

operator didn't provide data packages for a month, data packages with shorter validities were combined to reach a month's validity. Figure 4 shows the cheapest 1GB data package available in a country in Africa in USD for the first quarter of 2016.

In the Bundled Value Index, RIA tracks the data included as part of a bundled top-up. Of the 43 countries, a 1GB prepaid data package is generally cheaper than the data that is part of a bundled top-up (i.e. including data and SMS or data and voice). But in Uganda, Namibia and Madagascar, bundle top-ups were cheaper than data top-ups. This means that it's cheaper to buy top-up including SMS and voice minutes along with data rather than just a 1GB prepaid data package. For example, in Madagascar, the Kozy Kozy product from Airtel Madagascar gives 45 SMS and 50 MB of data for USD 0.24 and is valid for one day. Multiplying by 30 to get 1 month validity, provides the consumer with 1,5 GB of data and 1,350 SMS per month for a price of USD 7.2. The cheapest 1GB data package in Madagascar is USD 7.9 and doesn't offer any SMS.

The case in Namibia is more extreme. The Aweh Gig top up is valid for 7 days and includes 100 minutes, 700 SMS and 1 GB of data for 30N$. Multiplying by 4 to get 1 month's validity, provides 400 minutes, 2800 SMS and 4 GB of data for N$120 compared to 800 MB top up for N$129 or a 1.5GB for N$219. The Aweh Gig bundle offers more data and additionally vertically unlimited SMS and 400 minutes for the same price.

Summary

In the case studies that follow, we explain how flat rate pricing is the most successful strategy to retain revenues and how zero rated OTTs have been used to gain market share for new entrants using the three measurement tools explained in the previous sections: the Bundled Value Index, the Mobile Broadband 1GB basket and the OECD user basket.

Case Study - Kenya

The Kenyan market is currently made up of one dominant operator - Safaricom - and two smaller operators, Airtel and Orange Kenya. Kenya also has a mobile virtual network operator (MVNO) named Equitel. Airtel and Orange are the two smaller operators in Kenya. The fourth entrant, Essar Telecom (Yu) exited the market in 2014 through an acquisition split between Airtel and Safaricom. Despite the exit of Essar (Yu) total mobile subscriptions on the market increased for the year ending 2014 to 33.6 million subscribers. By September 2015 the market was still growing and had increased to 36.1 million subscribers (7.4% growth over the previous three quarters). Of this larger market Airtel holds 19% (7 million subscribers) and Orange holds 11% (4 million subscribers) and Safaricom has a market share of 67% (24 million subscribers).

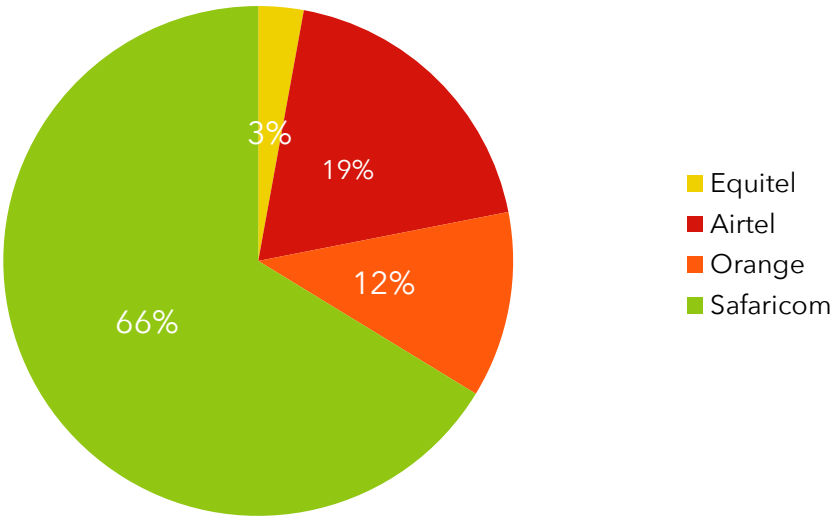


Figure 6: Market share by subscribers September 2015 (Source: CAK, 2015)

Analysing market share by voice traffic, which is a more robust measure of actual activity, Figure 7 shows that Airtel has 16% of the voice market, Orange has 8% of the market and Safaricom has 76%.

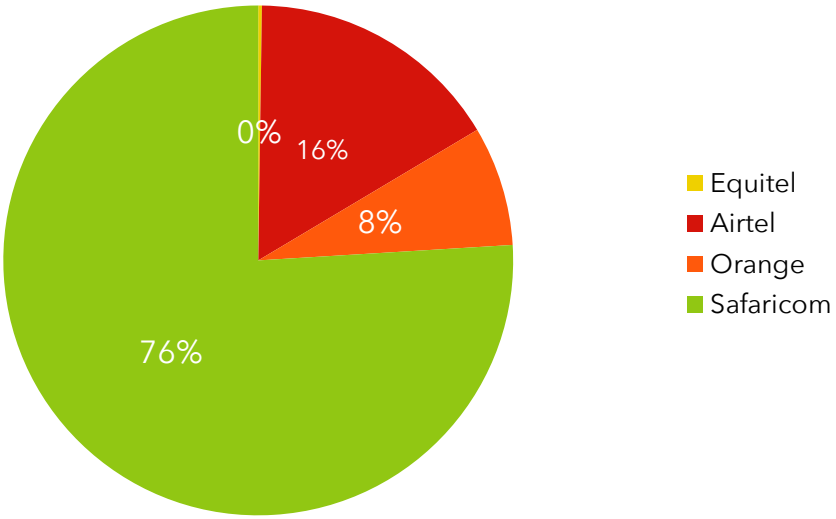


Figure 7: Market share by voice traffic July to September 2015 (Source: CAK, 2015)

Safaricom has long been the market leader in Kenya with an average market share of 66% as measured by subscribers and 76% as measured by voice traffic over the last five financial years.

Safari com is in a unique situation in that it has growing revenues from a non telco service, i.e. Mpesa. Mpesa makes up about 20% of Safaricom's total revenue in the financial year ending in 2015, while data only accounted for 9%. Surprisingly Safricom also managed to grow its voice revenue over time and even SMS revenues increased each year since 2011.

Table 2: Safaricom 5 YEAR PERFORMANCE SUMMARY in billion Kshs (source: Safaricom, 2016)					
	FY11	FY12	FY13	FY14	FY15
Voice service revenue	63.5	68.12	75.84	84.32	87.41
M-Pesa revenue	11.78	16.87	21.84	26.56	32.63
Mobile data revenue	4.54	5.22	6.62	9.31	14.82
Fixed service revenue	0.84	1.37	2.11	2.57	3.13
SMS revenue	7.54	7.77	10.15	13.62	15.63
Other service Revenue		0.84	1.49	1.98	2.63
Service revenue	88.2	100.19	118.05	138.36	156.25
Handset revenue	5.75	5.94	4.93	4.95	5.67
Connection and other revenue	0.88	0.87	1.31	1.36	1.45
Total revenue	94.83	107	124.29	144.67	163.37
M-Pesa revenue as share of total	12.4%	15.8%	17.6%	18.4%	20.0%
Mobile data revenue as share of total	4.8%	4.9%	5.3%	6.4%	9.1%

Safari com may thus not be too concerned about OTTs since the market is still expanding and Safaricom can wait until its voice revenues start to decrease before and makes strategic changes.

OECD user basket

The OECD basket ranks all the prepaid products based on 30 calls and 100 SMS's. Both Orange and Airtel offer cheaper basket prices than Safaricom. Safaricom's prepaid product is in the middle of the pack and scores USD 2.9. Orange Kenya offers a prepaid product for USD 2.2 and Airtel Kenya offers a prepaid product for USD 2.5. But with 66% market share, Safaricom doesn't need to offer significantly cheaper products than the competitors because most calls will be on-net.

Table 3: OECD 30 calls 100 SMS basket values in Kenya		
Operator	Product	Basket USD
Orange Kenya	Tujuane tariff	2.2
Airtel Kenya	Tosha Montly	2.5
Airtel Kenya	Tosha Weekly	2.6
Airtel Kenya	Freelanga Free tariff	2.7
Airtel Kenya	KLUB 254	2.8
Safaricom	Uwezo	2.9
Orange Kenya	Holla	3.0

Table 3: OECD 30 calls 100 SMS basket values in Kenya		
Operator	**Product**	**Basket USD**
Airtel Kenya	Tosha Daily	3.0
Airtel Kenya	Vuka	3.0
Airtel Kenya	Yu Jichanue na MOSMOS	3.2
Orange Kenya	Usinyamaze	3.4
Airtel Kenya	Ongea Mob Jioni Pack Yu	4.6
Airtel Kenya	Freedom Ten (Yu)	5.1

The OECD user basket doesn't provide much insight into the various strategies of operators in Kenya. The difference between the cheapest basket and Safaricom is not large enough to differentiate operators enough to draw large numbers of new subscribers or to convert existing ones.

1GB data basket

The three major operators in Kenya offer a 1GB basket for the price of Ksh. 500. There is no differentiation based on data prices.

BVI

In Kenya, the dominant operator, Safaricom, does not offer bundles that combines data with voice and SMS. With its market share of subscribers at 66% (Figure 6), it can afford not to. All of the bundle packages from Orange Kenya and Airtel Kenya offer more on-net than off-net minutes. Airtel's Amua plan has the best value in the market - offering unlimited on-net calls, unlimited on-net sms and 300MB of data at a cost of USD 3 (assuming 1 month validity) and a BVI score of 1.9.

Table 4: Bundled Value Index		Cost Ksh	Validity	Free Minutes	Free SMS	Free MB	Social Media MB	FX USD Q2 2015	BVI
Airtel	Daily Tosha 100	29.8	Day	450	15000	3000	0	100.7	1.6
	Weekly Tosha 100	27.8	Week	420	14000	2800	0	100.7	1.6
	Monthly Tosha 100	29.8	Month	450	15000	3000	0	100.7	1.6
	Amua plan (Yu product)	3.0	Day	0	600	300	0	100.7	1.9
Orange	Holla	4.5	Day	0	0	300	0	100.7	1.8

The Amua Plan from Airtel and the Holla plan from Orange offer significant value to the subscriber. However, the value offered is considerably lower than in other countries, such as Namibia or Uganda. While Airtel and Orange are testing the waters with products such as the Amua Plan, there is still significant upside, as the case study on Namibia will show.

Summary

What is driving Safaricom's increasing revenues is not data but the competitive advantage its mobile money platform MPESA offers. MPESA's revenue nearly tripled between 2011 and 2015. Safaricom thus does not need to engage in price bundling strategies or behave defensively towards OTTs or

offer voice and SMS prices that are cheapest in the market. Safaricom's market share and financial position is so secure, with 76% of the voice market, 66% of total subscribers that Safaricom can afford to *not* be antagonistic towards OTTs.

In order to attract subscribers, Airtel and Orange need to differentiate themselves. Basic data products are insufficient because pricing for 1GB of data is the same between all three operators. Top-Up products offering unlimited on-net SMS or voice is one way to differentiate the smaller operators from Safaricom.

Case Study - South Africa

Vodacom and MTN are the two dominant operators in South Africa. Vodacom and MTN have a market share of 39% and 32% respectively. Cell C is gaining subscribers and market share. Telkom Mobile is struggling and has 3% of the market. MTN and Vodacom have consistently increased their subscriber numbers, though their growth has slowed in comparison to Cell C. Overall, the South African mobile market continues to expand.

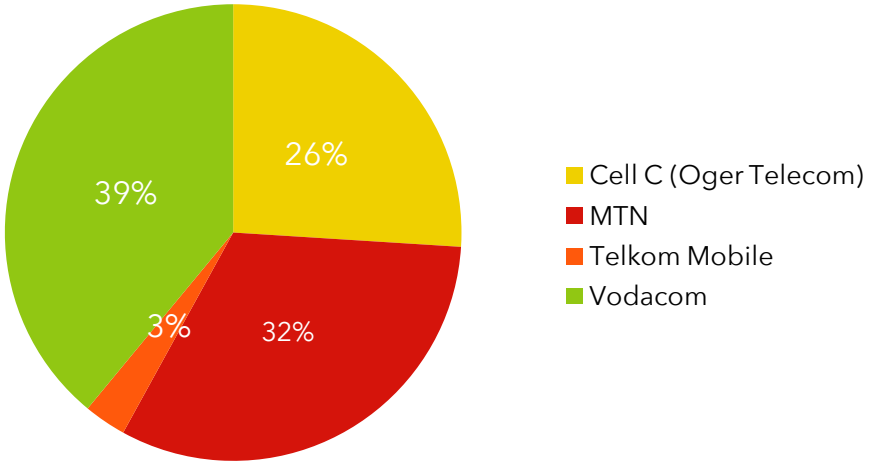


Figure 8: Market share by subscriber numbers in South Africa, 2014 (Source: Brookhurst, 2015)

Both operators are facing increasing growth rates in data revenue as users increasingly take up mobile broadband services. For FY 2015 MTN's data contributed 23.8% to its overall revenue, while Vodacom's data revenue increased to 21.8% (see Figure 2).

With the substitution away from voice and towards OTT, and the increase in number of active SIM cards the ARPUs of Vodacom and MTN have been decreasing since 2012 (Figure 11). This despite the fact that both operators *increased* postpaid prices for all postpaid contracts mid-contract at the beginning of 2015.

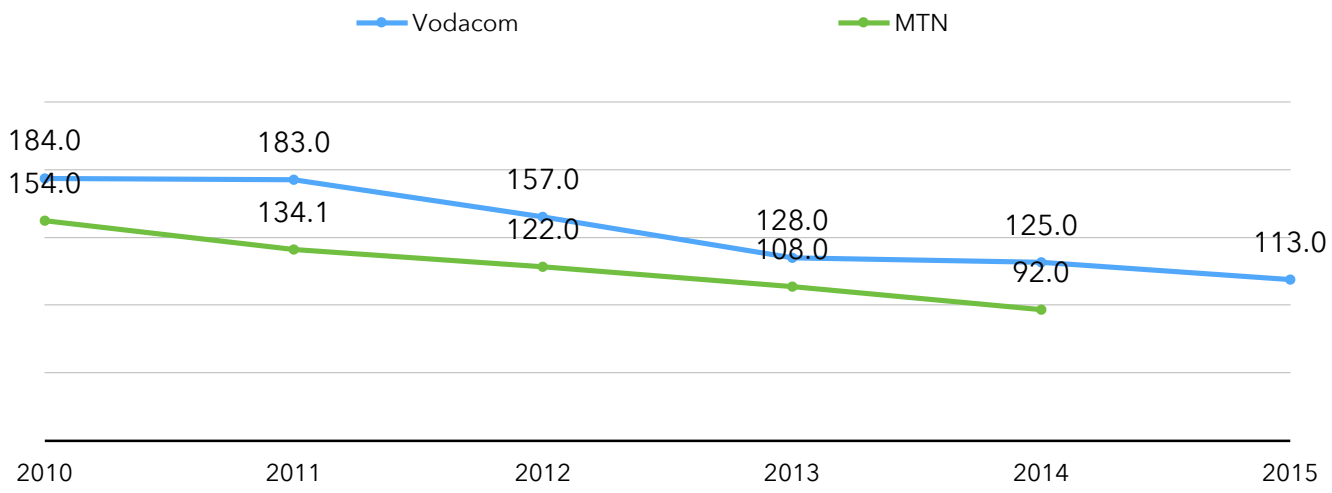


Figure 9: ARPU for Vodacom and MTN (Source: MTN 2015, Vodacom 2015)

The increase in data revenue and the growth thereof, implies that the decrease in blended ARPU is attributable to (1) falling voice revenues and (2) an increase in the number of SIM cards.

Table 5: Revenues in R(m)		2013	2014	2015
Vodacom	Mobile voice	29,151	28,135	25,855
	Mobile messaging	3,027	2,675	2,522
	Mobile Data	8,882	10,974	13,538
MTN	Mobile voice	22,125	19,677	
	Mobile messaging	2,365	2,069	
	Mobile Data	8,656	9,264	

OECD user basket

The OECD user basket shows that Telkom Mobile is the cheapest operator in South Africa. The cost of the OECD user basket is USD 3.8 and the nearest competitor is Cell C at USD 5.9. MTN and Vodacom are close behind with products that costs USD 6.3.

Table 6: OECD basket value		
Operator	**Product**	**OECD USD**
Vodacom South Africa	Prepaid Anytime	15.9
Vodacom South Africa	Prepaid Standard	15.9
MTN South Africa	MTN Muziq	14.0
MTN South Africa	MTN Zone Per Second	11.4
Vodacom South Africa	Vodacom 4 less	11.4
Telkom Mobile	Talk more	10.3
Cell C	Easychat standard	8.8
Cell C	trace mobile	8.8
Vodacom South Africa	Power Bonus	8.8

Table 6: OECD basket value		
Operator	**Product**	**OECD USD**
Vodacom South Africa	Daily Free Calls	8.8
Vodacom South Africa	Anytime Per Second	7.8
MTN South Africa	MTN Talk free	7.1
Cell C	99c for real	7.0
Virgin Mobile	Prepaid	7.0
Virgin Mobile	1 2 FREE!	7.0
MTN South Africa	MTN Pay Per Second	6.3
Vodacom South Africa	Vodacom Prepaid 79c	6.3
Cell C	66c	5.9
Telkom Mobile	Sim-SONKE	3.8

Telkom Mobile is the cheapest but its market share is too small to represent a serious threat to the other three operators. Cell C undercuts both Vodacom and MTN, but the difference is small and doesn't provide any insight into Cell C's strategy to differentiate itself and attract new subscribers or existing MTN and Vodacom subscribers.

1GB data basket

Telkom mobile is attempting to attract data subscribers by offering a 1GB package for USD 7. The next cheapest package is from Cell C and Vodacom for USD 10.5. Vodacom is matching Cell C's price - Telkom Mobile is too small to have an impact on Vodacom's subscriber numbers. MTNs pricing is higher than Vodacom's, so a pure data play is not its strategic focus.

Table 7: 1GB basket value	Q1 2016
Cell C	10.5
MTN South Africa	11.3
Telkom Mobile	7.0
Vodacom South Africa	10.5
Virgin Mobile	12.3

Like the OECD basket, the 1GB data basket shows that the operators are competing at roughly the same level - pricing is very similar. To get insight into how the operators are differentiating themselves, we turn to the BVI.

BVI

Like Kenya, the dominant operator in South Africa, Vodacom, does not offer bundles. MTN is the second largest operator and offers 10 types of bundles. The bundle with the best score on the BVI is MTN's Sky UnlimitedUncapped product. This product offers unlimited voice and text (off and on-net) and 10 GB of data for USD 112.5. This is an effective strategy against OTTs because unlimited calls, data and SMS means that there is no real benefit to consumers to use OTTs.

Cell C offers only one bundled product, infinity. This product offers unlimited voice calls, 1000 SMS's and 1GB of data for USD 70 per month.

Table 8: Bundled Value Index		Cost (ZAR)	Validity	Free Minutes	Free SMS	Free MB	Social Media MB	FX USD Q4 2015	BVI
Cell C	infinity	70.3	Month	7,200	1,000	1,024	0	14.2	0.36
MTN	MTN Sky Daily	166.7	Day	4,500	12,000	600	0	14.2	0.20
	MTN-to-MTN Sky Daily	52.8	Day	0	0	300	0	14.2	0.20
	MTN Sky Super 1GB	70.3	Month	3,000	12,000	1,000	0	14.2	0.40
	MTN Sky Absolute 2GB	140.4	Week	600	1,600	8,000	0	14.2	0.50
	MTN Sky Super Uncapped	1897.5	Day	67,500	84,000	90,000	0	14.2	0.50
	Boosta 39	16.5	Other	0	600	1,200	0	14.2	0.70
	Boosta 189	26.6	Other	0	1,000	2,000	0	14.2	0.70
	Boosta 339	23.9	Month	0	700	2,000	0	14.2	0.80
	Boosta 79	16.7	Other	0	600	1,500	0	14.2	0.90
	MTN Sky unlimitedUncapped	112.5	Month	4,500	12,000	10,000	0	14.2	1.00

MTN clearly sees OTTs as an existential threat and is hoping to counter it by offering attractive top-up bundles. Vodacom and MTN South Africa have vehemently opposed OTT players in the mobile broadband market. This opposition arose with the prominence of Facebook mobile and WhatsApp.

Summary

Like Safaricom, both Vodacom and MTN are market leaders, have healthy EBITDA's and have increased investment substantially over the last six financial years. However, unlike Safaricom, MTN and Vodacom are openly opposed to OTT services and believe they should be regulated as opposed to innovating around it. MTN wishes to regulate WhatsApp yet offers other non telco OTT services such as its online television viewing platform MTN Vu, similar to Safaricom, while Vodacom offers Deezer (an online radio service).

Cell C has gained market share significantly over the last 5 years, moving to its present position of 26% of subscribers. However, as the Namibian case study will show, there is significant scope to increase its market share by offering a top-up bundle that more closely matches MTN's Sky UnlimitedUncapped product, with unlimited voice, SMS and 10GB of data.

Case Study - Namibia

MTC Namibia is the market leader, but contrary to Vodacom (S.A) and MTN's (S.A) oppositional stance to OTT, or Safaricom's laissez faire approach, MTC has embraced OTT's. MTC's financial performance shows that dominant operators can benefit from OTT developments and the migration from mobile voice to mobile broadband.

The product with the highest BVI is Telecom Namibia's Jiva Plus. NS30 (US$ 2.1) per week gives the user 1.3 GB data, 500 MB social media data, 100 minutes and 700 SMS. MTC's highest BVI is a top up product with 7 days validity. 1GB of data, 510 MB social media data, 100 minutes and 700 SMS cost N$30. For a month this means 4 GB of data, 2.2 GB of social media data, 2800 SMS and 400 any time any network minutes for N$ 120 (US$ 7.6). The MTC product has been in the market for over a year and TN Mobile copied it initially with its Jiva product. The promotion that it is currently running with Jiva plus tops the value for the customer compared to MTC's Aweh Gig by providing more data. Table 8 lists the top up products for MTC and Telecom Namibia and calculates the BVI for each.

MTC has a major advantage in offering top up bundles that Telecom Namibia cannot match due to its dominance. Above 99% market share of outgoing calls means that termination rate payments to Telecom Namibia are insignificant. MTC can thus pursue a strategy of constant ARPUs. A sequence of four Aweh Gig or Aweh Prime top-ups would give MTC N$ 120 revenue (excluding VAT). If used by all prepaid subscribers of MTC it would yield N$ 3.5 billion a year for prepaid only. It's current total revenue is N$2 billion in total.

Table 9: Bundled Value Index		Cost N$	Validity	Free Minutes	Free SMS	Free MB	Social Media MB	FX USD Q2 2015	BVI
MTC	Aweh Super	50	7 Days	700	1500	350	710	14.2	**3.8**
	Aweh Prime	30	7 Days	350	700	200	210	14.2	**2.6**
	Aweh Gig	30	7 Days	100	700	1000	510	14.2	**7.6**
	Aweh Go	12	7 Days	50	150	50	60	14.2	**1.6**
TN Mobile	TN Mobile 20	19	7 Days	20	20	20	0	14.2	**0.2**
	TN Mobile 50	49	30 Days	50	50	50	0	14.2	**0.2**
	Business Lite	149	30 Days	150	150	150	0	14.2	**0.2**
	Jlva	30	7 Days	100	700	1000	0	14.2	**5.2**
	Jiva Plus	30	7 Days	100	700	1300	500	14.2	**9.0**
	Jiva Surf	40	7 Days	150	1000	1300	500	14.2	**6.9**

While not all prepaid subscribers can afford to spend N$ 120 a month, this strategy also has the benefit of competing effectively with Over The Top (OTT) services such as Facebook, WhatsApp, Skype, Viper, Talkray, FaceTime etc. The vast number of bundled SMS and minutes means that using OTTs for domestic communication does not bring any cost benefit to consumers. The top up strategy of MTC can be seen as a transition to flat rate prices seen in Europe and the US for the postpaid market, but in the case of Namibia for prepaid.

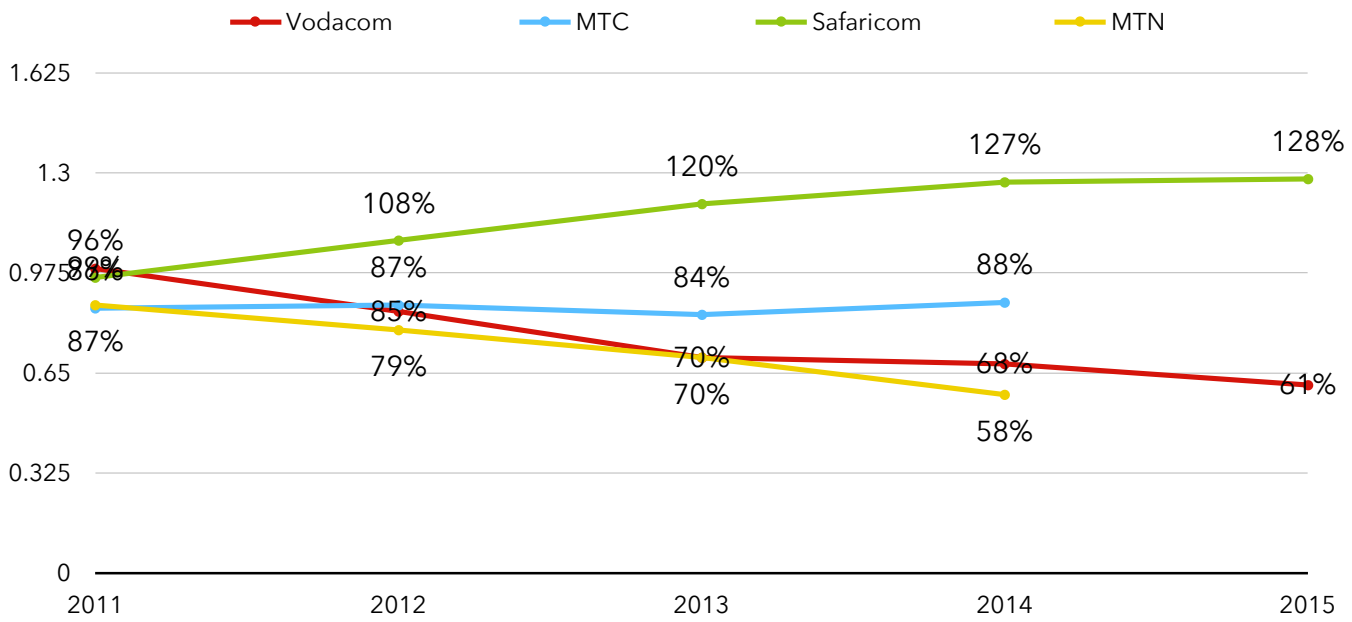
Conclusion

The paper shows that embracing OTTs and providing prepaid products that resemble flat rate pricing is the most successful strategy to retain revenues. The paper also shows how zero rated OTTs can be used to gain market share for new entrants.

In all three countries - Kenya, Namibia and South Africa - mobile penetration has increased, driven mainly by lower prepaid prices. But the increased mobile penetration has come at a cost for some operators: As migration from voice to internet takes place, and markets expand with increases in lower income users joining networks, all main operators bar Safaricom have experienced declining voice revenues. The extent of this decline has been more visible for South African operators Vodacom and MTN, who have historically had a strong postpaid base pushing up average revenues. With the entrance of Cell C (the third market entrant) competition increased along with a concomitant increase in mobile penetration. Decreases in mobile termination rates and subsequently voice call prices, increases in postpaid rates in 2015 and a slow move towards data and OTT have had an impact on overall revenues.

The exception to this trend has been Safaricom in Kenya. As this paper has shown, MPESA contributes 20% of revenues for Safaricom. Its dominant position in the financial services market (via MPESA) means that churn is low and it is able to watch the impact of OTTs and top-up bundling in other markets first.

Figure 10: Change in Blended ARPU (Base year 2010) - Financial Years 2011-2015



It is Namibia that is showing how the trend towards lower voice and SMS and higher data usage is an opportunity. In the case of MTC, its blended ARPUs are the lowest out of all operators but its strategy of bundling data, SMS and voice means that its ARPU has been nearly flat for the last 4 years and its revenue has flattened in the last three years. MTCs strategy means that it gets a consistent return on its investment. In contrast, Vodacom and MTN are seeing a declining return on investment as voice and SMS revenues decline. MTC's strategy means that it is ranked second on the BVI, compared to Kenya (ranked 10th) and South Africa (ranked 12th). Table 8 provides a brief summary of the rankings for each country based on the BVI, 1GB data package and the OECD user basket.

Table 9: Comparison between dominant operators		Kenya	South Africa	Namibia
Number of Mobile operators		3	4	2
Marketshare of dominant operator in terms of active SIM		67%	MTN 33% Vodacom 42%	96%
Marketshare of dominant operator in terms of traffic		76%	NA	99%
Cheapest OECD Basket	USD	2.23	3.82	6.12
	Ranking	4	13	21
Cheapest 1 GB	USD	4.97	6.97	5.3
	Ranking	7	19	12
Highest Bundled Top up	BVI	1.92	1.1	7.79
	Ranking	10	12	2
Share of Data Revenue of total for dominant operator FY 2014		6.4%	23.8%	30%

The approach of benchmarking voice and SMS in order to compare countries (as in the OECD user basket) fails to explain how dynamic and innovative the mobile sector is. New strategies to retain revenues and shore up subscribers are continually being tested. The BVI is a critical tool in evaluating operator strategies. The combination of the OECD user basket, the 1GB data basket and the BVI provides insight into which strategies are working and which need to be tested more thoroughly as well as the potential opportunities for smaller operators such as Airtel and Orange in Kenya and CellC in South Africa.

References

- Alfreds, D. (2016). AS IT HAPPENED: Parliament holds meeting on WhatsApp regulation. http://www.fin24.com/Tech/News/live-parliament-meets-to-discuss-whatsapp-regulation-20160126 . accessed 10 February 2016.
- Body of European Regulators for Electronic Communications (BEREC). (2012). A view of traffic management and other practices resulting in restrictions to the open Internet in Europe. BoR (12)30. https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/Traffic%20Management%20Investigation%20BEREC_2.pdf. Accessed 11 February 2016.
- Brookhurst, Q (2015). SA mobile subscribers: Vodacom vs MTN vs Cell C vs Telkom. http://businesstech.co.za/news/mobile/85752/sa-mobile-subscribers-vodacom-vs-mtn-vs-cell-c-vs-telkom/
- CAK (2015). FIRST QUARTER SECTOR STATISTICS REPORT FOR THE FINANCIAL YEAR 2015/2016 (JULY-SEPTEMBER 2015http://www.ca.go.ke/images/downloads/STATISTICS/Sector%20%20Statistics%20Report%20Q1%202015-16.pdf.
- Cell-C (2015). Internet.org Terms and Conditions. https://www.cellc.co.za/dl/cms/downloads/InternetOrg-2015.pdf. Accessed 29 October 2015

- Claasen, (2016). Operators sharply divided on OTT regulation http://www.techcentral.co.za/operators-sharply-divided-on-ott-regulation/62741/. Accessed 9 February 2016.
- Fontanella-Khan, J. (2013). EU raids telecoms operators over 'throttling' concerns. http://www.ft.com/intl/cms/s/0/f07c61d4-ea24-11e2-913c-00144feabdc0.html#axzz4099I0vj9. Accessed 11 February 2016.
- Internet.org. (2016). Where we have launched. https://info.Internet.org/en/story/where-weve-launched. Accessed 9 February 2016.
- IT News Africa. (2016b). Airtel CEO calls for the regulation of over-the-top operators http://www.itnewsafrica.com/2015/06/airtel-ceo-calls-for-the-regulation-of-over-the-top-operators/ Accessed 9 February 2016.
- IT News Africa. (2016a). Free WhatsApp for Tanzanians http://www.itnewsafrica.com/2016/02/free-whatsapp-for-tanzanians/ Accessed 9 February 2016.
- Layton, R. and Calderwood, S. (2015). Zero Rating-do hard rules protect or harms consumers and competition? Evidence from Chile, Netherlands and Slovenia. Accessed 19/01/2016.
- Lelinwalla, M. (2015). Egypt Officials Shut Down Facebook's Free Basics Internet Program. http://www.techtimes.com/articles/120830/20151231/egypt-officials-shut-down-facebooks-free-basics-Internet-program.htm . Accessed 9 February 2016.
- McCloud, D. (2015). MTN to zero-rate FrontRow data usage. http://www.techcentral.co.za/mtn-to-zero-rate-frontrow-data-usage/59694/. Accessed 22 February 2016.
- McCloud, D. (2016). OTT row: Q&A with Shameel Joosub http://www.techcentral.co.za/ott-wars-qa-with-shameel-joosub/62840/. Accessed 9 February 2016.
- Mochiko, T. (2016). Over-the-top services punted by Cell C boss. http://www.bdlive.co.za/business/technology/2016/01/18/over-the-top-services-punted-by-cell-c-boss. Accessed 9 February 2016.
- MTN. (2015) Five Year Review, https://www.mtn.com/Investors/FinancialReporting/Documents/INTEGRATEDREPORTS/2014/MtnGroup5YearReview2014.pdf.
- MTN (2016). Vu-What you love. https://mtnfrontrow.discoverdigital.co.za/faq. Accessed 11 February 2016.
- Research ICT Africa (2015). Africa bundling up: bundles moving towards flat pricing on the prepaid market. Bundle Value Money Index Methodology. Available at: http://goo.gl/GmGF3L (November 2015).
- Safaricom, 2016: Five Year Review: http://www.safaricom.co.ke/investor-relation/financials-and-reports/five-year-financial-summary.
- Seixas, P. (2015). ITU-ASEAN forum on Over the Top Services: Business, Policy and Regulatory Trends. Presentation at Phnom Penh. 8-9 December 2015. https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/Dec-

OTT/Presentations/Phnom%20Penh%20%20Session%205%20-%20OTT%20Telcos%20Final%20PS.pdf

- Southwood, R. (2016). Ugly war looming over OTTs. Techcentral. http://www.techcentral.co.za/ugly-war-looming-over-otts/62630/ accessed 10 February 2016.
- Stork, C. and Chair , C. (2015): Consumers benefit from lower mobile termination rates, Policy Brief No.1 2015, http://www.researchictafrica.net/polbrf/Research_ICT_Africa_Policy_Briefs/2015_Policy_Brief_1_Consumers_benefit_from_lower_MTRs.pdf.
- Stork, C. and Khan, S. (2015): Are recent postpaid price increases by SA operators justifiable?, Policy Brief No.2 2015, http://www.researchictafrica.net/polbrf/Research_ICT_Africa_Policy_Briefs/2015_Policy_Brief_2_Postpaid.pdf.
- Stork, C. Calandro, E. and Gillwald, A. (2013). Internet going mobile: Internet access and use in eleven African countries, Emerald Group Publishing Limited, info-05-2013-0026, ISSN: 1463-6697, info, Vol. 15 Iss: 5, http://www.emeraldinsight.com/journals.htm?issn=1463-6697&volume=15&issue=5&PHPSESSID=ul8ffj413i8f1i1vvqs8lgt697.
- Stork, C., Calandro, E. & Gamage, R. (2014). "The future of broadband in Africa", info, Vol. 16 Iss: 1, pp.76 - 93, http://www.emeraldinsight.com/journals.htm?articleid=17102951&ini=aob.
- Tigo. (2016). Free WhatsApp. http://www.tigo.co.tz/en/freewhatsapp
- van Zyl (2016). WhatsApp faces possible regulation in SA http://www.fin24.com/Tech/News/whatsapp-faces-possible-regulation-in-south-africa-20160113
- Vincent, J. (2016). Facebook's Free Basics service has been banned in India http://www.theverge.com/2016/2/8/10913398/free-basics-india-regulator-ruling
- Vodacom (2015): http://www.vodacom.com/about-us/investors/financial-reporting.
- Vodacom. (2016). Deezer. http://www.vodacom.co.za/vodacom/services/deezer. Accessed 11 February 2016.
- WhatsApp, (2016). "One Billion". WhatsApp Blog. https://blog.whatsapp.com/616/One-billion. Accessed 9 February 2016.
- Zuckerberg, M. (2015). Facebook Milestone. https://www.facebook.com/zuck/posts/10102329188394581 . Accessed 9 February 2016.