



The Mobile Economy

Sub-Saharan Africa 2014





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CONTENTS

EXECUTIVE SUMMARY	2
1 REGIONAL OVERVIEW	8
1.1 A diverse region with significant growth potential to come	9
1.2 Migration to mobile broadband now underway	11
1.3 Sub-regional groupings in Sub-Saharan Africa	17
1.4 Competition and regulatory intervention in SSA	24
1.5 Ongoing investments by operators to improve capacity and coverage	26
1.6 Revenue growth set to slow but SSA will remain fastest-growing region	27
2 THE ROLE OF MOBILE IN DELIVERING DIGITAL INCLUSION TO THE STILL UNCONNECTED POPULATIONS	28
2.1 Network infrastructure and policy	31
2.2 Affordability barriers: significant challenges in bringing inexpensive internet access to all	34
2.3 Consumer barriers - literacy and awareness	35
2.4 Local content	37
3 THE SOCIAL AND ECONOMIC CONTRIBUTION OF MOBILE IN SUB-SAHARAN AFRICA	38
3.1 The mobile ecosystem makes a significant contribution to economic growth	39
3.2 The role of the Internet of Things in Sub-Saharan Africa	44
3.3 Digital entrepreneurship: mobile driving growth of new businesses and start-ups across SSA	47
3.4 mHealth: facilitating health service delivery across the region	48
3.5 mAgriculture: empowering smallholder farmers in SSA	49
3.6 Mobile money: extending the reach of financial services across SSA	50
3.7 Improving access to energy and water	55
3.8 Disaster response to the Ebola crisis in Africa	56
4 ACHIEVING PUBLIC POLICY GOALS	57
4.1 Meeting the demand for mobile broadband	58
4.2 Achieving the right balance between taxation and growth	64
4.3 Evaluating universal service funds	67
4.4 Delivering a high quality of service	68

Executive Summary

Sub-Saharan Africa (SSA) has been the fastest growing region over the last five years, in terms of both unique subscribers and connections. By June 2014, there were 329 million unique subscribers, equivalent to a penetration rate of 38%. Consumers, governments and businesses across SSA are rapidly adopting mobile, not only as a basic communication tool, but also to access information and a growing range of new applications and services. As of June 2014, there were 608 million connections in SSA, including seven million machine-to-machine (M2M) connections.

SSA is forecast to remain the fastest growing region going forward, helped by ongoing economic growth and the increasing affordability of mobile services. The unique subscriber base will grow at a compound annual growth rate (CAGR) of 7% out to 2020, reaching just over half a billion subscribers.

The region is now seeing a rapid technology migration to higher speed networks, helped by the growing range of lower-cost devices and ongoing network deployments by the operators. 3G connections accounted for only 15% of the total base at the end of 2013, a figure that will rise to more than half by 2020. SSA will then be the second largest region for 3G connections by 2020, behind only the highly-populated Asia-Pacific region.

The increasing proportion of 3G connections largely reflects the accelerating rate of smartphone adoption. SSA is forecast to see the highest growth of any region in terms of the number of smartphone connections over the next six years. There will be 525 million smartphone connections in the region

by 2020, accounting for more than half of the total connection base at that date.

The growing adoption of smartphones along with other data-capable devices such as tablets and dongles is in turn driving an explosion in data traffic. SSA's mobile data traffic is forecast to see a twenty-fold increase from 2013 to 2019, around twice the global growth rate.

Operators across SSA have seen strong growth in revenues over recent years, driven in particular by the increase in the number of connections and subscribers. Revenues grew at a CAGR of 7% per annum over the period 2008-13, by some way the fastest growth of any region. Growth rates are set to slow slightly going forward, but increasing data traffic will see revenue growth remain at a healthy 5.6% out to 2020.

Operators have invested over US\$45 billion over the last six years to expand coverage and increase network capacity. Capital expenditure levels will need to increase substantially over the coming years to cope with the expected growth in data traffic, as well as to increase 3G coverage and to begin to build out new LTE networks. Total capital expenditure over the next seven years is forecast to total around US\$97 billion. This level of investment will be dependent on regulatory clarity which will help provide the necessary market conditions for operators to maintain both the positive revenue trends and the levels of profitability required to justify investments of this magnitude.

In 2013, the mobile industry contributed 5.4% to overall gross domestic product (GDP) in the region, and this is forecast to increase to 6.2% by 2020. This figure only captures the direct market impact of mobile services, and therefore does not include many of the key socio-economic impacts from the use of mobile-based services. These unquantified outcomes include improved access to health, finance and education and improved quality in the delivery of public services.

The mobile industry is a significant source of employment and job creation in SSA. In 2013, the mobile ecosystem directly provided employment to nearly 2.4 million people, a figure that is expected to grow to around 3.5 million by 2020. The industry also makes a very large contribution to the funding of the public sector, in the form of general taxation (US\$13 billion in 2013), and through further payments in the form of licence and regulatory fees and spectrum auctions.

The broader mobile ecosystem is also an important source of innovation across SSA, with mobile acting as a crucial enabling platform for companies to reach new customers and to monetise new products and services. This is also bringing new opportunities for digital entrepreneurship, and the industry has stimulated the emergence of a number of hubs, incubators, and accelerators across SSA.

The region will witness a number of innovative new M2M services in areas as diverse as telematics, smart metering, mobile banking and finance, security solutions and smart cities. The total number of M2M connections in SSA stood at only seven million as of June 2014, but is forecast to grow at a CAGR of 26% per annum, reaching 28 million by 2020.

For the full potential of mobile to be realised, populations need access to mobile broadband networks, and to affordable devices and services. Despite the progress to date, there remains a significant proportion of the population in SSA who do not have access to the internet. This lack of internet access, compared to other regions in the world, has the potential to hinder development opportunities and prevent the region from truly engaging in the information age.

At the end of 2013, there were almost 150 million individuals using mobile devices to access the internet in SSA. This is equivalent to an overall mobile internet penetration rate of only 17% of the total population, compared to a global average figure of just over 30%. This figure will more than double by 2020, reaching 38%, with an additional 240 million people across SSA gaining mobile internet access by that date.

Internet access rates in SSA will though continue to lag behind the global average. There are a number of barriers to extending mobile internet access in SSA, with issues around affordability and extending network coverage to rural areas particular challenges given high levels of poverty and with over 70% of the population living in rural areas. Operators, other ecosystem players, as well as governments and regulators all have a role to play in addressing these barriers. Allowing commercially-agreed network sharing deals and ensuring the timely release of Digital Dividend spectrum will be important factors in enabling the extension of network coverage on a cost-effective basis to the still unconnected populations.

Mobile money services are a clear success story for the industry, with mobile money bringing financial services to millions of previously unbanked citizens across the region, driving economic growth and promoting financial inclusion. SSA leads the rest of the world in the number of active mobile money deployments, with over 130 live services as of September 2014 aimed at unbanked populations, with services available in 38 Sub-Saharan markets.

Mobile can also facilitate access to basic services such as healthcare and education for previously underserved populations, as well as helping to address a number of the pressing social challenges that the region faces, including high levels of poverty. By end of 2016, the GSMA Pan-African mHealth Initiative aims to have catalysed nationally-scaled, commercially sustainable mHealth services which contribute meaningfully to national health objectives in nutrition as well as maternal and child health in 10 African countries.

Mobile networks can also play an important role in disaster response and crisis management. mHealth services are of particular relevance to the region given the ongoing Ebola outbreak that is currently impacting a number of countries in West Africa. The GSMA is assisting Ministries of Health in Nigeria, Senegal, Guinea, Liberia and Sierra Leone to mobilise the required support of mobile network operators in formulating a timely and effective response to the outbreak.

Realising the transformative potential of the mobile industry in SSA will depend in part on a supportive regulatory regime. Key regulatory issues include the need for clear and transparent spectrum management processes, as well as high levels of taxation in some markets and a need for regulators to consider long-term approaches that will encourage continued investment. Operators

and investors require stability and clarity in order to fund the significant inputs required to further extend network coverage and meet the growing demand for higher speed connectivity over the coming years.

While some governments and regulators have recognised the importance of harmonising spectrum across the region, much work remains to be done in this regard. In many countries, concrete commitments to the harmonised allocation and assignment of sub-1GHz spectrum are yet to be fulfilled. Coordinating and accelerating the analogue to digital switchover (DSO) and freeing the Digital Dividend spectrum bands (700 and 800 MHz) for mobile broadband will be essential steps in bridging the digital divide and meeting the strong demand for data services across the region.

The taxation of mobile services is relatively high in a number of markets in SSA and can significantly add to affordability barriers for consumers. Examples include Ghana, Kenya and Chad; all of which have a mobile services tax burden of over 25% of revenues. Over the past five years, 15 African countries have imposed an additional mobile-specific tax, in the form of a surtax on international incoming traffic (SIIT). Recent GSMA studies show that the price increases resulting from the SIIT can deter individuals and businesses from making calls to people in the African countries imposing this tax, which can in turn impact regional economic integration and intra-Africa trade.

Realising the full transformative potential of the mobile industry in SSA will require increased collaboration between all players in the region. This includes cooperation between the mobile operators and other ecosystem players; as well as collaboration with governments, regulators and other industry stakeholders.



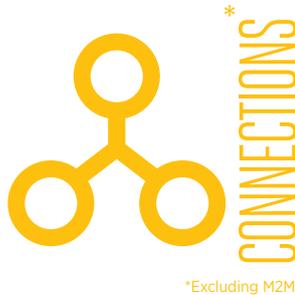
Mobile money services are a clear success story for the industry, with mobile money bringing financial services to millions of previously unbanked citizens across the region, driving economic growth and promoting financial inclusion.

MOBILE ECONOMY SUB-SAHARAN AFRICA



2013 **311M**
36% PENETRATION RATE

2020 **504M**
49% PENETRATION RATE



2013 **564M**
65% PENETRATION RATE

2020 **947M**
91% PENETRATION RATE

*Excluding M2M

Accelerating moves to mobile broadband networks and smartphone adoption

52%

3G connections to increase
from 15% of total in 2013
to 52% by 2020



By 2020 there will be
525M
smartphones, up from only
72 million at the end of 2013

Data traffic in SSA to grow by 20 times out to 2019, twice the global average

Subscriber growth and now increasingly data traffic fuelling revenue growth



Operator revenues grew
at a CAGR of over 7% 2008-13

Revenues forecast to grow at
a still healthy CAGR of 5.6% 2013-20



Mobile addressing economic and social challenges across the region



Delivering digital inclusion to the still unconnected populations
Mobile internet subscriber penetration: 17% 2013, 37% 2020



Delivering financial inclusion to the still unbanked populations
130 live services in 38 markets across SSA as of September 2014



Delivering innovative new services
Number of M2M connections to grow at a CAGR of 26% per annum out to 2020

Mobile ecosystem contribution to GDP



Public funding



Mobile ecosystem contribution to public funding in SSA before regulatory fees

Employment

Jobs directly supported by mobile ecosystem

2013:
2.4M

2020:
3.5M

Plus an additional 3.7M indirect jobs supported in 2013

1 Regional overview

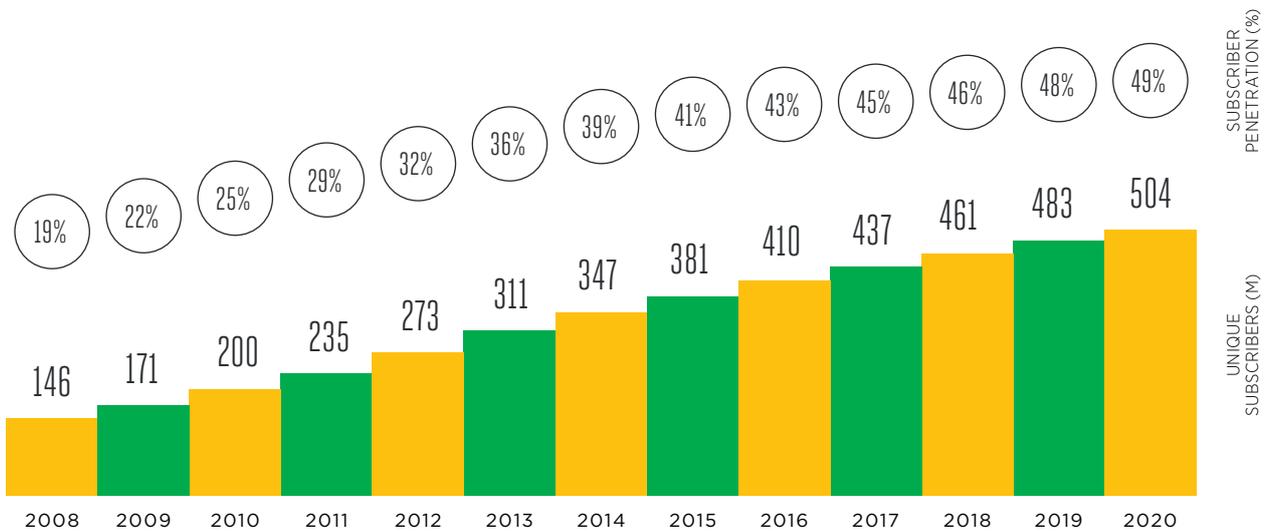
Sub-Saharan Africa (SSA) has been the fastest growing region over the last five years in terms of both unique subscribers and connections (i.e. SIM cards), with the unique subscriber base growing at a compound annual growth rate (CAGR) of 17% per annum over the period. By mid-2014, there were 329 million unique subscribers, equivalent to a penetration rate of 38%. Consumers, governments and businesses across SSA are rapidly adopting mobile not only as basic communication tool but also to access information and a growing range of new applications and services.

The mobile subscriber base is forecast grow at a CAGR of 7% per annum, reaching just over half a billion unique subscribers by the end of 2020. Despite this growth, by 2020 less half the population of SSA will have a mobile subscription, compared to a global average of six out of 10 people by the same date. Whilst this highlights the medium term growth potential, it also underlines the need for concerted efforts on the part of both operators and regulators to address the remaining barriers to the adoption of mobile technologies by the still unconnected populations.

By mid-2014, there were over 600 million SIM connections in the region¹, equivalent to a penetration rate of 68%. SSA is forecast to remain the fastest growing region helped by ongoing economic growth and the increasing affordability of mobile services.

Source: GSMA Intelligence

Unique subscribers and penetration rates



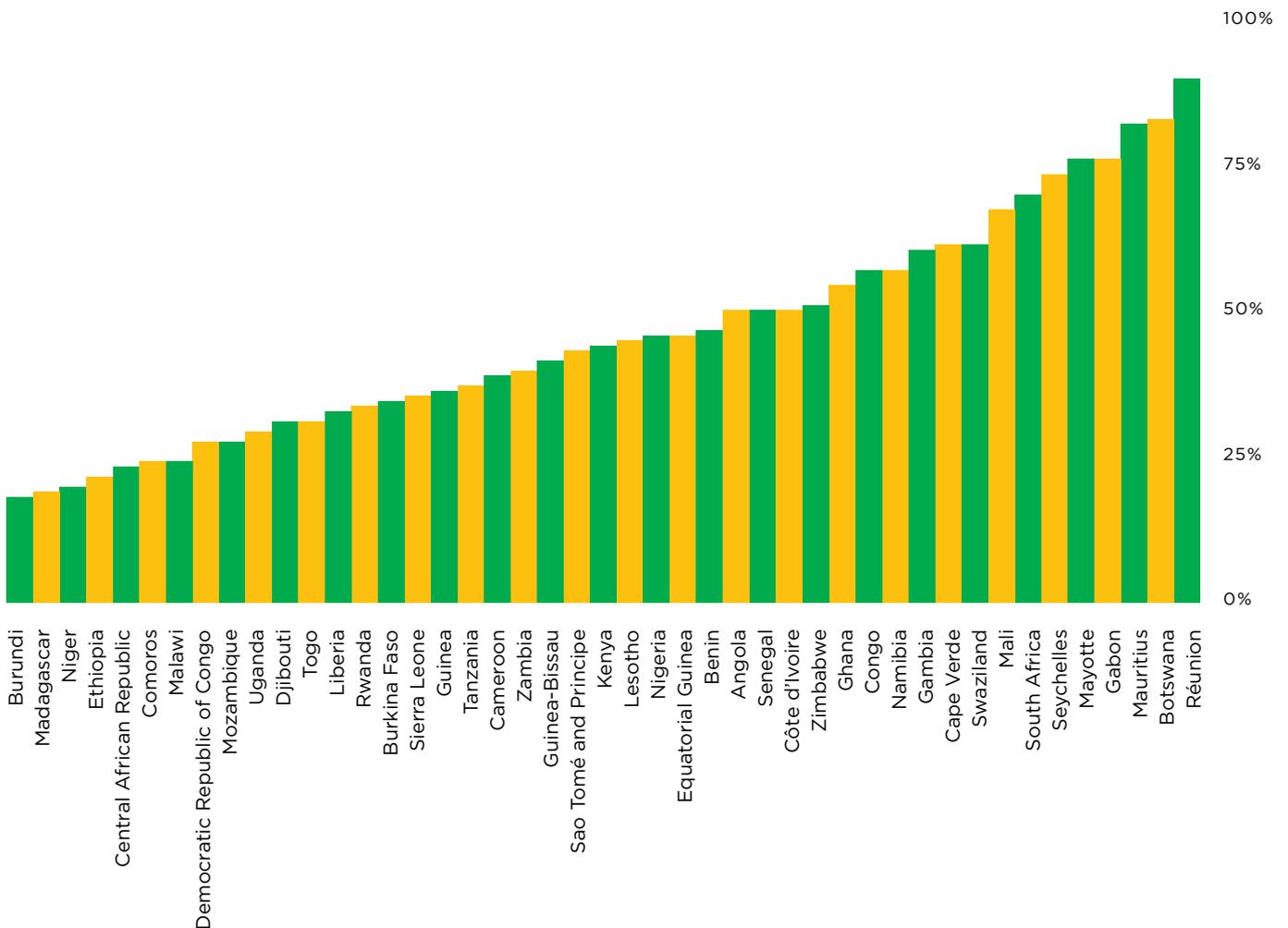
1. Excluding cellular M2M connections

1.1 A diverse region with significant growth potential to come

SSA covers 46 countries, each with a range of spoken languages and different cultures. The region is extremely diverse in terms of population size, as well as in terms of the levels of development of both economies and mobile markets. The most populous country is Nigeria, with a population of 176.1 million, while the smallest, Seychelles, has just 100,000 people. The region includes an assortment of economies ranging from South Africa with gross domestic product (GDP) per capita of US\$6,618 to Malawi with a GDP per capita of US\$226.

Source: GSMA Intelligence

Unique subscriber penetration by country
2013



The region is dominated by six major markets (Nigeria, South Africa, Tanzania, Ethiopia, Kenya and Democratic Republic of Congo) that together account for over half of its subscriber base. These markets will add over 200 million new connections by 2020, driving the overall developments and trends in network rollouts, smartphone adoption rates as well as advances in the deployment of new applications and services.

As is common in other developing markets, mobile subscribers in SSA tend to have multiple SIM cards in order to take advantage of promotional offers, as well as to avoid cross-network call charges. Levels of multi-SIM ownership vary with local market conditions, such as the level of competition between operators and availability of attractive tariffs. Markets such as Namibia and Ghana on average have more than two SIM cards per subscriber, whereas in Ethiopia, Niger and Swaziland the average is around one SIM per subscriber

1.1.1 Falling ARPUs driven by competition and penetration into lower income segments

Average revenue per subscriber (ARPU) in SSA has been falling sharply over the last five years, declining at a CAGR of minus 9% per annum. This reflects several factors including increasing competition, efforts to improve affordability and the penetration of mobile services into lower income segments. As many of the incremental subscribers going forward will come from rural and lower income parts of the region, average ARPU levels are expected to fall further. This is often a significant challenge for operators in terms of the need to generate adequate return on investments when deciding on network expansion, especially in the more remote and rural areas.

Source: GSMA Intelligence

Average monthly ARPU 2008-2013 (US\$)



Note the ARPU figures in this chart are calculated on a per subscriber rather than a per connection basis

1.2 Migration to mobile broadband now underway

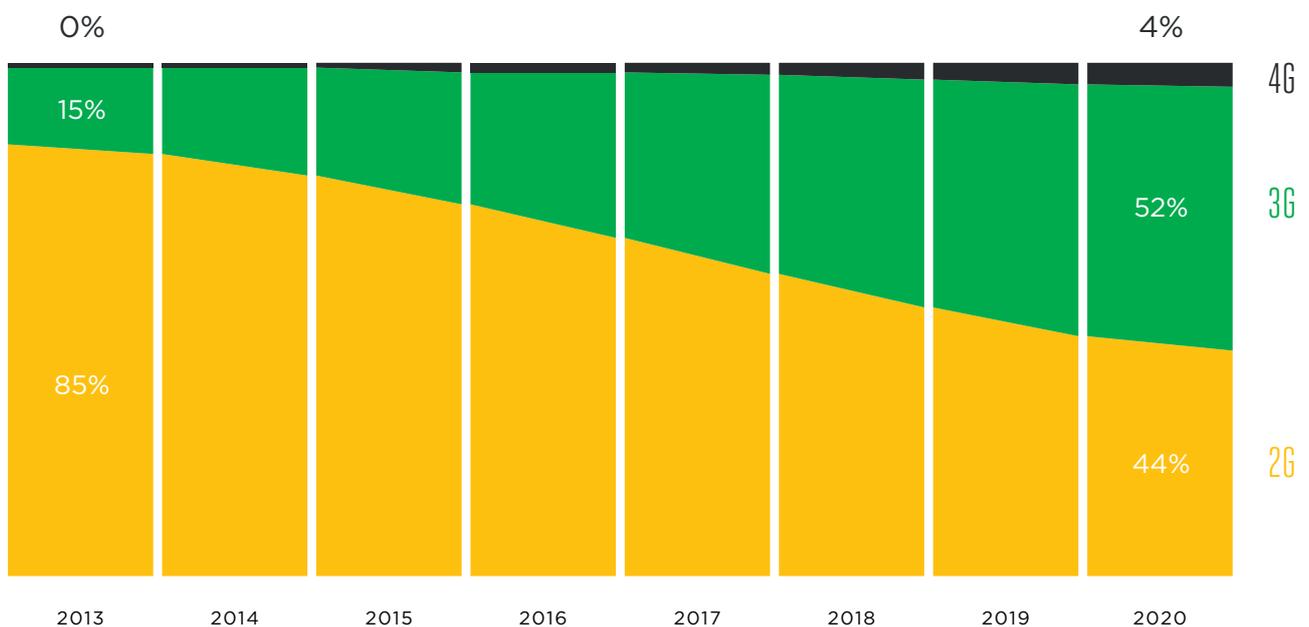
The region is now seeing an increasing migration to higher speed mobile networks, with profound implications for operators and users alike. While 2G connections accounted for 85% of the total connections at the end of 2013, 3G networks have been extensively deployed and are now seeing increasing uptake. This rapid subscriber migration will see 3G accounting for more than half of the total connection base by 2020, with nearly half a billion 3G connections by that date. SSA will be the second largest region for 3G connections by 2020, second only to the populous Asia-Pacific region.

LTE deployments are still very much in the early stages, although a number of operators are looking to increase their 4G network coverage especially in urban areas. For example, Airtel Zambia is expected to inject invest US\$80 million in 2014 into network expansion, with plans to roll out several new 3G and 4G sites. In South Africa Vodacom added 473 4G sites over a 12 month period, which took 4G coverage to 22% of the population as of June 2014.

The proportion of 4G connections will grow from close to zero in 2013 to 4% in 2020. This will leave 4G penetration in SSA trailing well behind other regions. This is due to a number of factors including limited spectrum and device availability, and crucially the challenge of affordability given low income levels in many countries across the region.

Source: GSMA Intelligence

Total connections by technology generation



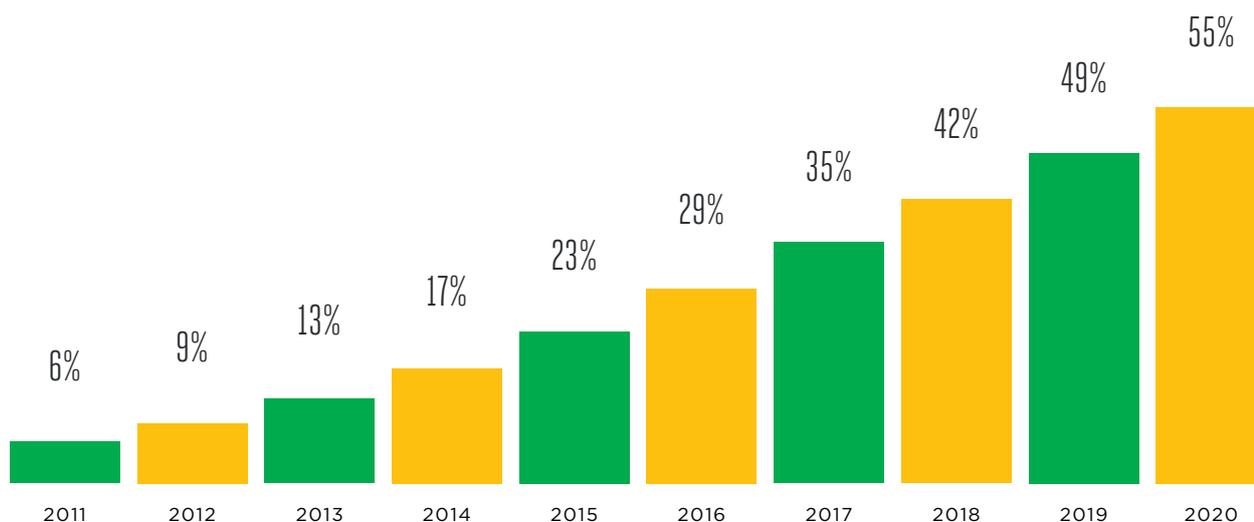
1.2.1 Smartphone adoption rate also now accelerating

The spread of high speed networks and the increasing affordability of more advanced devices means that SSA is now beginning to see an acceleration in the rate of smartphone adoption. This is bringing a transformative change in the lives of subscribers and businesses across the region. Forecasts indicate that that well over half of all connections in SSA will be smartphones by 2020, against a figure of only 13% at the end of 2013.

Recent research from GSMA Intelligence highlights that a number of developed markets are becoming more and more saturated in terms of smartphone adoption, and that growth over the coming years will increasingly be in developing regions². Indeed, SSA is forecast to see the highest growth of any region in terms of the number of smartphones over the next six years. There will be 525 million smartphone connections in the region by 2020. For the majority of users, smartphones will be the first device over which to access the internet and to use new applications and services, as well as to explore digital content.

Source: GSMA Intelligence

Smartphone connections as percentage of total connections



2. <https://gsmaintelligence.com/files/analysis-subscription/?file=140911-smartphones.pdf>

The increasing uptake of smartphone in emerging markets reflects the rapid erosion in the average selling price (ASP). In particular, emerging markets are seeing strong demand for low-cost phones, with the sub-US\$50 price point gaining increasing traction. The increasing availability of lower-cost handsets will bring a large scale user migration from basic and feature phones to smartphones over the next few years.

Mozilla is one of the pioneers of low-cost smartphones, announcing at Mobile World Congress 2014 the availability of a US\$25 handset. Microsoft is also focusing on entry-level smartphones with its Windows Phone operating system. Microsoft announced last July a new entry-level addition to its Windows Phone-powered Lumia device range in the shape of the 85 Lumia 530.

In contrast to many developed markets, operators in developing markets do not typically subsidise the cost of handsets. One exception in the case of SSA is South Africa, which is one of the most developed markets in the region. Operators across the region follow a range of alternative strategies, including for example providing free data bundles to independent device retailers, with commission payments made when the data bundle is activated.

Operators are already reporting accelerating adoption of smartphones in markets across SSA. The number of smartphones and tablets on Vodacom's network increased 23.5% to 7.8 million over the course of 2013, supported by the operator offering a number of device financing offers. However, there are significant differences at the country level - smartphones accounted for only 5% of connections in the Democratic Republic of Congo (DRC) at the end of 2013, compared to 17% in Ghana and 23% in South Africa.

1.2.2 Role of 2G networks and feature phones will remain a key feature of the region

Despite the increasing adoption of smartphones over the next few years described previously, 2G networks and more basic feature phones will continue to play an important role for many communities and subscribers across SSA. In a number of markets, lower GDP per capita levels may mean that smartphones remain beyond reasonable levels of affordability for a majority of people for quite some time.

2G networks and more basic devices such as feature phones will therefore continue to play a vital role in driving the internet take-up in SSA, particularly in the semi-urban and rural areas in the longer term³. The regional 2G subscriber base will continue to increase in absolute terms up to 2016 and will still account for nearly seven out of 10 connections by this date. Issues such as literacy and a limited ICT knowledge will also see some users continue to rely on feature phones and the more basic range of services that they offer.

3. <https://gsmaintelligence.com/files/analysis-subscription/?file=130726-future-of-2g.pdf>

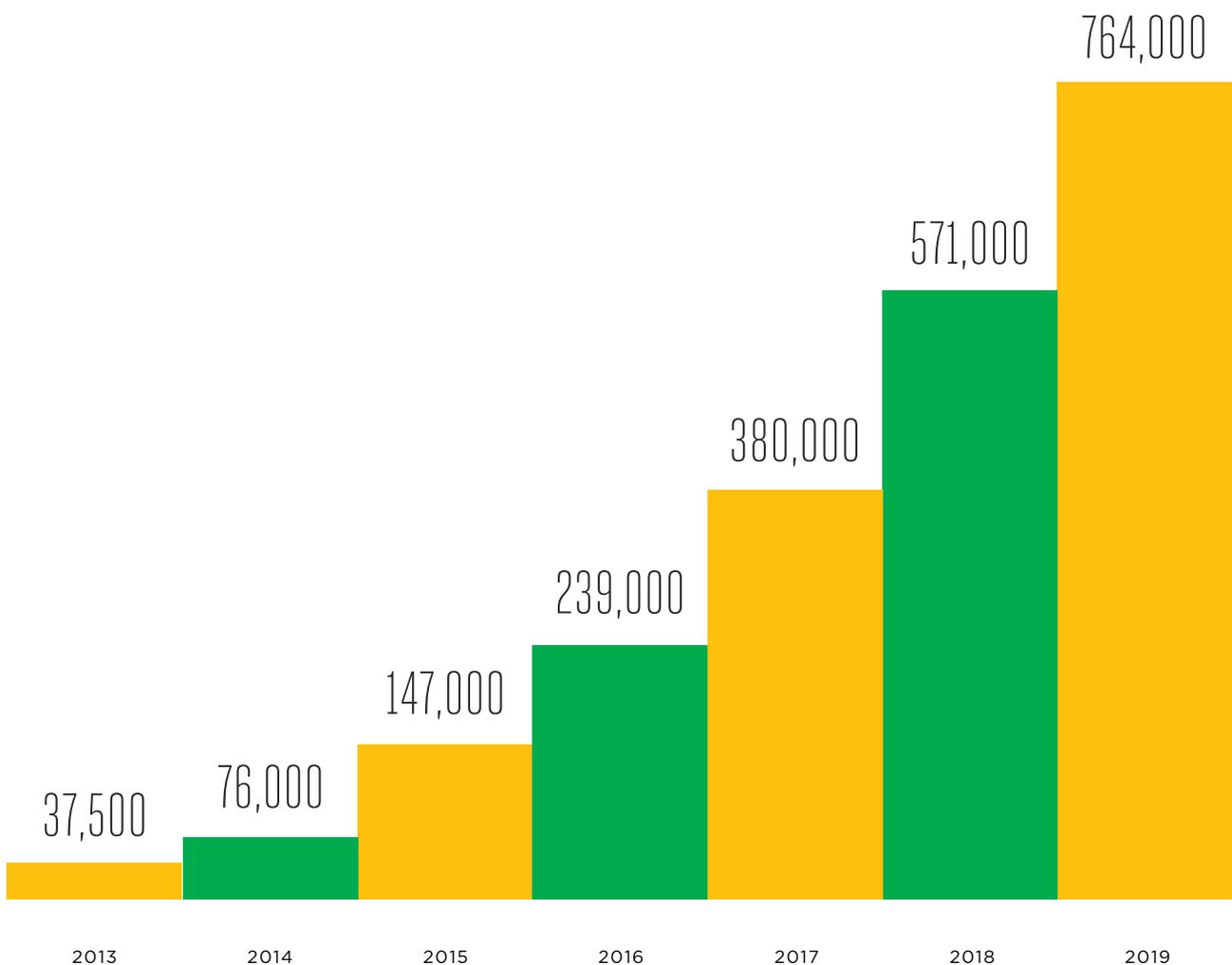
1.2.3 Mobile data traffic see explosive growth across the region

The growing adoption of smartphones along with other data-capable devices such as tablets and dongles is significantly increasing mobile data traffic. Mobile data traffic in SSA will see a 20-fold increase from 2013 to 2019, compared to only a 10-fold increase in overall global traffic.

Source: Ericsson

Mobile data traffic in Sub-Saharan Africa

(monthly Terabytes)



The industry is seeing a virtuous growth cycle as users with more advanced devices on higher speed networks consume an increasing amount of data. A number of factors are driving data traffic, including increasing levels of social media engagement, content-rich apps and the increasing accessing of video content. Whilst levels of social media penetration in SSA are low by global standards, they are growing rapidly. At the start of 2014, there were nearly 10 million active Facebook users in South Africa and over 11 million in Nigeria.

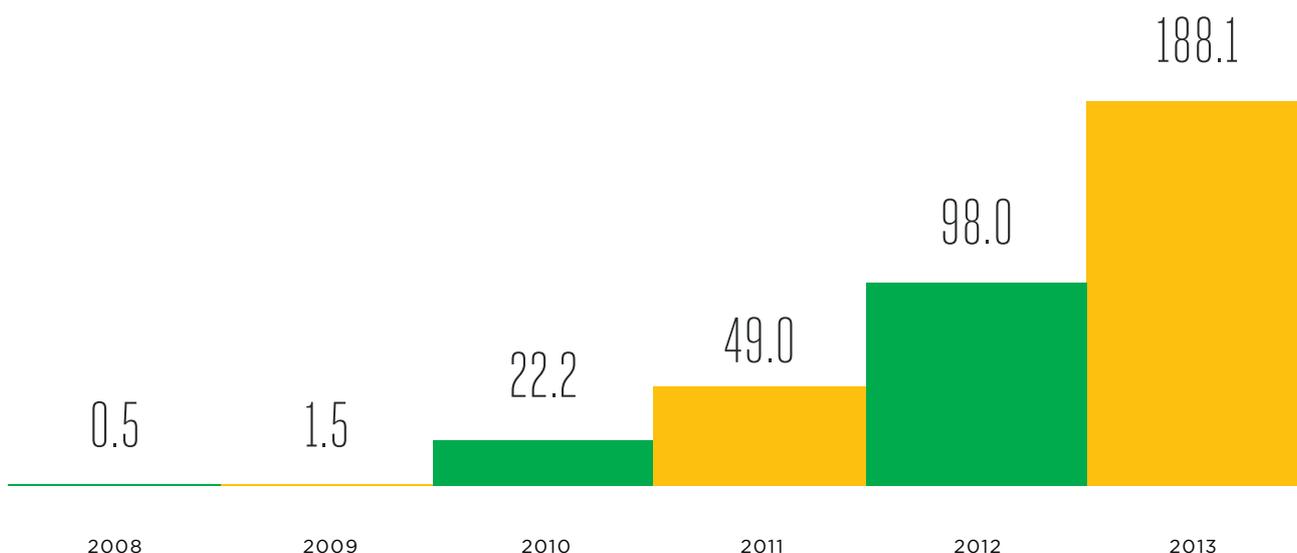
Operators across the region are witnessing a surge in mobile data traffic growth. Vodacom South Africa saw the average monthly data usage on smartphones increase by 81.7% to 253 MB per device, and by 25.2% to 743 MB on tablets, for the year ending March 2014. Orange Senegal stated in its results for the first half of 2014 that total mobile data traffic had increased by a factor of 2.5 times over the past year⁴.

The rapid growth in data traffic is also providing incremental revenues for operators, an important market development at a time when competition and regulatory intervention are impacting revenue growth from traditional voice and messaging services. For example, MTN Nigeria has seen its data revenues growth at a CAGR of 185% over the last five years. Users are also consuming more data over time, reflecting both the increasing familiarity of data services as well as likely impact of upgrading to more advanced handsets such as smartphones which generate higher data volumes.

Source: Company data

MTN Nigeria data revenue

(US\$M)



4. <http://www.sonatel.sn/rapports-financiers.html>

1.2.4 Growth of online messaging services in SSA

Online messaging service (OMS) providers have been present in a number of markets in SSA for several years, and are now seeing rising usage levels as a result of the increasing uptake of smartphones and higher speed networks. Several new entrants, including both LINE and Viber, are also looking to establish a presence in the region. In addition, the region is also starting to see its own locally developed OMS providers. One example is MXit, which was developed in South Africa and claims nearly five million active monthly users. The company is now looking to expand into other countries, both in SSA and beyond. MXit is already present in Nigeria, Indonesia and India.

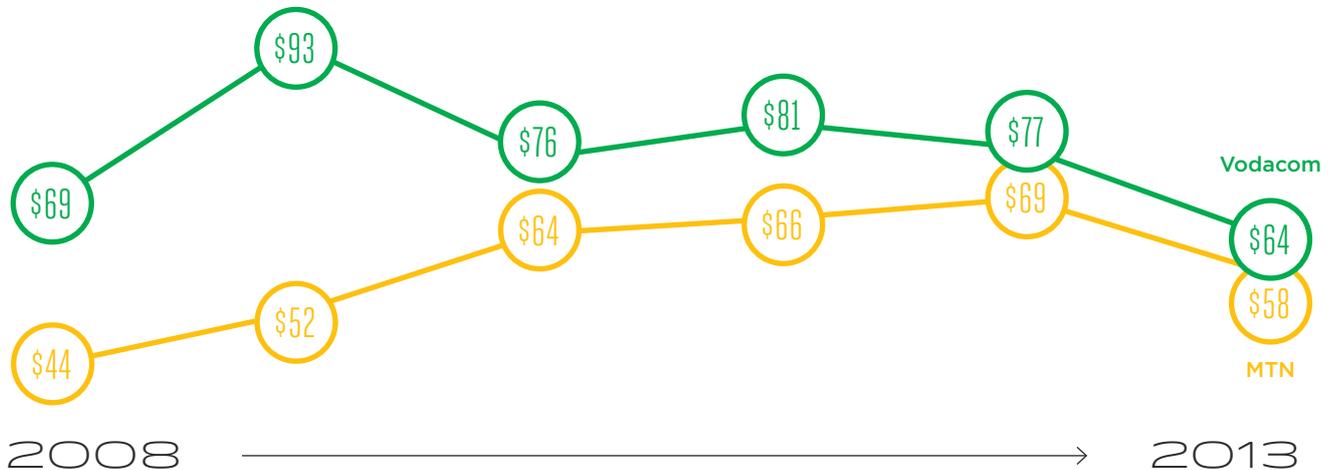
The impact of these OMS providers is evident in markets such as South Africa, where more than half of adult users living in cities and towns are using WhatsApp on their phones, according to recent research⁵. In Zimbabwe, WhatsApp usage now accounts for nearly a quarter of entire mobile data traffic on Econet Wireless’s network as of May 2014.

The popularity of these OMS providers will inevitably begin to impact on mobile operators’ voice and messaging revenues. For example, both Vodacom and MTN in South Africa have begun to see material declines in their SMS revenues over the last couple of years, with the impact of instant messaging likely to be a significant factor in this trend.

Source: GSMA Intelligence

SMS revenues 2008-2013

(US\$ M)



However, partnerships and collaborations have the potential to bring upside for both the operators and OMS providers. A number of operators have already chosen to pursue this strategy. One example is Airtel Nigeria, who have recently collaborated with WhatsApp to provide discounted access to the application to its subscriber base.

Several operators including Telecel in Zimbabwe and MTN Cameroon have teamed up with Facebook Zero

- a text-only mobile site that allows users to access the Facebook content free of charge. Any additional services such as access to photos, external links, games, and accessing Facebook Zero while roaming, entail normal data charges from the operator. Zimbabwe’s Econet Wireless has also recently launched an unlimited WhatsApp bundle, a strategy that incentivises subscribers to move to affordable data-driven services while generating incremental revenues for the network operator.

5. Conducted by World Wide Worx and Fuseware into the use of social media and instant messaging (IM)

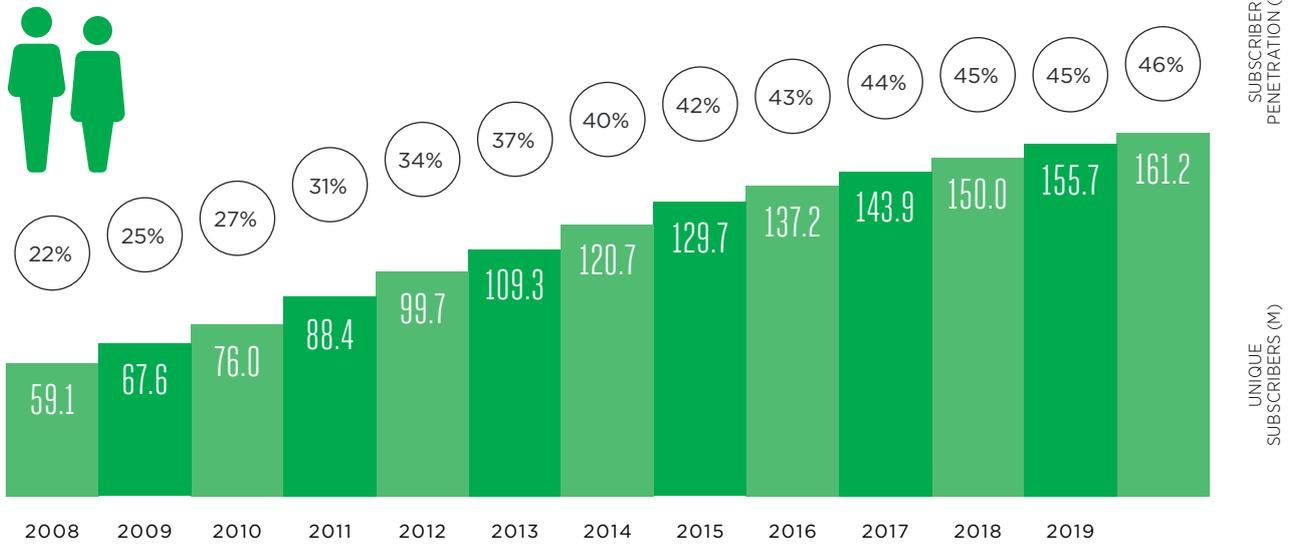
1.3

Sub-regional groupings in Sub-Saharan Africa

This report highlights three regional groupings in SSA, with a high-level analysis of key trends in each of these sub-regional markets detailed over the following pages.

Source: GSMA Intelligence

SADC unique subscribers (m)



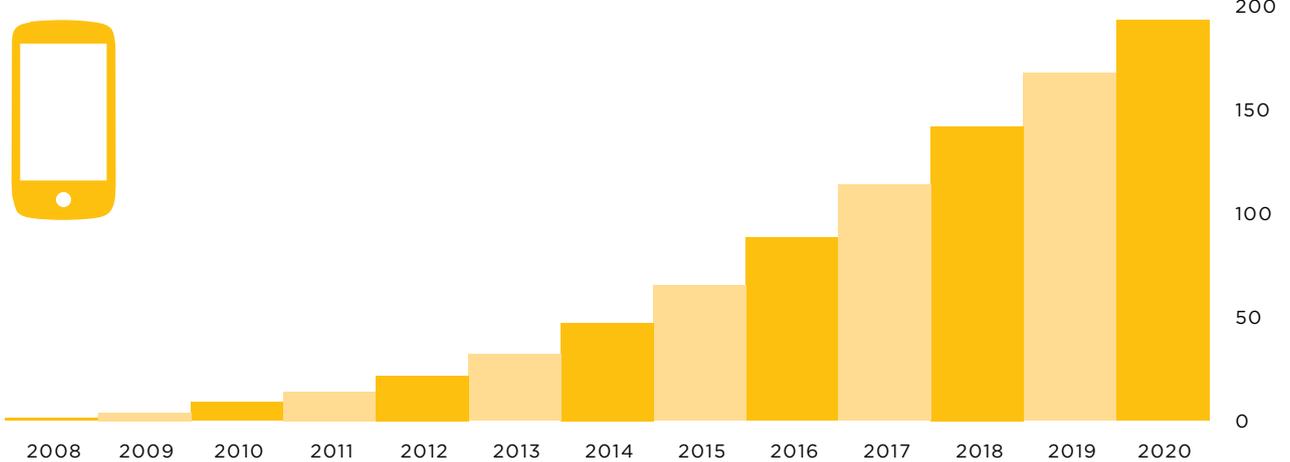
Source: GSMA Intelligence

SADC technology mix

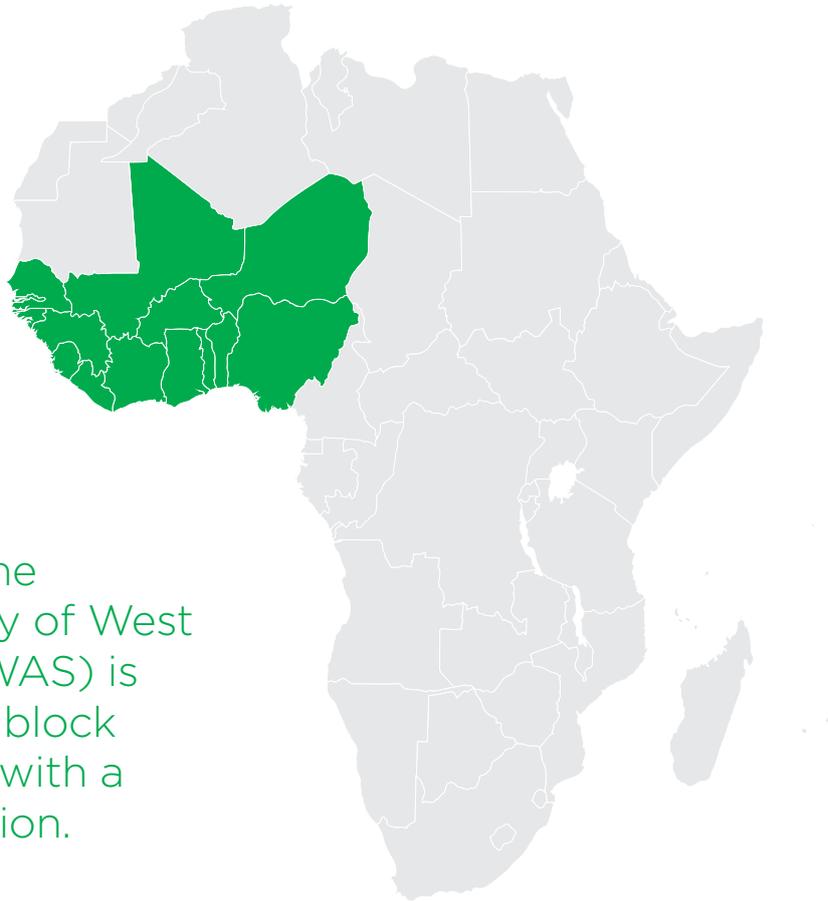


Source: GSMA Intelligence

SADC Smartphone connections (m)



1.3.2 Economic Community of West African States



The Commission of the Economic Community of West African States (ECOWAS) is another sub-regional block of 15 member states, with a population of 331 million.

Four out of 10 people in the ECOWAS region had subscribed to mobile services at the end of 2013, ahead of the SSA average of 36%. Over the period of 2013-2020, this region will add 80 million new subscribers, taking the penetration rate to just over half the population. However, there are also significant variations in penetration and growth rates. Nigeria had 77 million unique subscribers as of June 2014 and is the largest market in ECOWAS, accounting for more than half of this region's subscriber base.

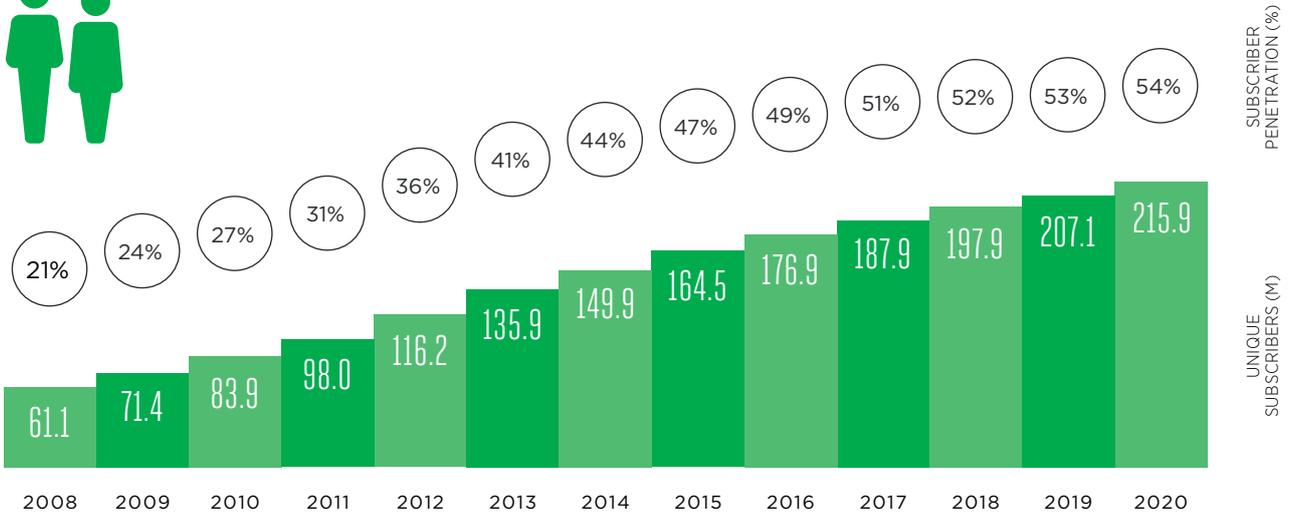
More than nine in every 10 subscribers in this sub-region are using 2G networks at end of 2013. However, with 3G deployments gaining pace, the proportion

of 2G connections is projected to fall to around 60% by 2020. Over this period, the ECOWAS region will remain more focused on 2G connections and services than the broader SSA region. 4G networks were launched in early 2014 in Nigeria, and more recently in both Ghana and Côte d'Ivoire.

At the end of 2013, smartphones accounted for 13% of total connections, in line with the SSA average. Smartphone connections will rise at a CAGR of 32% over the next seven years reaching a figure of 228 million by 2020.

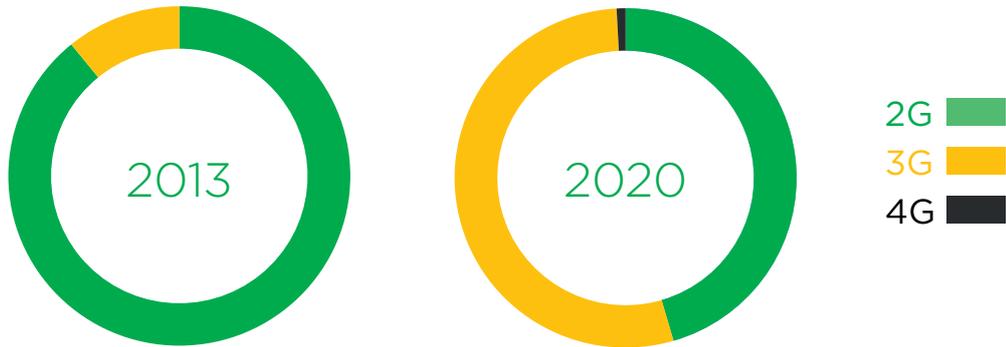
Source: GSMA Intelligence

ECOWAS unique subscribers (m)



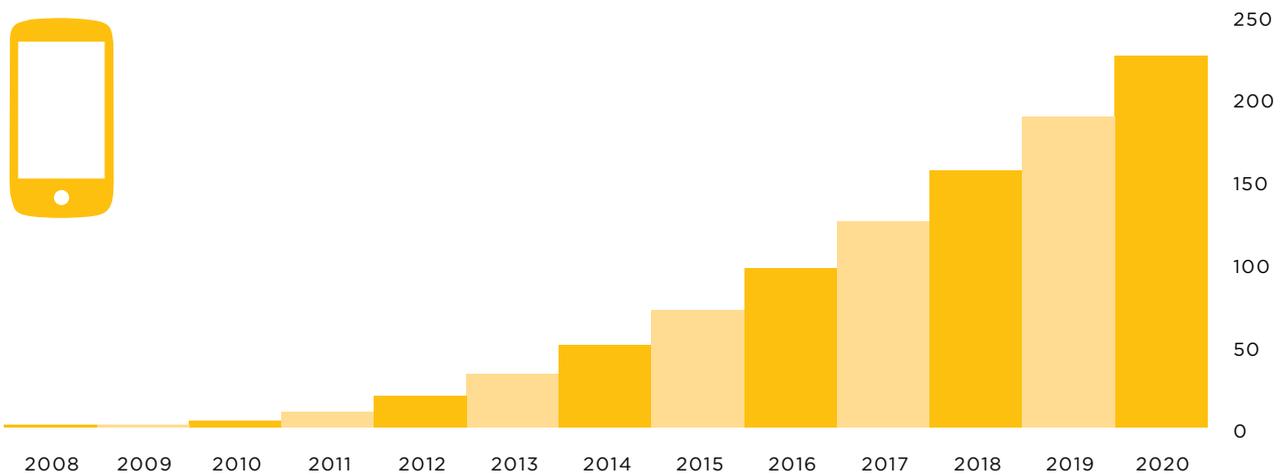
Source: GSMA Intelligence

ECOWAS technology mix



Source: GSMA Intelligence

ECOWAS Smartphone connections (m)



1.3.3 East African Community/Eastern Africa region



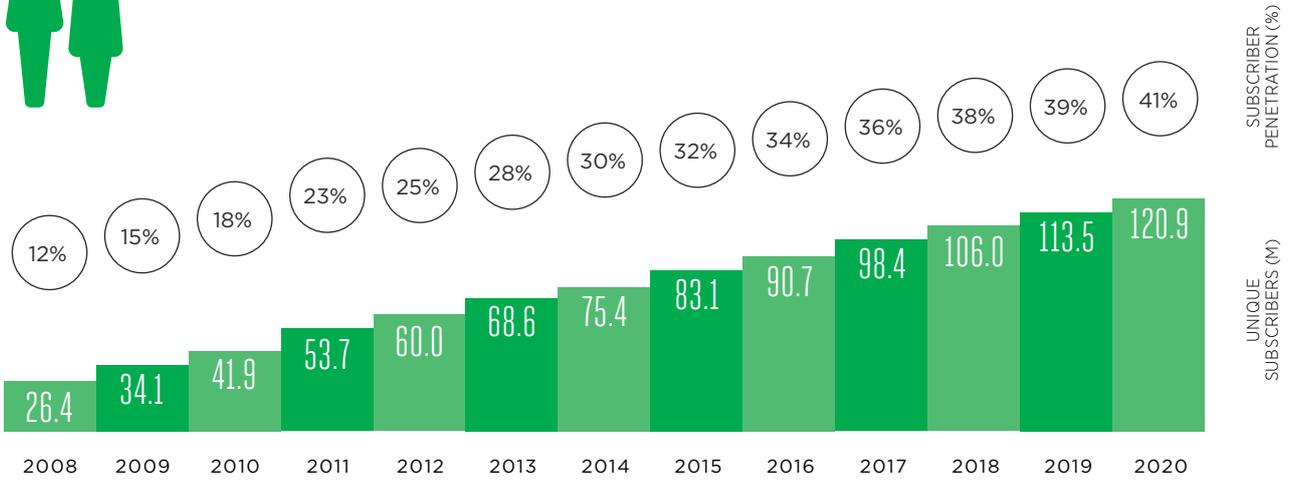
The East Africa grouping includes the countries that are members of the East Africa Community (EAC), as well as several countries such as Djibouti, Eritrea, Sudan and Ethiopia which are not formally members of the EAC but are located in Eastern Africa.

With a total population of 246 million, Eastern Africa is an extremely diverse region in regards to mobile adoption and uptake, subscriber penetration ranging from 5% in Eritrea to 40% in Kenya. Overall subscriber penetration rates remain below the SSA average and global averages despite growth in recent years. Only 28% of the population at the end of 2013 had a mobile subscription, compared to a figure of 36% for SSA as a whole, clearly demonstrating that there is still significant growth in subscriber numbers to come. East Africa's subscriber base grew at a CAGR of 21% in the period 2008-13, and is forecast to grow at a rate of 8% per annum out to 2020.

In 2013, only 5.1% of the total connections were smartphones, well below the average in the broader SSA region. However, smartphone adoption is set to accelerate, with smartphones accounting for four out of every 10 connections by 2020. However, the region will remain heavily focused on 2G services, still accounting for nearly 60% of total connections by 2020. There have recently been 4G service launches in Rwanda and Uganda, whilst there are plans to launch services in Kenya if the government allocates spectrum.

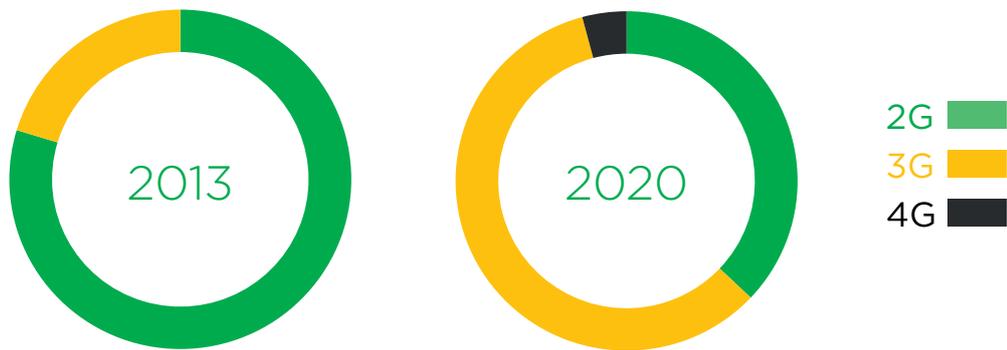
Source: GSMA Intelligence

East Africa region unique subscribers (m)



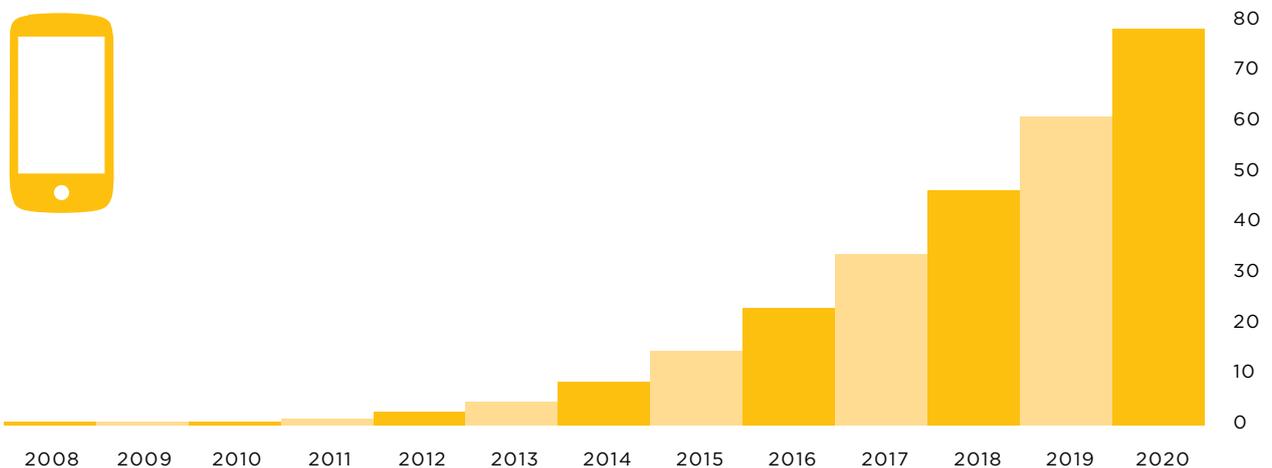
Source: GSMA Intelligence

East Africa region technology mix



Source: GSMA Intelligence

East Africa region smartphone connections (m)



1.4 Competition and regulatory intervention in SSA

Competition has been increasing across many markets in SSA over recent years, often reflecting increased regulatory action and the impact of new entrants. In South Africa, the two main operators have reported revenue declines in recent quarters, reflecting in large part both the impact of termination rate cuts and increased competition from the third operator, Cell C. Termination rates in South Africa have already fallen sharply and are now set to almost halve in the four year period out to September 2017.

The Nigerian Communications Commission (NCC) introduced mobile number portability (MNP) in mid-2013, at the same time as mandating further reductions in interconnect rates. The rate is in the process of halving from NGN8.2 in April 2013 to NGN3.9 by April 2015. In April of 2014, the NCC imposed both fines and a ban on selling new SIM cards on the three largest operators in the market after the companies had failed to meet quality of service standards earlier in the year. This has impacted revenue trends for the leading operators in the market, although overall revenues continue to grow.

Other countries in the region are also looking to introduce MNP. In Senegal, the introduction of MNP has been delayed on several occasions but the regulator recently announced that it was targeting October of this year as a launch date. In Zimbabwe, the regulator has held consultations with the goal of introducing MNP in the current year.

Regulators in a number of markets are also looking to introduce mobile virtual network operators (MVNOs). There are relatively few MVNOs in SSA at present, although the number has increased over recent years, with a total of 13 active at the end of 2013 (which includes five operator sub-brands which are owned and operated by the mobile operators). MVNOs are more common in mature markets with connection penetration levels around the 100% level, suggesting that MVNOs may become more common as markets mature. South Africa is one of the more developed markets in the region with amongst the highest penetration rates, and is home nearly half of the region's currently active MVNOs. A new MVNO recently launched in South Africa, owned by a locally listed retailer.

Recent research by GSMA Intelligence⁶ highlighted several countries in the region that are set to introduce their first MVNO, including Kenya. Kenya's telecoms regulator awarded three MVNO licenses in the first half of 2014, with trial offers from some of these new entrants already in the market.

6. <https://gsmaintelligence.com/files/analysis-subscription/?file=140612-mvnos.pdf>

1.4.1 Moves to sustainable market structures

Competition has played an important role in making mobile services affordable to end users over recent years. However, a number of markets are highly competitive with a large number of operators. Policymakers must be wary of infrastructure duplication and high levels of competition in SSA and should allow a sustainable industry structure to emerge.

One example is Nigeria, where there are still up to nine operators competing in the market. There are signs of some of the smaller CDMA players, with limited subscriber bases, beginning to exit the market. Starcomms recently had its licence declared inactive by the NCC, after a period of significant financial losses and ongoing reductions in its subscriber base.

There are clearer signs of consolidation in other markets in the region. For example, Warid Group has been rationalising its operations in SSA. The company sold its operations in Uganda to Bharti Airtel, and those in the DRC to MTN.

Safaricom has indicated that it hopes to complete the acquisition of its smaller rival Yu Mobile (Essar) within the next few months, at a cost of around US\$120 million. The deal will see Essar Group sell its Kenyan base stations and transmission infrastructure to Safaricom and then separately sell its customer base to Airtel Kenya.

The issue of sustainable market structures is an important one for regulators. Too great a focus on promoting competition and on lower consumer prices can have a detrimental impact on medium-term investment levels which can slow the adoption of mobile broadband, reducing the possibility for mobile industry to create economic and social benefits for all.

1.5 Ongoing investments by operators to improve capacity and coverage

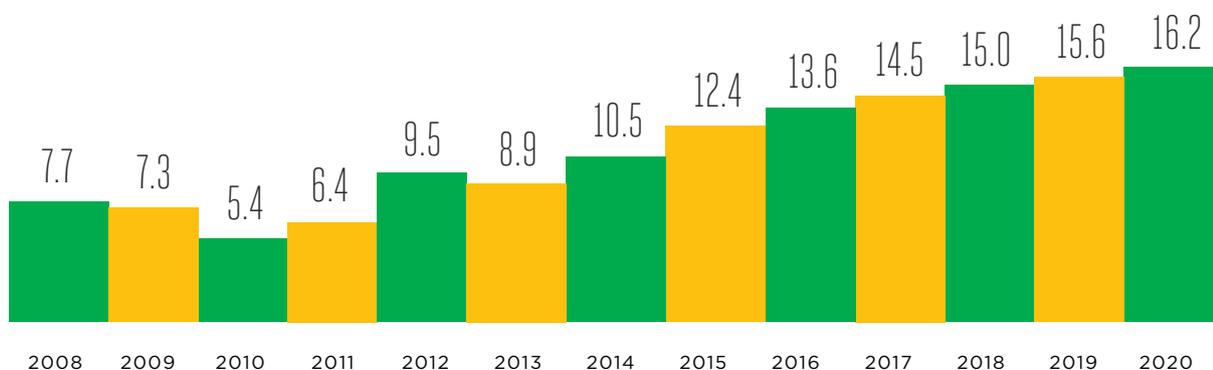
Operators across the region have seen their total capital investment (capex) grow at CAGR of 3% over the last five years. Capex in recent years has been focused on new cell sites for the 2G and 3G networks, as well as in backbone transmission capacity in a region that still lacks adequate terrestrial fibre infrastructure.

Going forward, capex growth will need to accelerate to cope with the expected strong growth in data traffic, as well as to increase 3G coverage and to begin to build out new LTE networks. Total capex over the next seven years is forecast at a total of US\$97 billion, although this level of capex will be dependent on operators maintaining positive revenue trends and adequate levels of profitability in order to justify investments of this magnitude.

Source: GSMA Intelligence

SSA operator capex

(US\$ B)



Expanding coverage in rural areas is a significant challenge for operators as a majority of rural areas and remote parts of SSA have low population densities and the users' propensity to pay is also extremely low making it difficult for operators to realise economies of scale or generate return on investments. Currently mobile network coverage levels vary significantly across the region ranging

from 55% in DRC, 38% in Central African Republic, 87% in Nigeria and 91% in Senegal (all as of the end of 2013). Operators will increasingly explore opportunities to reduce capex while embarking on network coverage expansion strategies such as active and passive network sharing and a multi-vendor strategy for their core networks.

1.6 Revenue growth set to slow but SSA will remain fastest-growing region

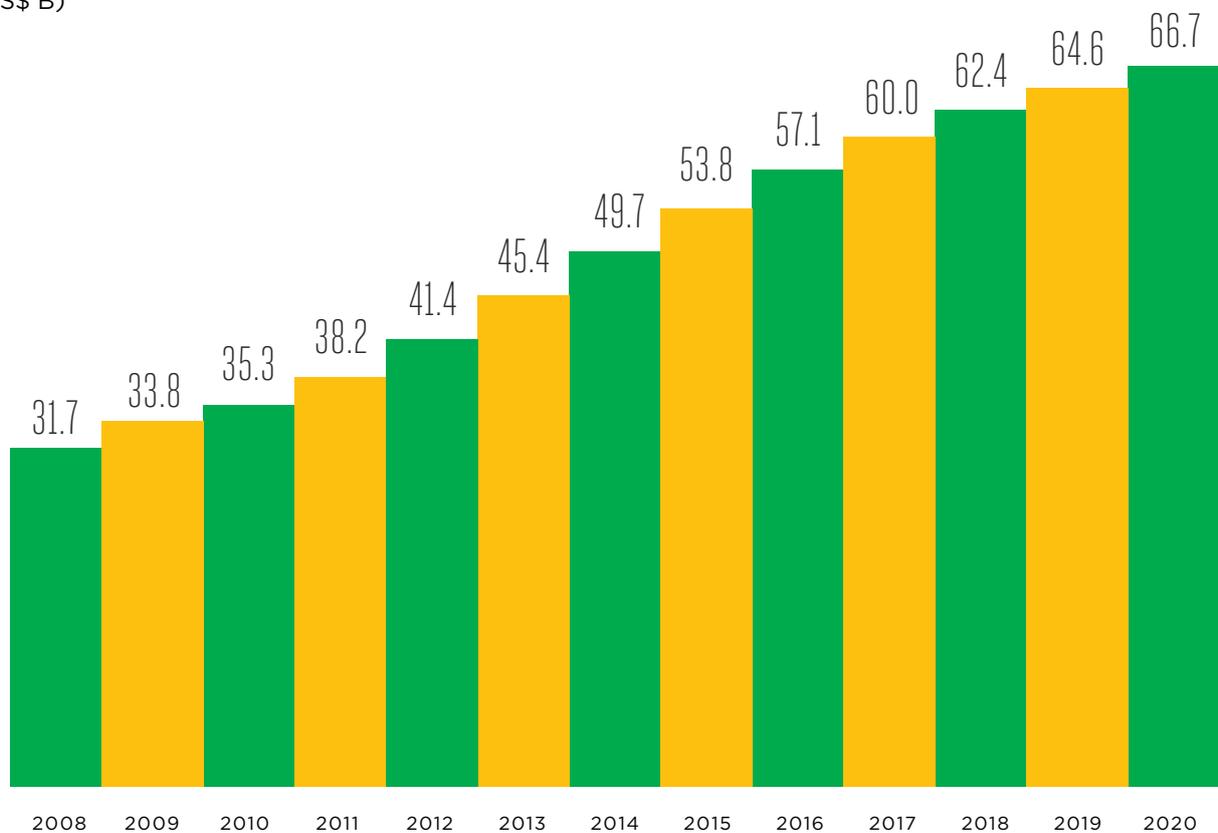
Operators across Sub-Saharan Africa have seen strong growth in revenues over recent years, driven in particular by a rise in the number of connections and subscribers. As discussed previously, data traffic is an increasingly important source of incremental revenues for the operators. Revenues grew at a CAGR of 7% per annum over the period 2008-13, by some way the fastest growth of any region.

Growth rates are set to slow going forward, reflecting both slowing subscriber growth rates and rapidly reducing ARPU levels as incremental subscribers are increasingly from lower income population segments. However, with revenue growth forecast to be a still healthy 5.6% per annum out to 2020, SSA is set to remain the fastest growing region.

Source: GSMA Intelligence

SSA operator revenues

(US\$ B)



2

The role of mobile in delivering digital inclusion to the still unconnected populations



Feature phones and more recently the increasing adoption of smartphones, are bringing internet access to the masses across the region, with SSA having seen the fastest growth in subscriber numbers of any region in recent years. The region is also now seeing an increasing migration to mobile broadband networks, with the potential to bring access to a range of new services and to have a profound impact on the lives of individuals across the region.

However, for the full potential of mobile to be realised, populations need access to mobile broadband networks and affordable devices and services. Despite the progress to date, there remains a significant proportion of the population who do not have access to the internet across SSA. This lack of internet access compared to other regions in the world has the potential to hinder development opportunities and prevent the region from truly engaging in the information age.

The challenge of broadening access to the internet is compound by the lack of fixed line infrastructure in the region, with fixed line penetration across SSA standing at only 0.3% in 2012⁸, the lowest of any region. Where fixed line networks do exist, they tend also to be relatively expensive⁹. Mobile will therefore be the key access technology to help connect these still unconnected populations, particularly with regard bridging the digital divide and delivering internet access.

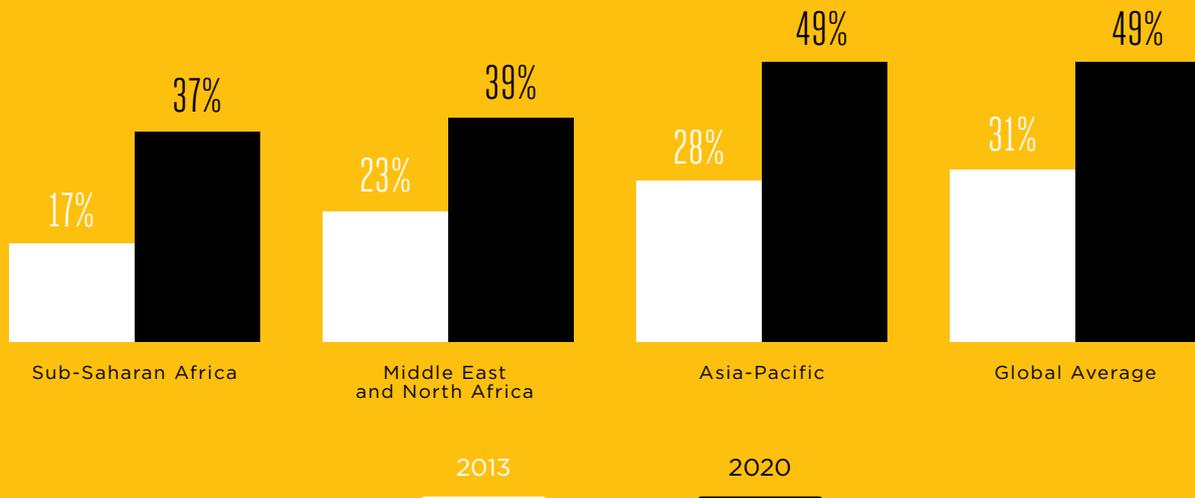
Mobile broadband has the potential to transform access to jobs and education across the region, with a number of studies having shown that broadband access is a key driver of job creation and economic growth.

At the end of 2013, there were almost 150 million individuals using mobile devices to access the internet across the region, over 60% of which were doing so over 2G devices. This is equivalent to an overall penetration rate of only 17% of the total population, compared to a global average figure of just over 30%. Including fixed lines paints a more negative picture, with internet access in SSA less than half of the global average according to International Telecommunication Union (ITU) data. The mobile internet penetration rate is expected to increase to 37% by 2020, with an additional 240 million people across SSA gaining mobile internet access over the period. The region will though remain well below the global average, with half the global population having mobile internet access by that date.

8. <https://gsmaintelligence.com/analysis/2014/02/gauging-the-relationship-between-fixed-and-mobile-penetration/414/>
9. http://www.itu.int/en/ITU-D/Regulatory-Market/Documents/IIC_Africa_Final-en.pdf

Source: GSMA Intelligence

Unique mobile internet subscriber penetration



Mobile internet access can create a virtuous cycle in developing countries. In the first instance, mobile connectivity using simpler feature phones can provide communications and basic services to currently disadvantaged populations. Indeed, as mobile networks become more ubiquitous, mobile penetration rates are often higher those for other basic services, including basic utilities, education and banking services. As a result, mobile can act as an enabler when other more traditional delivery mechanisms fall short, and is already being used to provide underserved populations with access to information and services.

McKinsey have suggested that if access to the internet achieves an impact on the same scale as mobile telephony has already achieved in Africa, then it could account for as much as 10% of total GDP by 2025, up from only 1% today. This would be equivalent to over US\$300 billion¹⁰, due to the internet's transformational effects on sectors such as retail, agriculture, education and healthcare.

The GSMA launched its Digital Inclusion programme in April of 2014 in order to expand global connectivity and to address the barriers to mobile internet adoption. The programme will collaborate with mobile operators, governments, internet players and non-government organisations to address four key barriers to mobile internet access in SSA.

- **Network infrastructure and policy:** increasing network coverage to currently unserved areas;
- **Affordability and taxation:** reducing the total cost of ownership of mobile internet services, including government taxes and fees;
- **Consumer barriers:** including digital literacy and awareness; and
- **Local content:** content that is both local language and locally relevant.

¹⁰ http://www.mckinsey.com/insights/high_tech_telecoms_internet/lions_go_digital_the_internets_transformative_potential_in_africa

2.1 Network infrastructure and policy

Whilst 2G networks have been extensively built out in most markets, in many cases higher speed mobile broadband network coverage is limited to urban areas. As a result, there are still significant populations across the region who do not have access to these services.

- **MTN in Nigeria** reported that at the end of 2013, 2G coverage stood at 87% and 3G at 49% of the population;
- **Safaricom in Kenya** reported 2G and 3G coverage at 91% and 67% respectively as of the first quarter of 2014; and
- **MTN Côte d'Ivoire** indicated that at the end of 2013, 2G and 3G coverage reached 93% and 36% respectively.

A significant proportion of the still unconnected population live in rural and in some cases geographically remote areas. These areas have additional infrastructure challenges such as a lack of electricity infrastructure and low road density, which can provide additional obstacles to extending network coverage. For example in Kenya, the large majority of the population live in rural areas (approximately 76%) where grid power distribution and reliability remains poor. Additionally a number of countries in the region have a vast geographic scale and often challenging environmental conditions making it difficult and potentially uneconomical for operators to extend coverage.

Recent research from GSMA Intelligence has also highlighted the importance of local internet exchange points, as content delivery and internet traffic is currently very Europe and North America-centric. For example, of the 436 global IXPs listed by Telegeography, only 28 (6%) are in Africa, and out of the 86 content delivery network (CDN) locations run by Level 3, one of the world's largest CDNs, 64 (75%) are based in Europe and the US, with only three in Africa.

The establishment of an IXP in the country enables local ISPs to connect directly together and exchange domestic traffic, saving cost on international transit while improving performance, and by facilitating the interconnection between operators, content providers and users, these IXPs improve the quality of service and help reduce the transmission costs for internet traffic in their respective country

2.1.1 Measures to address the infrastructure barriers – the industry players

Operators across the region have already invested significant amounts in order to broaden network coverage, and are committed to even higher levels of investment in network infrastructure and connectivity going forward. MTN Uganda, plans to invest UGX 238 billion (US\$89 million) on upgrading its networks in 2015. Vodacom is currently preparing to extend its network coverage to two underserved central provinces of the Democratic Republic of Congo (DRC), by deploying around 61 antennas in remote areas- covering a total of around 15 million people.

Operators in Kenya and a number of other countries across SSA are now employing a wide array of solutions to tackle the challenge of off-grid connectivity, including the growing use of 'green' solutions-solar, wind, water, biomass and fuel cells. Such alternatively powered cell sites can significantly reduce the cost of using diesel, often the main power source in areas of the main electricity grid, and so help extend coverage to more remote areas on a more cost effective basis.

The GSMA's Green Power for Mobile estimated that at the end of 2013, there were around 2,365 off-grid sites using renewable energy solutions¹¹. This is only a small proportion of the total of off-grid mobile towers (estimated at around 45,000 in 2012), though the deployment of renewable energy is likely to increase going forward.

Network sharing is another solution that can help reduce the cost of extending network coverage, particularly into remote or geographically challenging areas. Network sharing can also significantly increase capacity in urban areas, particularly for example where operators are looking to deploy small cell technology. There have been some moves to introduce network sharing in South Africa, Nigeria and Ghana, but so far it has not been widely adopted by operators as a strategy to increase capacity and coverage.

In Kenya, the creation of a local IXP has enabled the localisation of over 1 gigabyte per second of peak traffic, dramatically reducing latency (from 200–600ms to 2–10ms on average), while saving ISPs almost US\$1.5 million per year on international connectivity. The IXP also played a role in increasing mobile data revenues by an estimated US\$6 million as a result of increased data traffic. Finally, it has improved the visibility of local content through search engine optimisation, contributed to government tax revenues, and increasingly acts as a regional hub for traffic from neighbouring countries¹².

11. http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/04/MECS_Synergies-between-Mobile-Energy-and-Water-Access_Africa.pdf

12. Assessment of the Impact of Internet Exchange Points: Empirical Study of Kenya and Nigeria, Analysys Mason, April 2012

2.1.2 Measures to address the infrastructure barriers – governments and regulators

Whilst the operators themselves are taking steps to address the coverage challenge, there are measures that can also be taken by governments and regulators to help support the goal of improving mobile broadband coverage. These particularly relate to issues around spectrum management, network sharing and proposals for single wholesale networks (SWN).

a) Regulators should facilitate voluntary network sharing

The GSMA believes that regulators should facilitate voluntary network sharing (both active and passive). Furthermore, registered providers (including third party tower companies) should be permitted to construct and acquire passive infrastructure and then sell access to operators.

b) Spectrum management and release of the Digital Dividend spectrum bands

The spectrum management policies of countries also play a critical role to realise the potential of mobile broadband. Governments and regulators must do their part, particularly by the timely releasing of spectrum to accelerate mobile broadband deployments, such as the Digital Dividend spectrum, that can play an important role in facilitating faster and efficient network deployments. Lower frequency bands in particular (the 700MHz and 800MHz bands) have broadest geographical coverage and are therefore more cost-effective in providing coverage to wider areas.

c) Regulators should not impose single wholesale networks

Furthermore, there is a need to overcome the barrier of building high-capacity backbone networks. Government policy related to these networks is a key component of overall broadband policy. Regulators in several countries have voiced support for single wholesale networks as a way to expand coverage and use spectrum more efficiently. However, a GSMA report has highlighted the risks of this approach, which would remove the competition between networks that drives innovation and investment in telecoms industry¹³. GSMA believes that the move away from single networks to multiple operator markets has delivered significant benefits for both consumers - such as falling prices and expanded coverage - and economies, which have benefited from huge investments in infrastructure.

13. <http://www.gsma.com/newsroom/gsma-report-favours-competition-over-single-wholesale-networks/>

2.2 Affordability barriers: significant challenges in bringing inexpensive internet access to all

Unconnected populations in developing regions often have low income levels. According to the UN, nearly half the global population, 2.8 billion people, live on less than US\$2 a day, which represents the poverty line in developing nations. The latest data from the World Bank showed that in 2010 nearly half of the population in SSA was still living below the poverty line, the highest proportion of any region. This highlights the particular challenge of raising levels of digital inclusion in the region. Connectivity remains beyond the reach of many, particularly those who must prioritise food, shelter, clean water and energy over access to the internet.

2.2.1 Measures to improve affordability

There have been considerable efforts over recent years both by mobile operators and other ecosystem players, including device manufacturers, to improve the affordability of mobile services. Although handsets are not subsidised in most countries across SSA, operators are now making efforts to attract lower-income subscribers via a range of new pricing and marketing strategies. MTN South Africa in September 2014 announced the availability of new bite-sized internet bundles, designed to give consumers quick access to the internet for three months.

Smartphone adoption will be enabled by ongoing reductions in handset pricing. However, with the average smartphone ASP still standing at US\$293 in 2013, such devices remain unobtainable by the vast majority of the population in developing countries. Mozilla has announced plans to bring a low cost smartphone to developing countries, with the company announcing in 2013 plans to launch a new device in the sub-US\$50 range through collaboration with a number of handset manufacturers and operators. The company has recently announced that it will begin marketing a device priced as low as US\$25 in a number of markets including India and Indonesia before the end of this year¹⁴.

There is an important role for regulators and government in further improving the affordability of mobile services. Taxes on mobile devices and usage will hinder efforts to improve the affordability of mobile services in SSA. A recent study by the GSMA found that across a sample of 19 countries, US\$3 out of every US\$10 of mobile revenues was transferred to the government in the form of taxes, regulatory fees or other charges¹⁵. Examples of highly taxed mobile countries in SSA that were in the study include Chad, Ghana, Nigeria, South Africa and Cameroon. All of these countries have a mobile service's burden of over 20%. These high levels of taxation add significantly to the cost of services for consumers, so proving additional obstacles to the goal of delivering more affordable mobile services to currently underserved populations.

Other sector-specific taxes in the region include taxes on international incoming traffic, which have been imposed in 15 countries over the last five years and can serve to reduce calling volumes to impacted countries. In addition, many African governments have established universal service funds, which impose levies on operators. However, in many cases these funds have relatively low levels of activity, while they can have a significant impact on operators' ability to invest in network infrastructure. Both of these topics are explored in more detail in the final section of this report.

14. <http://online.wsj.com/articles/mozilla-to-sell-25-smartphones-1402466959>

15. http://www.gsma.com/publicpolicy/wp-content/uploads/2014/02/Mobile-taxes-and-fees-A-toolkit-of-principles-and-evidence_fullreport-FINAL1.pdf

2.3 Consumer barriers - literacy and awareness

There has been significant progress in increasing adult literacy rates across SSA in recent years. Despite these advances, around 37% of the adult population still lack basic literacy skills, equivalent to over 170 million people¹⁶. In addition to basic literacy, digital literacy—the ability to effectively and critically navigate, evaluate and create information using a range of digital technologies—is also significantly lacking amongst the population in SSA.

There is also a gender dimension to this challenge, as females generally have lower language and digital literacy rates across SSA as compared to men. Research conducted by the GSMA Connected Women programme highlighted that women in low and middle-income countries are 21% less likely to own a mobile phones compared to men. Whilst many women were comfortable with making and receiving phone calls, less than half of women showed confidence sending and receiving SMS¹⁷.

A significant portion of the offline population in SSA also lack the awareness of the internet or its use cases. A survey conducted by Research ICT Africa (RIA) in 2012, showed less than half of the respondents' in Namibia, Nigeria, Cameroon, Ghana, Rwanda and Kenya were aware of the internet while only a quarter knew what it was in Ethiopia and Tanzania¹⁸. Furthermore, awareness of relevant use cases is also a barrier to adoption- many customers in Kenya who have access to mobile phones do not use any applications other than M-PESA due to a lack of awareness and confusion about the difference between applications, phone functionalities and the Internet, as well as challenges in the use of USSD/SMS applications¹⁹.

16. <http://www.uis.unesco.org/literacy/Documents/fs20-literacy-day-2012-en-v3.pdf>

17. http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2013/01/GSMA_Women_and_Mobile-A_Global_Opportunity.pdf

18. The RIA (Research ICT Africa): <http://www.econstor.eu/bitstream/10419/72503/1/741715880.pdf>

19. iHub, Research Solutions Africa: http://www.infodev.org/infodev-files/final_kenya_bop_study_web_jan_02_2013_0.pdf

2.3.1 Measures to address the consumer barriers

Mobile operators have been at the forefront of the drive to improve awareness of the internet and technical literacy amongst their subscriber bases. This is being achieved through a range of measures, including direct marketing or by holding regional events and exhibitions to showcase new data products and services.

An example is MTN in Uganda, where the company has launched the 'MTN Internet Bus' in order to deliver ICT education to rural populations. The bus has computer work stations linked to MTN's 3G and LTE networks, and aims to provide training in basic computing skills and e-learning.

The African Story Book project aims to provide stories in local languages in order to help children read in their own languages and so develop multi-lingual literacy. The project will rely on open access and innovative digital publishing models in order to encourage the development of new reading practices in schools and communities. The initial focus will be a pilot launch in South Africa, Kenya and Uganda.

There is also an important role for governments to play in raising digital literacy across the region. The South Africa government launched its 'South Africa Connect' strategy in 2013. This is a broad programme that aims to focus on a range of issues that impact on digital inclusion. The strategy specifically includes plans to introduce an e-readiness campaign in schools as well as more widely focused e-literacy campaigns.

There have also been concerns about impact of mobile phone usage on young people. The GSMA leads and participates in a range of initiatives designed to protect children online, promote the safer use of mobile phones by children and young people, and help operators address new issues in an efficient and timely manner.

2.4 Local content

A recent GSMA report highlighted the fact that content and services that are relevant, accessible, and available to the users in their own language will be crucial in bringing the full benefits of the mobile internet to users²⁰. The vast majority of digital content and mobile applications and services accessible across SSA have been developed in more advanced markets. There has been little or no customisation in terms of either the content or the languages available online. There are large proportions of the population in SSA for whom English is either not their first language or in many cases not spoken at all, whilst a broad range of local dialects can provide a further hurdle.

However, some localisation approaches are now emerging. One example is HiviSasa- a free online newspaper in Kenya offering locally-relevant news generated by young people. Google also began launching localised versions of YouTube for Sub-Saharan countries, encouraging subscriptions and uploads - overall the number of YouTube views in Nigeria grew by 125%, 140% in Ghana, 95% in Kenya and 80% in South Africa in 2012.²¹

EveryImobile is a South African based company that uses social media to provide relevant and interesting content and information to young people, with eight 'communities' developed focused on specific topics including health, education and entertainment. The company has a strong presence in seven countries across the region, and with a growing presence in 12 more²².

The growing smartphone user base is also leading to an increasing amount of local app development in a number of countries. Nigeria provides a good example, where high levels of blackberry ownership have created an important local market. As of January 2013, there were said to be 146 developers in Nigeria, who between them had submitted 419 apps specifically for African BlackBerry consumers²³.

The operators themselves are playing an active role in addressing these challenge of locally relevant content and services:

- **The Vodacom Developer Programme** aims to partner and collaborate with local application developers, and provides technical and commercial support. The programme aims to maximise the exposure to local consumers for new apps and services;
- **RIM** is working with a number of universities and schools across Africa in order to teach and educate students on mobile application development, as part of its BlackBerry Academic Programme; and
- **The Grameen foundation** has created the AppLab Incubator in Uganda in order to design and deliver new mobile services and applications that specifically target the needs of the poor and rural population, both in Uganda and more broadly across the region.

The South Africa Connect programme referenced earlier in the report also includes measures that aim to improve the provision of local content and services. These programmes will include a local content and applications development fund and dedicated ICT entrepreneurship and research and development funds.

20. <https://gsmaintelligence.com/analysis/2014/09/local-world-content-for-the-next-wave-of-growth/445/> "Local world – content for the next wave of growth"

21. <http://www.technessivity.com/2013/03/nigeria-records-2nd-highest-youtube-growth-in-sub-saharan-africa-in-2012/>

22. <http://www.africabusinesscommunities.com/index.php/rss-abc-interviews/202864-interview-with-ceo-of-everyimobile-impact-of-mobile-tech-on-african-youth>

23. <http://www.mcsaatchimobile.com/wp-content/uploads/2013/06/Inside-Mobile-Africa.pdf>

3

The social and economic contribution of mobile in Sub-Saharan Africa

3.1 The mobile ecosystem makes a significant contribution to economic growth

The rapid growth in the mobile subscriber base and usage levels in recent years has meant that the sector makes a very large contribution to the economy of the region, totalling 5.4% GDP in 2013. This overall impact includes a direct contribution from mobile network operators of US\$27 billion (1.9% of the region's GDP), and from directly related industries such as infrastructure service providers, retailers of mobile products and services, handset manufacturers and mobile content creators (the mobile ecosystem) of US\$8 billion (0.6% of GDP). The activity generated by both the mobile operators and the ecosystem also has a knock-on effect on the rest of the economy, inducing further economic activity valued at US\$7 billion (0.5% of GDP).

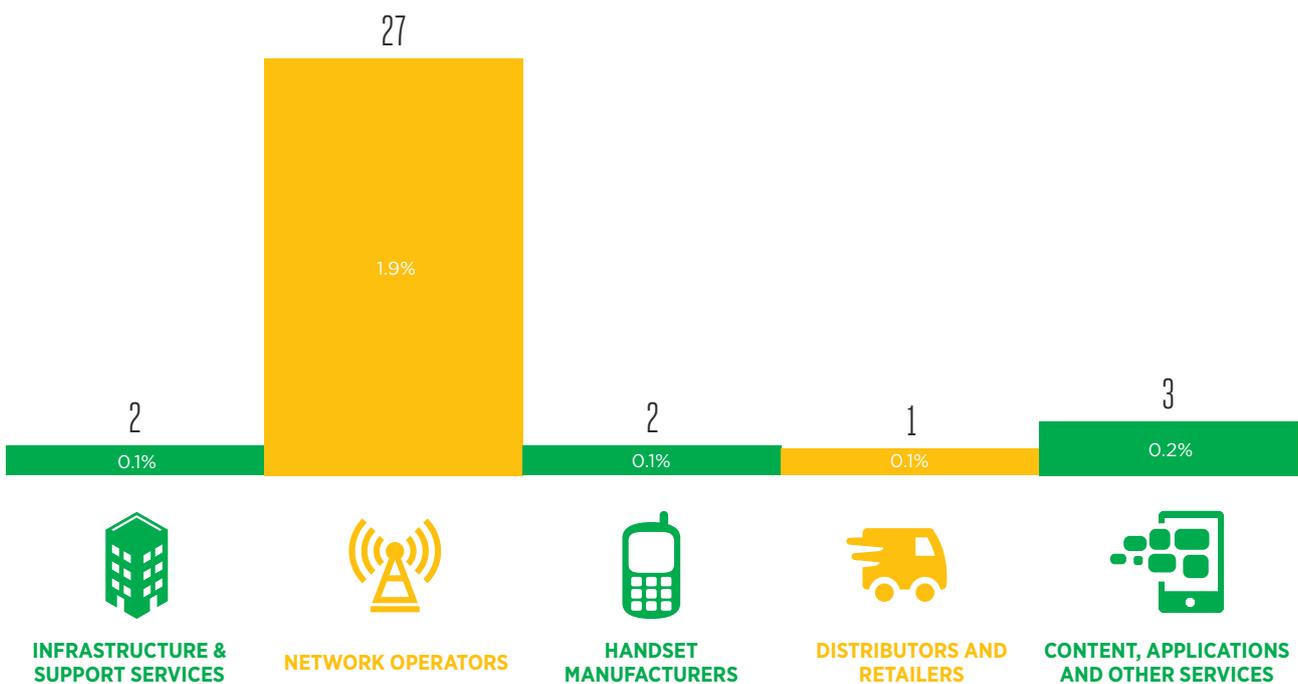
Additionally, the use of mobile technologies also means a more efficient use of existing resources. The increased productivity brought about by the widespread use of mobile technology in businesses and by workers in the region generated an additional US\$33 billion in 2013, or 2.4% of GDP.

The direct economic contribution to GDP of the mobile ecosystem (mobile network operators and other related industries) is estimated by the value created by companies that operate in the sector. The value that is added to the region's economy is equivalent to the payment of wages, tax contributions and business profits by the industry²⁴.

Source: GSMA Intelligence

Direct GDP contribution of the mobile ecosystem

US\$ B, % 2013 GDP



24. Value added by the sector can also be approximated as the difference between the value of sales made by the sector and the direct cost of making these sales.

Beyond the direct contribution to GDP, revenues generated in the mobile industry have a multiplier effect on the rest of the economy. A significant proportion of the wages, taxes or profits paid out by the industry are subsequently spent across other sectors of the economy. This results in other economic sectors also benefiting from the value added generated by the mobile ecosystem. It is estimated that this effect resulted in the generation of additional economic activity in SSA with a value of US\$7 billion in 2013.

In addition to the direct and indirect contribution to GDP by mobile network operators and the mobile ecosystem, an additional 2.4% in GDP comes from the increased productivity brought about by the widespread use of mobile technology across other sectors of the economy. Mobile technology has already facilitated productivity improvements for many workers and businesses. For example, the costs to access and send information have reduced drastically, allowing as a result more effective coordination and exchange of information and an improved decision making process for many businesses. In the agricultural sector, mobile services have brought about better access to pricing,

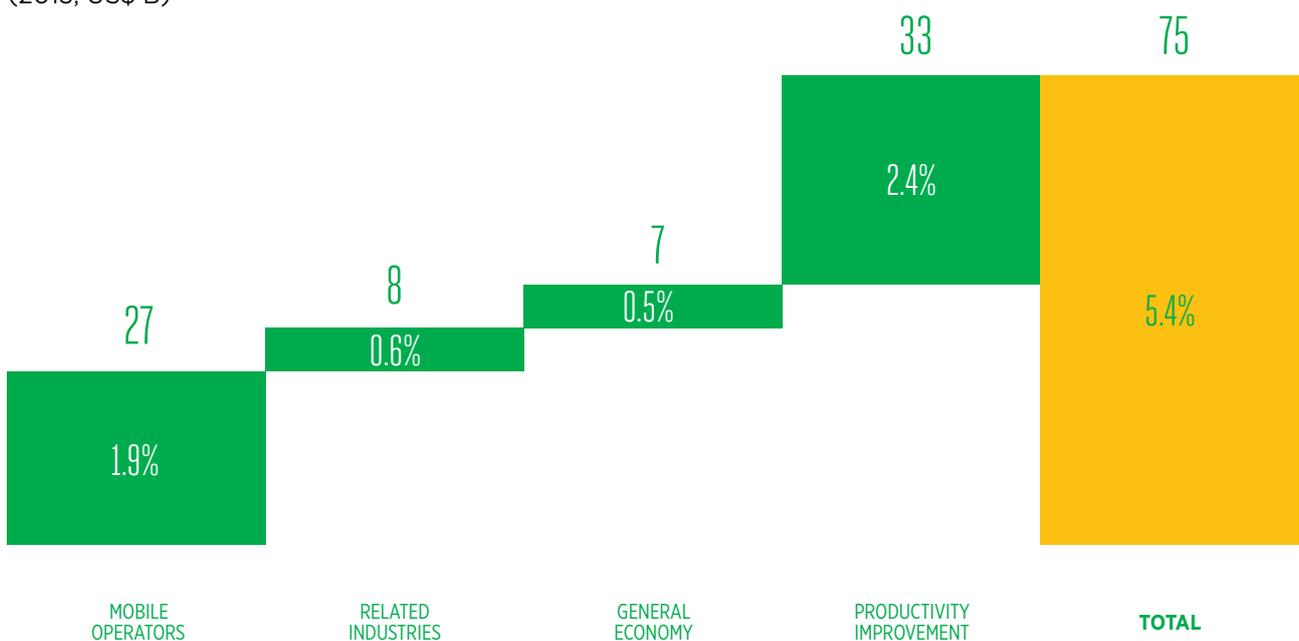
weather and other key information, and this has helped support improved logistics in the sector. The increase in productivity is estimated to have already generated in 2013 an additional US\$33 billion contribution to GDP. Productivity growth has the potential to increase even more in the future, as more efficient practices are adopted on the back of increasingly advanced services supported by mobile broadband.

Overall, in 2013 the mobile industry made a contribution of US\$75 billion or 5.4% of the region's total GDP.

Source: GSMA Intelligence

Total (direct and indirect) contribution to GDP

(2013, US\$ B)

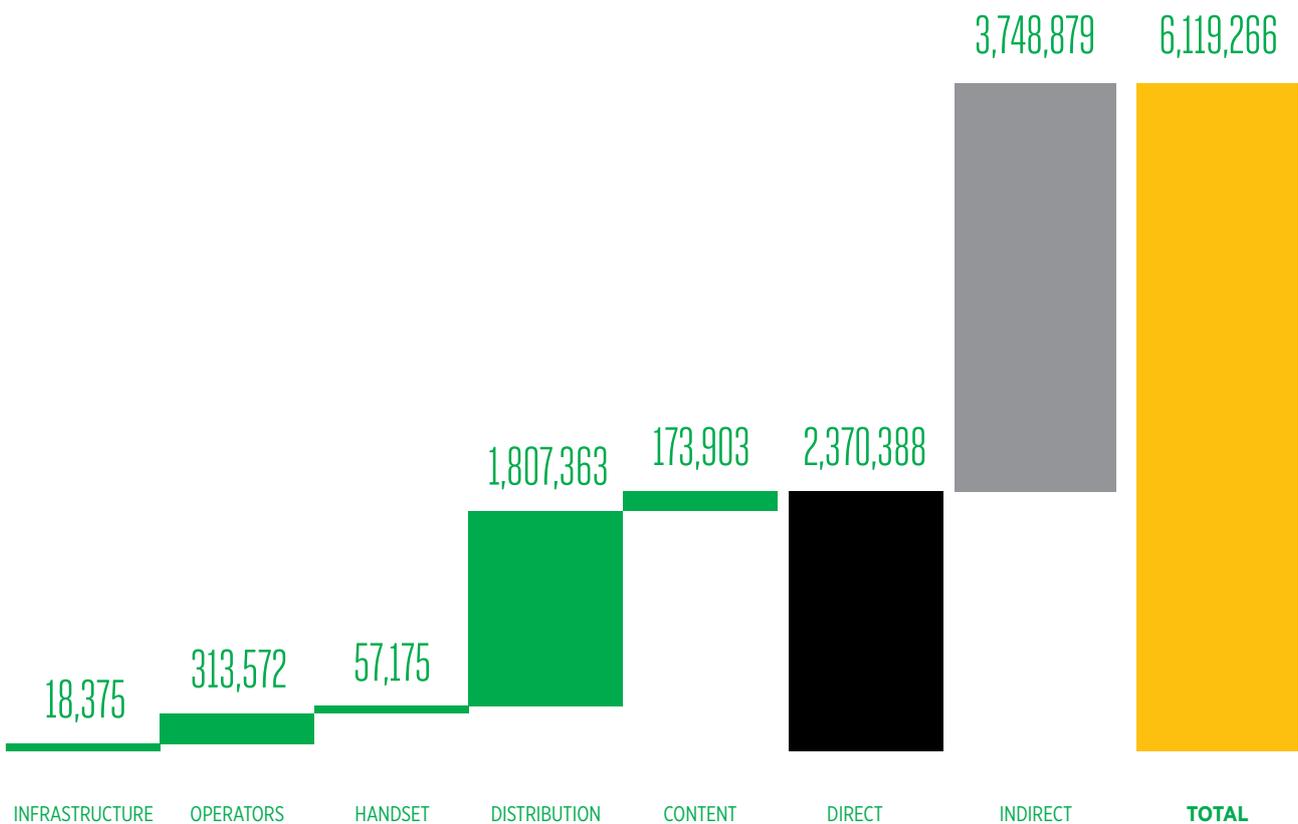


In 2013, the mobile industry provided direct employment to 2.4 million people in the region. A significant proportion of these direct jobs were in distribution and retail services, many of which were small retailers involved in selling pre-pay cards, mobile handsets and other mobile-related products and services. A significant proportion of jobs was also provided by mobile network operators, with a little over 300,000 persons directly employed by operators.

Additional jobs were also indirectly supported in the rest of the economy as wages, public funding contributions and profits paid by the industry are re-spent elsewhere in the economy. It is estimated that nearly four million jobs were indirectly supported in this way, bringing the total impact (both direct and indirect) of the mobile industry in SSA to more than six million jobs in 2013.

Source: GSMA Intelligence

Direct and indirect employment from the mobile ecosystem

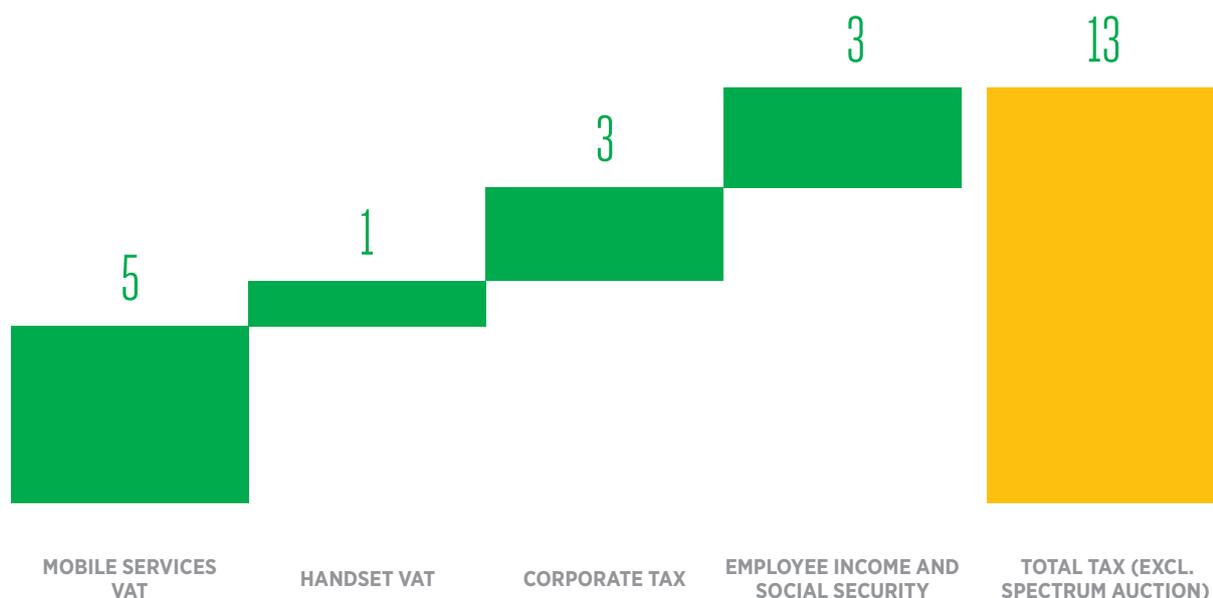


The mobile industry also makes a substantial contribution to public funding in the region. The mobile ecosystem makes a sizeable contribution through general taxation, which for most countries includes sales tax, corporation tax, income tax and social security. The GSMA estimates that the mobile sector made a public funding contribution of approximately US\$13 billion in 2013.

Source: GSMA Intelligence

Contribution to public funding from the mobile industry

(2013 US\$ B)



In addition to the funding provided to governments across the region in the form of general taxation, mobile operators also make further contributions to public finances through the payment of mobile-specific taxes in a number of countries. For example, the effective tax rate on mobile handsets can be as high as 50% in some countries of the region, such as in Cameroon²⁵. An additional US\$575 million has been raised across the region as universal service funds contributions – most of which (over US\$400 million) remain undisbursed, as indicated in a study recently commissioned by GSMA²⁶.

25. ITU (2013) <http://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Publications/Taxation2%20E-BAT3.pdf>
 26. Ladcomm Corporation (2014) http://www.gsma.com/publicpolicy/wp-content/uploads/2012/03/Sub-Saharan_Africa_USF-Full_Report-English.pdf

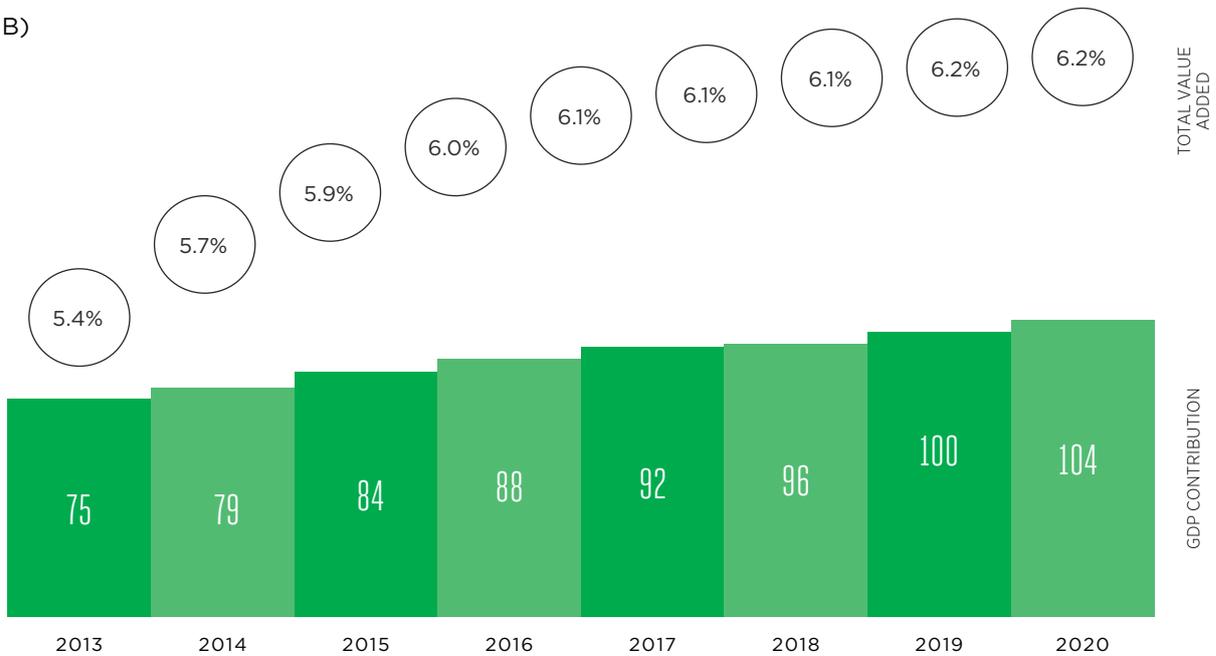
3.1.1 Outlook to 2020

Going forward, the mobile industry will continue to increase both in absolute and relative terms its contribution to the economy of the region. This growth will be brought about by the increasing numbers of subscribers and value added services generated by the ecosystem, but also by the increasingly transformative use of mobile technologies in society, enabling a more efficient use of resources and supporting growth not only in the sector but throughout the whole economy. By 2020, it is estimated that the mobile ecosystem will contribute US\$104 billion to the region’s economy, representing at that point 6.2% of the region’s projected GDP in 2020.

Source: GSMA Intelligence

Mobile contribution to GDP to 2020

(US\$ B)



The predicted increase in GDP contribution over the period will be accompanied by a strong growth in the number of people directly employed by the industry, which will reach 3.5 million people by 2020, up from 2.4 million in 2013.

3.2 The role of the Internet of Things in Sub-Saharan Africa

There are many challenges facing communities across SSA, including those arising from high levels poverty and the need to extend access to basic services to currently underserved populations. The region has seen encouraging progress in raising economic growth rates over recent years, though significantly more needs to be done given the relatively low starting point. The economic and social situation in the region still remains fragile and vulnerable to internal and external shocks.

The Internet of Things (IoT) has the potential to offer a range of innovative new services and solutions to individuals across the region, and in doing so to begin to address some of these challenges. Mobile networks have become the predominant infrastructure across SSA with more people now covered by mobile networks than have access to energy and water. Mobile is already bringing internet access to previously unconnected populations (as discussed previously), as well as delivering a growing range of financial services to previously unbanked populations.

The broader mobile ecosystem is also an important source of innovation across SSA, with mobile playing a role as a crucial enabling platform for companies to reach new customers and to monetise new products and services. Whilst many of these services are still at a relatively early stage of development, with the right policy environment and with increasing collaboration between all players in the ecosystem, the industry has the potential to make a more significant contribution going forward.

3.2.1 Growing range of M2M deployments across SSA

There are already a broad range of IoT deployments across SSA, with around seven million cellular M2M²⁷ connections by mid-2014. South Africa remains the biggest market for M2M followed by Kenya with deployments seen in vehicle tracking, monitoring air quality and railway track conditions. The rise of tech hubs across SSA, as discussed in the next section will bring innovative new M2M services in the coming years. However, as an increasing number of businesses and enterprises adopt M2M technologies, operators must have the right infrastructure, software and services to support for the growing demand.

27. The GSMA Intelligence M2M connections data used in this report refers exclusively to a SIM connection that enables mobile data transmission between machines. It does not count SIMs used in computing devices in consumer electronics such as smartphones, dongles, tablets, e-readers, routers and hotspots

Examples of current deployments include the following:

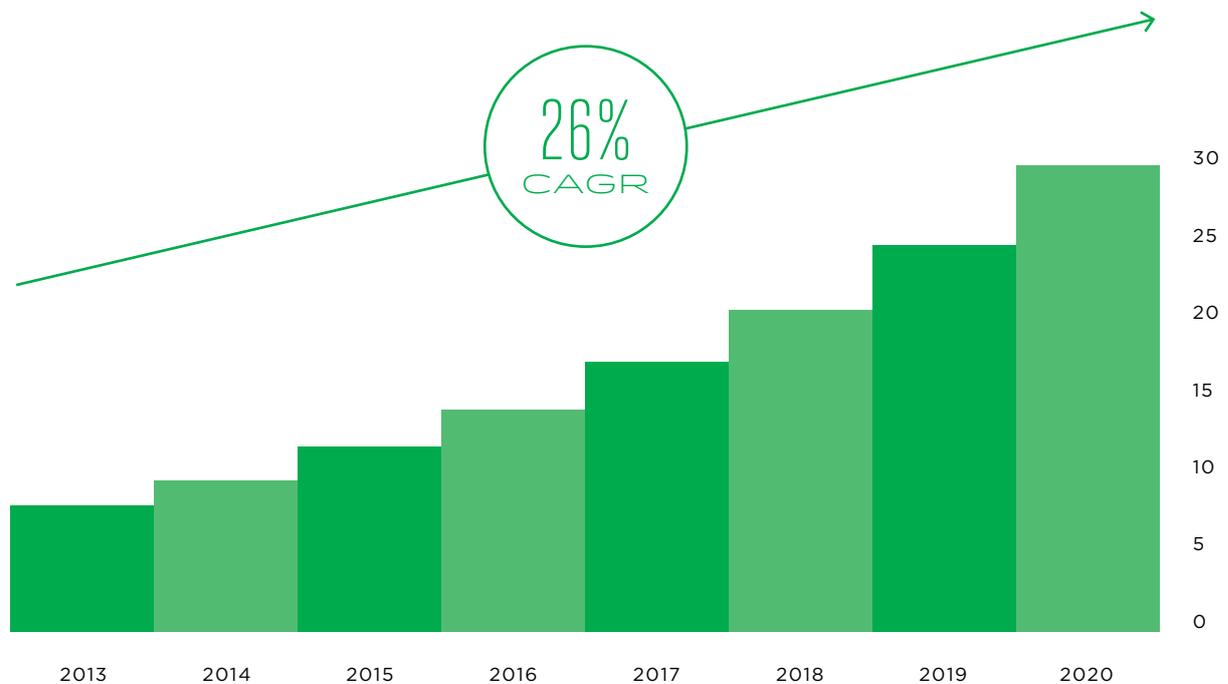
- **Airtel Congo** has partnered with a local vehicle tracking company to offer fleet location services to its customers.
- **MTN Rwanda** recently reported that the fastest growth in connections was in the area of point-of-sale (PoS) terminals, a market that had seen rapid growth over recent years. The market is being driven by the focus of financial institutions in the country on growing the number of payment cards in use.
- **MTN in South Africa** recently implemented its first smart metering project for the City of Johannesburg. This project aimed to install 50,000 meters by June 2014 as part of the first phase of the project, which is due to complete in 2015.
- In the health sector, **Sequoia Technology** provides a HIV diagnosis communications system using M2M GPRS printers and a dedicated GSM gateway. The solution allows for test results from far away laboratories to reach the clinics much faster, saving lives in the process.

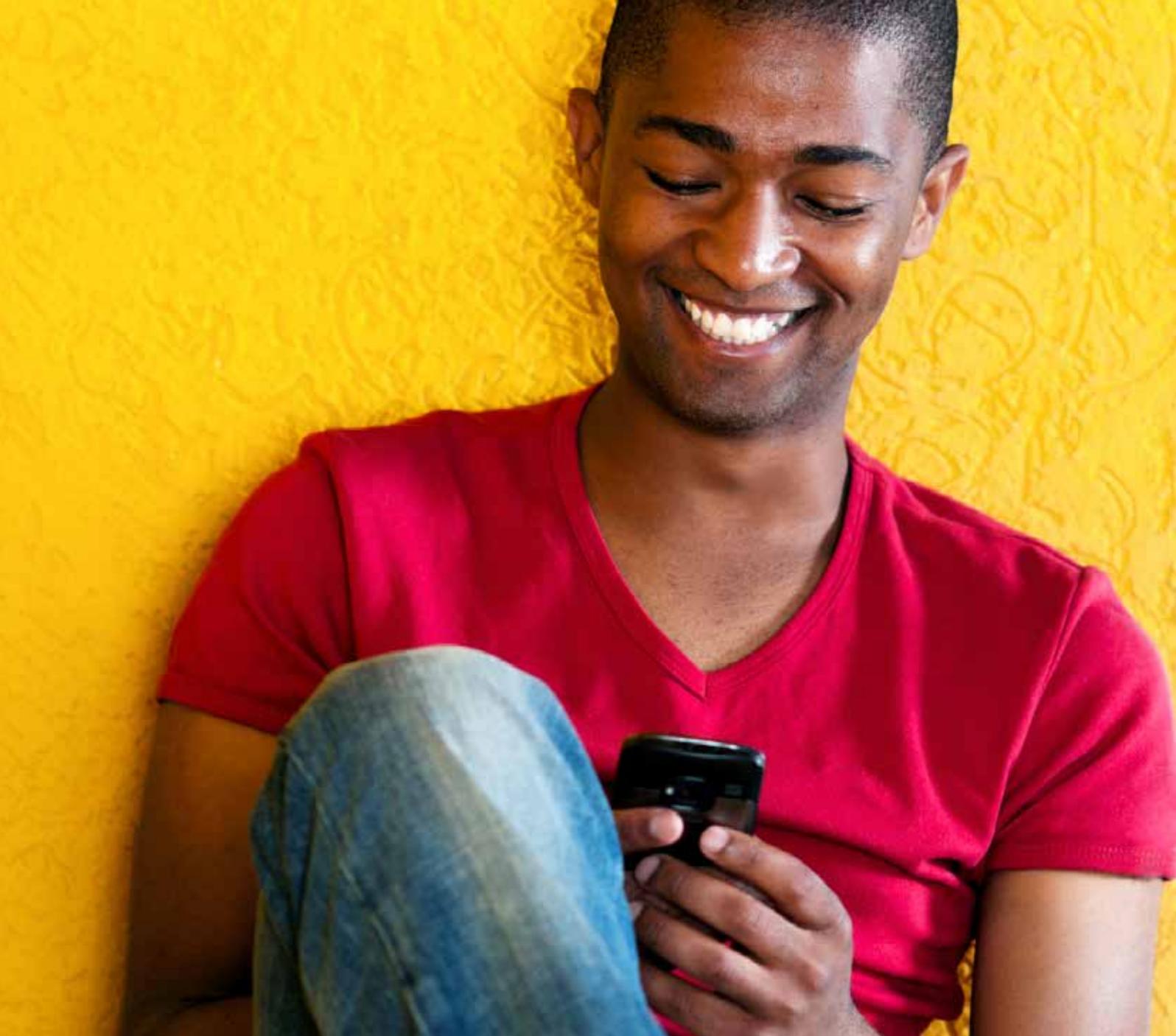
The market will witness a number of innovative new M2M approaches in areas as diverse as telematics, smart metering, mobile banking and finance, security solutions and smart cities. The total number of M2M connections in SSA is forecast to grow at a CAGR of 26% per annum, reaching 28 million connections by 2020.

Source: GSMA Intelligence

Cellular M2M connections SSA

(M)





There are upside scenarios to these forecasts if a number of growth inhibitors are addressed by industry players, regulators and governments over the coming years, as highlighted in recent research by GSMA Intelligence²⁸. The areas identified as possible growth stimulators and that are of particular reference to SSA include the following:

- The introduction of additional government policies enabling a wider deployment of cellular M2M connections in key sectors such as utilities, smart cities, automotive and healthcare.
- The development of new operator business models in the M2M space, particularly those that move beyond simply providing the mobile connectivity.

Addressing these growth inhibitors, both at a regional and global level, could see growth rates similar in future to those witnessed over the past few years, which could result in an uplift over the current trajectory forecasts ranging from 30% to 50%.

28. <https://gsmaintelligence.com/analysis/2014/9/cellular-m2m-forecasts-and-assumptions-2010-2020/446/>

3.3 Digital entrepreneurship: mobile driving growth of new businesses and start-ups across SSA

The evolution of the mobile industry in SSA is also bringing new opportunities for digital entrepreneurship. The industry has stimulated the emergence of a number of hubs, incubators, and accelerators across SSA from Cape Town to Kigali, Lagos and Nairobi. While many are still in the relatively early stages of development, these hubs have the potential to support and grow successful businesses across the region. As well as more established centres such as iHub in Kenya, there are a number of new examples of these across the region:

- **Orange** runs a network of start-up accelerators across the world and has recently launched the Orange Fab Cote D'Ivoire. The programme aims to help the growth of new digital businesses in the local economy, and has already identified four start-ups that will receive mentoring and financial support to help them develop.
- In March 2014, **Tigo Rwanda** launched a tech incubator called 'Think' designed to support exceptional start-ups in developing new and innovative digital solutions.
- In February 2014, **IBM**, announced two new innovation centres in Nigeria to help spur investment and technology transfer, particularly in the areas of big data and cloud computing in Lagos and Calabar.

There are also many examples of successful start-ups now emerging:

- In Nigeria the **Stereo.me** service allows educators to pre-record content which is then delivered through a voice call to students outside the classroom. Teachers are notified on completion of the work, reducing time spent on this in class²⁹.
- **MoWoza** in Mozambique uses text messages and a smartphone app to find available taxi drivers to deliver parcels from wholesales to small traders, allowing for a more efficient supply chain.
- **ReKindle Learning** was set-up in South Africa in 2013 and is developing personalised, interactive learning apps that work on simple mobile devices such as feature phones.

Recent research by the GSMA highlights the potential opportunity for the mobile industry to engage, collaborate, and partner with entrepreneurs in Kenya in order to build a thriving digital entrepreneurship ecosystem in the country, to the benefit all players³⁰.

29. <https://gsmaintelligence.com/files/analysis/?file=140626-nigeria.pdf>
30. <http://www.gsmaentrepreneurshipkenya.com/>

3.4 mHealth: facilitating health service delivery across the region

SSA faces significant challenges in the provision of basic health services. Infant and maternal mortality remain significant problems, with the maternal mortality rate of one in 30 in SSA, around 130 times greater than the risk in developed markets.

Mobile is already facilitating the delivery of basic health services to underserved populations across SSA by successfully addressing challenges such as reducing maternal and infant mortality rates, combatting infectious diseases, creating awareness of HIV and delivering nutritional health and treatment for a variety of health conditions remotely.

The GSMA is also playing an active role in helping the development of mHealth services. In June 2012, the GSMA mHealth programme launched the Pan-African mHealth Initiative (PAMI). After an initial focus on South Africa, in September 2013 PAMI launched the nutrition initiative, in the area of maternal and child health. This 10-country (Cote d'Ivoire, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda and Zambia) initiative aims to improve the health of at least 0.5 million people by 2016, rising to one million by 2018, by catalysing partnerships and facilitating the development of mHealth nutrition advisory services.

Prominent mHealth services that are already operational in SSA include the following:

- **Hello Doctor** is a paid mobile health service recently launched by MTN in South Africa, giving users access to advice and assistance from doctors and helping them to make informed decisions about their health. The service was launched in late November 2013 and is in the process of being rolled out to several markets, including Zambia, Ghana, Uganda, Cameroon and Rwanda.
- **MomConnect** is the first national public mHealth service in South Africa launched by the Department of Health. The service aims to promote the registration of each pregnancy at a government health facility, and then sends stage-based, personalised SMS to each mother, whilst also allowing women to engage with the health system through help desk tools and services.
- **M-Pedigree** in Ghana is a mobile application helping users determine the authenticity of their medication. Working with technology providers and pharmaceutical companies, the service aim is to protect consumers from the fatal effects of pharmaceutical counterfeiting, which kills nearly a million people a year, and maim countless more, in vulnerable parts of the world.
- Grameen Foundation's **Mobile Midwife Service** in Nigeria sends local language voice messages containing targeted, time-specific information to women and their families during pregnancy and the first year after birth. Grameen received a grant from the GSMA Connected Women programme in order to replicate a service that Grameen already offers in Ghana. There is a high incidence of both maternal and child mortality in Nigeria, with the service aiming to reach 200,000 women in its first year³¹.

31. http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/08/Mobile_Midwife_Snapshot_Online.pdf

3.5 mAgriculture: empowering smallholder farmers in SSA

Mobile technology has potential to improve the way that the agriculture sector operates in SSA. Agriculture employs two third of Africa's labour force and accounts for a third of the region's GDP³². It remains the most essential sector for SSA's growth with mobile now giving farmers the opportunity to stay abreast of pricing movements, gain access to current market information, take advantage of financial services and supply chain solutions thereby helping them to increase their yield, cost crops or livestock more competitively and grow their business.

The use of mobile enabled services is particularly helping smallholder farmers in more remote areas where limited infrastructure has hindered their progress due to a lack of information. Several initiatives are being offered by mobile operators, entrepreneurs and start-ups across the sector:

- **Tigo Kilimo** was launched in 2013 by the Tanzanian mobile phone operator Tigo. The service aims to increase productivity for farmers through providing a range of information covering for example weather forecasts, best practices tips and market prices for the major crops grown in the country.
- **Vodacom Tanzania** is using mobile based services to improve the performance of smallholder farmer in the country, part of the Connected Farmers Alliance. Services offered include access to real time weather and pricing information, as well as payment services that allow farmers to receive payment for their crops.
- **Kilimo Salama** (micro-insurance of crops): Safaricom in Kenya offers micro-insurance covering crops in case of extreme drought or extreme rain, based on measurements of the closest weather station, using mobile money.

32. <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21935583-pagePK:146736-piPK:146830-theSitePK:258644,00.html>

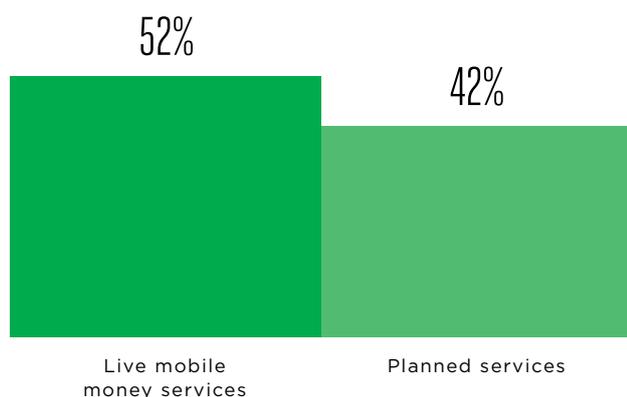
3.6 Mobile money: extending the reach of financial services across SSA

Access to finance remains a key challenge for populations across SSA, where low income levels and a general lack of brick and mortar infrastructure means that traditional banking models are not economical to deploy. Mobile money services have already made a significant contribution to delivering financial inclusion, though there is still much to be done, with only around 20% of families in the region having access to bank accounts³³.

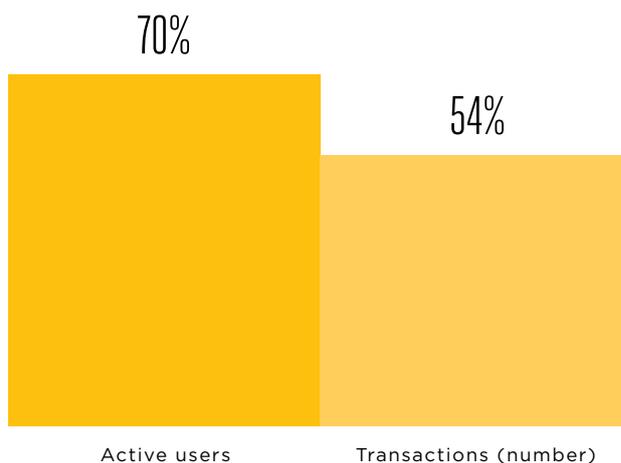
SSA has seen the strongest take up of mobile money services of any region. As of September 2014, more than half of the world's active mobile money services for the unbanked were located in SSA. At the same date, there were 130 live mobile money services aimed at the unbanked population of the region. These services are now available in 38 markets³⁴, providing unbanked customers choice, security, convenience and affordability that is often missing in cash operations.

Source: GSMA

Proportion of global mobile money services in SSA



Proportion of global active user base and transactions in SSA



33. <http://www.afdb.org/en/news-and-events/article/fostering-financial-inclusion-with-mobile-banking-12125/>

34. MMU Deployment tracker (<http://www.gsma.com/mobilefordevelopment/programmes/mobile-money-for-the-unbanked/insights/tracker>)

3.6.1 Recent developments in SSA

Mobile money services have seen strong take-up in a number of markets, including Kenya, Uganda and Tanzania. In Kenya alone, there were 26 million registered mobile money users at the end of 2013, with estimates suggesting that nearly 60% of the adult population in the country were using the service³⁵.

However, in several other countries, the uptake of mobile money has been relatively slow. For example, Vodacom launched its M-PESA service in South Africa in 2010, but suspended the service in 2014. Vodafone has recently re-launched the service with a range of new offerings for customers: the registration process has been simplified and users will also be able to withdraw funds at ATMs and to make payments at electronic points of sale using the M-PESA Visa card.

Côte d'Ivoire is a good example of a market where mobile money services are beginning to gain traction after a challenging start. Services were first launched in 2008, but by the end of 2011 there just over two million registered users, of which only 22% were active³⁶. However, by mid-2013 the situation had improved significantly, with the five service providers in the country having almost five million registered users, of which over a third were active. There was a significant increase in the user base in the country in 2012 when the economy began to recover after a decade of political crises, during which time public mistrust in the traditional financial system in the country deepened.

In addition to improved political stability, mobile money providers in the country also adopted new tactics to increase service adoption. For example, Orange partnered with national water and electricity utilities to administer bill payments, whilst MTN decided to consolidate and strengthen its distribution network.

The growing uptake of services in many countries, as well as the still large potential customer base, is attracting new entrants to the sector and so driving competition in the market. Twenty-two markets across the region are now home to three or more competing mobile money services. Additionally, the sector is seeing an increasing proportion of new entrants such as financial institutions and banks, which are trying to complement their traditional business model with new electronic access channels that the banks control. One example is Kenya's Equity Bank, whose subsidiary, Finserve, was recently licensed as a MVNO and plans to deliver its banking services through this vehicle, placing the company in direct competition with the market-leading M-PESA service.

35. http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/09/MMU_2014_Kenya-Pathway_Infographic_Web.pdf

36. http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/05/MMU_Cote_dIvoire_Turnaround_Story.pdf



3.6.2 Innovations will drive further growth in the sector

There have been some notable innovations in the sector over the last year that are set to improve the attractiveness and adoption of mobile money services. These range from broader product offerings to improved interoperability.

A BROADER PRODUCT RANGE

Mobile money service providers are looking to broaden the range of products on offer to users, including products such as insurance, micro credits, international remittances and savings. Notable examples include the following:

- Following the success of **M-Shwari in Kenya**, the Commercial Bank of Africa partnered with Vodacom to launch M-Pawa in Tanzania. Both these services enables subscribers to save and borrow money while earning interest on money saved in their accounts.
- In late 2013, **Econet Wireless Zimbabwe** launched a savings product, EcoCash Save that enables subscribers to save money through their phone while earning interest on money saved. In April 2014, Econet launched a loan product, EcoCash Loans.
- **Tigo Senegal**, in partnership with mobile micro insurance specialist Bima, offers micro insurance product 'Tigo Kiiray'. Subscribers are given free life insurance cover when they make a minimum monthly spend on Tigo's GSM network. Subscribers can also choose to opt-in to a paid version which offers twice the level of insurance coverage.
- **Safaricom in Kenya** is looking to develop its established M-PESA service into a broader m-commerce platform, with a particular focus on attracting small business users. The operator has already signed up 122,000 merchants³⁷ to accept M-PESA to pay for goods and services, including local supermarkets.

DRIVING INTEROPERABILITY

With an increasing number of countries in the region having two or more mobile money services, interoperability is an important focus area if the full potential of these services is to be realised. Interoperability allows mobile money subscribers to transfer money between rival systems regardless of the operator involved. Tanzania provides a good example of a competitive market that has introduced interoperability on a market-led basis. In August 2014, Airtel and Tigo began offering a cross-

network money transfer service allowing subscribers from both networks to send and receive money between their mobile money wallets.

The GSMA's global Mobile Money Interoperability (MMI) programme focuses on helping operators successfully launch and scale interoperable mobile money services by identifying and sharing best practices, guidelines and processes, creating performance benchmarks, and providing regulatory support. A number of operators from the region have committed to work together to accelerate the implementation of interoperable mobile money services, including Vodafone, Bharti Airtel, Etisalat, Millicom, MTN Group and Orange³⁸.

NEW INTEREST SHARING MODELS

New interest sharing models are now emerging which carry significant benefits for the mobile money customers and are having a positive impact on growth rates in the markets. These innovative models are aimed to bring some investment/savings-like qualities to mobile money; with the potential to enhance financial inclusion for the still excluded populations. Tigo Tanzania is a leading example in this space, with the operator committing in September 2014 to make a profit share distribution of US\$8.7 million out of returns generated on the capital held in the Tigo Pesa Trust Fund to its 3.5 million Tigo Pesa customers. Some countries including Liberia and Ghana expressly provide for the passing of accrued income on the Trust fund to customers. Other markets such as Kenya and Malawi while not expressly providing for the passage of the accrued income directly to customers, encourage its distribution but disallow the scheme provider or trustee from benefiting from the income. Namibia allows the e-money issuer to earn interest on pooled funds.

37. http://www.safaricom.co.ke/images/Downloads/Resources_Downloads/FY_2014_Results_Press_release.pdf

38. <http://www.gsma.com/newsroom/operators-commit-accelerate/>

3.6.4 Better mobile money regulatory policies will drive greater financial inclusion

Smart policies are decisive in enabling the development of mobile money and to reach a larger proportion of those who are still excluded from accessing financial services. The widespread availability of payment and other financial services is a hallmark of a mature and inclusive financial system. Progress has been made in a number of markets across the region in developing more enabling policy frameworks.

A conducive regulatory framework will play an important role in further promoting the development mobile money services, as has been in observed in several countries:

- **Democratic Republic of Congo (DRC)** - the central bank in the DRC established an enabling framework that allows non-bank e-money issuers to offer transformational financial services. Soon after the release of the initial framework, licences were issued to four mobile operators, creating a competitive mobile money market, which was quickly able to scale.
- In **Tanzania**, a conducive regulatory environment has been instrumental in the growth of mobile money services - 43% of the adult population is now actively using this service as of September 2013. The Bank of Tanzania (BOT) made a progressive decision at the outset, namely to let regulation follow innovation and support financial inclusion while managing risks³⁹. This approach has enabled the country's mobile money market to flourish. By engaging closely with MNOs (and their respective partner banks), the BOT has been able to offer the private sector a degree of freedom in rolling out new products, responding with sufficient safeguards where necessary.

As well as Tanzania, regulators in Kenya⁴⁰, Madagascar, Rwanda, Uganda and Zimbabwe have also created an enabling framework allowing non-bank financial providers to offer mobile money services alongside the existing players creating a level-playing field. These market examples show that better regulations, not more regulations is necessary for inclusive growth. Liberia and Ghana also recently made positive regulatory changes to this effect.

- In **Liberia**, the Central Bank of Liberia has moved to create an even playing field publishing a new regulatory framework in May 2014 that allows non-bank providers.
- In **Ghana**, the draft regulatory framework that replaces the existing regulations clearly distinguishes between banking business and e-money issuance, thus allowing non-banks to participate as e-money issuers.

An important lesson from markets where mobile money is growing is that in order to develop a successful regulatory framework, an open dialogue and a consultative process between the policymaker, the regulator, and the private sector is necessary. The examples in both Tanzania and the DRC show that designing enabling regulation through open communication with providers is key to meeting objectives around financial inclusion and in turn developing effective oversight of the mobile money sector.

39. <http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2014/03/Tanzania-Enabling-Mobile-Money-Policies.pdf>

40. <http://www.gsma.com/mobilefordevelopment/new-infographic-mobile-money-and-the-digitisation-of-kenyas-retail-payments-systems>

3.7 Improving access to energy and water

A significant proportion of the population lack access to basic infrastructure, such as energy or clean water, but do have access to a mobile phone. The tendency in many communities to share a mobile phone means that the availability of mobile services can often be higher than suggested by the headline subscriber penetration rates. The GSMA's Mobile Enabled Community Services Programme (MECS) estimated that in 2013 the number of people covered by mobile networks but lacking access to electricity in their home or to improved water services at 360 million and 130 million respectively⁴¹.

The extensive reach of mobile infrastructure, combined with the increasing take-up of mobile financial services and the growing range of M2M services is generating new ways to bring access to reliable energy and clean water to previously underserved populations. A key trend is the development of low cost GSM-enabled smart meters for water and electricity. These in turn allow the development of pay-as-you-go (PAYG) solutions that allow access to water and electricity to be controlled remotely depending on a customer's credit. These solutions have gained particular traction in East Africa, with for example PAYG solutions sold to more than 60,000 customers in 2013. Low-cost smart meters for hand pumps are another example of mobile-led innovation that are currently being developed and subject to field tests.

A number of operators from across SSA are working closely to support these initiatives, including distribution and marketing partnerships, branding, shared revenues, data connectivity, and mobile money platforms. These include Vodacom, MTN, Safaricom and Econet Wireless, whilst other operators are likely to develop partnerships and initiatives going forward.

41. <http://www.gsma.com/mobilefordevelopment/the-synergies-between-mobile-energy-and-water-access-africa>

3.8 Disaster response to the Ebola crisis in Africa

Mobile networks can play an important role in disaster response and crisis management, given their resilience and ability to facilitate critical communication between humanitarian agencies, affected populations and the international community.

This role is of particular relevance to the region given the ongoing Ebola outbreak that is currently impacting a number of countries in West Africa and has already caused several thousand deaths, as well as causing enormous disruption to everyday life. A key element of the strategy to contain the current outbreak relates to knowledge and education, what has been referred to as an 'information battle' against the disease⁴². Mobile networks and service can play an important role, as many of the affected areas are rural and often out of the reach of other means of communication.

- **Orange Telecom** in Senegal has allowed Flowminder, a Swedish non-profit organisation, to gain access to data from its subscriber base, providing insights into regional population movements. The new model will help Flowminder to develop a picture of overall travel patterns in the region, as the mobile phone data will be analysed in conjunction with data from other sources. The data was gathered in 2013 from 150,000 phones before being anonymised and aggregated;
- In Guinea, **Caritas**, an international aid agency, is working with mobile network operators to send text messages about Ebola prevention.

The GSMA is assisting Ministries of Health in Nigeria, Senegal, Guinea, Liberia and Sierra Leone to mobilise the required support of mobile network operators in formulating a timely and effective response to the outbreak. These coordinated efforts will also involve collaboration with the World Health Organization and ECOWAS, and could involve a range of services:

- Distributing educational messages;
- Providing access to anonymised CDRs (Call Data Records) to enable analysis on disease spread and population movement; and
- Empowering health workers in areas such as civil registration, data surveillance and reporting, financing mechanisms and clinical workflow management.

42. <http://www.gsma.com/mobilefordevelopment/could-mhealth-and-behaviour-change-communication-help-turn-the-ebola-tide>

4 Achieving public policy goals

Across SSA, the interests of the mobile industry, its customers and governments are closely aligned. Encouraging the uptake and usage of mobile broadband is one of the most cost-effective ways for governments to improve access to healthcare, education and other public services, while fuelling economic activity.

As highlighted in the earlier sections of this report, demand for mobile connectivity is rising rapidly across SSA, reflecting very strong demand for information and communication services that have the potential to enrich the quality of life for millions of people living in the region. Furthermore, access to mobile broadband can enable people and businesses to work more effectively and efficiently, and also have the power to connect enterprises to global markets and customers.

Policymakers and regulators can support the deployment and usage of mobile broadband by creating a stable, predictable and clear regulatory environment both in the telecoms sector and adjacent sectors, such as financial services. Well-designed regulation can also ensure that service providers enjoy a level playing field that encourages them to compete vigorously and innovate. To that end, governments need to allocate scarce resources, such as spectrum, in an equitable way that ensures service providers are not subject to unfair competition. Such an environment will encourage investment in the infrastructure needed to enable the region to reap the full benefits of mobile services and broadband technologies.

Conversely, excessive regulation can stifle innovation, raise costs, limit competition and, ultimately, lead to higher prices and less choice for consumers and businesses. This section explores the measures governments in Sub-Saharan Africa can take to encourage greater industry-led investment, through transparent and consultative policymaking. With the right regulatory environment, the mobile industry can deliver even greater socio-economic benefits to the region, helping governments to fulfil their public policy goals and enhance the lives of their citizens.

4.1 Meeting the demand for mobile broadband

In the absence of widespread fixed-line connectivity, populations across SSA are comparatively more reliant on mobile networks to access the Internet. Traffic on mobile networks in SSA is growing exponentially as more people get online and African businesses go digital. In order to accommodate this growth, mobile operators need the support of policy makers, particularly regarding the need access to sufficient suitable spectrum.

Such spectrum is becoming available - freed up by the switchover from analogue to more spectrally-efficient digital television - the so-called Digital Dividend, or the 700 and 800 MHz bands. This low-frequency spectrum is well suited to providing both indoor and rural coverage, potentially enabling Africa's mobile operators to connect far-flung communities to vital services whilst continuing to serve those in urban centres

In September 2013, the ITU announced the successful completion of coordination negotiations to set up a mechanism to deploy digital television in 47 Sub-Saharan African countries. At that time, the ITU said the consolidation of national plans to implement the digital switchover in Africa conforms to the deadlines of June 2015 (for UHF) and June 2020 (for VHF in 33 countries) set by the ITU's Regional Radiocommunication Conference in 2016.

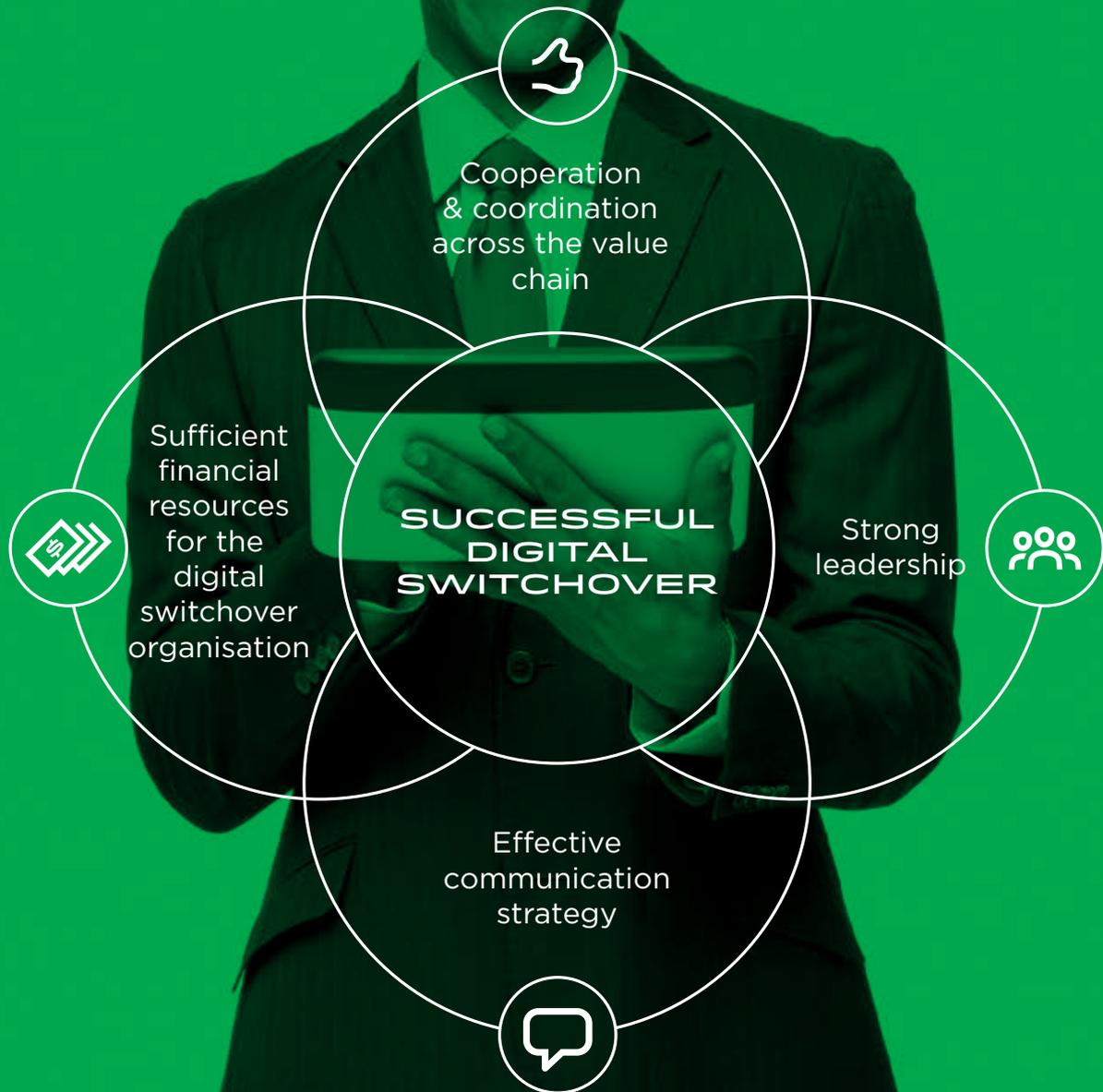
However, only five countries in SSA—Tanzania, Mauritius, Namibia, Rwanda and Nigeria—have either switched over to digital television or have made significant advances in the process of doing so. None of these countries has formally announced a channel plan preference for Digital Dividend spectrum.

In many African countries, including Kenya and South Africa, a lengthy legal, and sometimes political, process is holding back the digital switchover (DSO). As a result, hundreds of millions of people in the region are missing out on the socio-economic benefits that result from greater access to broadband.

If the mobile industry is to make broadband mainstream, governments and regulators across SSA need to clear the Digital Dividend spectrum of existing users, which can include legacy CDMA 850 networks, as well as analogue television broadcasters. Many of these CDMA networks are no longer in use or provide services to a relatively small number of subscribers. Moreover, in most countries, less than 40 per cent of households own a television set and, broadly speaking (with the exception of countries such as Nigeria and Kenya), terrestrial television usage remains low.⁴³

Although moving from analogue to digital television is far from trivial, dozens of countries around the world have made the switchover. The graphic below, taken from the GSMA's Digital Switchover Toolkit, illustrates the key success factors in this process.

43. Analysys Mason, "Global prospects for the 700MHz spectrum band", 2012.



By engendering cooperation and coordination across the value chain, policymakers can manage the digital switchover in a way that does not negatively impact the provision of local-language television content. Indeed, releasing the Digital Dividend will raise broadband penetration and ensure that consumers have access to more content, rather than less.

To prevent the Digital Dividend from becoming bogged down by bureaucracy, the GSMA recommends that local and regional policymakers play a leadership role, facilitating dialogue between the key stakeholders, including broadcasters, the mobile industry, set-top box manufacturers and consumers.

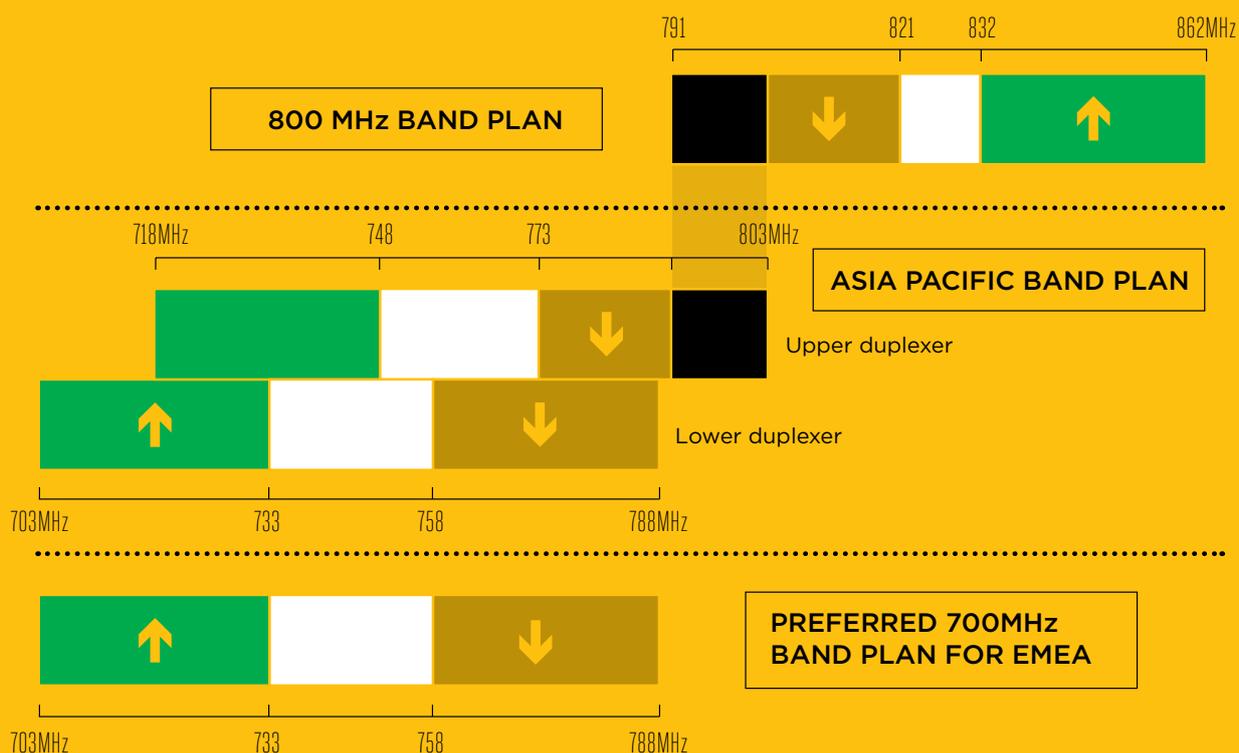
4.1.1 Harmonisation keeps costs down

As spectrum is a limited resource, it needs to be used as efficiently as possible. To that end, governments across SSA are encouraged to, wherever possible, adopt internationally-agreed band plans and make a considered effort to harmonise the technical and regulatory conditions under which they allocate and assign spectrum. International harmonisation creates economies of scale, reducing the cost of developing and manufacturing a wide range of mobile equipment, from network base stations to handsets and tablets. Although mobile devices can support multiple bands, each additional band increases the device cost, reduces the receiver’s sensitivity and drains the battery.

Spectrum harmonisation also makes it easier for people to use their mobile devices when travelling abroad, while also reducing the likelihood of interference between mobile networks in border areas of neighbouring countries.

In the spectrum being freed up by the switchover to digital television, countries in ITU-R Region 1 (Europe, Africa and the Middle East) have agreed to allocate the 790–862MHz band (aka the 800MHz band) to mobile services. In February 2012, the World Radiocommunication Conference agreed to also allocate the 694–790MHz frequency band (aka the 700MHz band) to mobile services in Region 1. This allocation is scheduled to take effect after the next World Radiocommunication Conference in 2015 (WRC-15), giving time for technical studies and for countries to plan for the migration of existing users and reassignment of this spectrum rearrange.

For ITU Region 1 (Africa, the Middle East and Europe), mobile operators support the proposed 2x30MHz channel plan that consists of 703–733MHz (uplink) paired with 758–788MHz (downlink) as the preferred channel plan for Africa, Middle East and Europe see graphic). This channel plan is based on the reuse of the lower duplexer of the APT (Asia-Pacific Telecommunity) 700 MHz channel plan (see graphic).



Harmonisation across different regions would compound the benefits or harmonisation within regions. If countries in EMEA were to follow the regulatory and technical conditions that are applied to the 700MHz band in the Asia Pacific Telecommunity (ATP), global equipment makers would be able to maximise economies of scale, thereby keeping handset costs low, mitigating interference along national borders and enabling roaming.

Ideally, governments should also look to support the use of the duplex gap for public commercial mobile networks (i.e. supplementary downlink). However, the mobile industry recognises that some governments in SSA may want to use the duplex gap for public protection/disaster relief (PPDR) mobile broadband applications. In this case, the GSMA recommends that such governmental networks operate outside of the 2x30MHz that will be aligned with the lower duplexer of the harmonised APT band plan.

4.1.2 Fair and predictable spectrum licensing

As governments across the region consider how best to clear and subsequently release Digital Dividend spectrum, there is an opportunity for these administrations to learn from mistakes made elsewhere. In some European countries, administrations looking to reduce public deficits have regarded spectrum licenses as a potential cash cow. Such an approach can be counterproductive in the medium-term. Levying excessive license fees on mobile spectrum will reduce the money available for network deployment, increase consumer prices and limit the potential economic benefits of mobile broadband. In effect, excessive license fees can prevent governments from achieving key policy goals, such as increasing broadband uptake and driving economic growth.

Instead, policymakers can leave it to the market to decide what spectrum is worth. When there is competition for scarce spectrum resources and demand is expected to exceed supply, auctions have proven to be an efficient way to assign spectrum. There are a number of alternative auction designs, each with its strengths and limitations. While governments often prefer multi-round auctions, the best choice is dependent on the market circumstances and public policy objectives.

Policymakers should also avoid the pitfalls that can befall spectrum auctions. In some markets, governments have designed spectrum auctions to favour new entrants, typically by reserving spectrum for a greenfield operation. Although such an approach is intended to benefit consumers, it can actually hold back the roll out of mobile services as mobile operators need scale to deliver affordable broadband to their customers. Spectrum should, therefore, be assigned to companies with the ability to deploy and invest in infrastructure.

Governments in SSA should also consider imposing stringent 'use it or lose it' license conditions in order to avoid the inefficient hoarding of unused spectrum by licensees who are no longer operational or no longer can demonstrate a valid argument for continued ownership of spectrum that could otherwise better benefit society. In the case of low frequency bands, such as those arising from the Digital Dividend, African governments may wish to impose coverage obligations to ensure efficient use of this spectrum.

4.1.3 Reducing uncertainty around license renewal

Throughout SSA, spectrum licenses, originally awarded to enable 2G services in the 1990s, are coming up for renewal in the next five years. If this process is not handled carefully, the renewal process can be highly disruptive.

To reduce uncertainty and encourage ongoing investment, regulators need to clarify what will happen to spectrum rights at least two to four years ahead of the license expiry date. Wherever possible, governments in SSA are encouraged to apply a presumption of licence renewal to support long term investment planning and innovation from the mobile industry.

Ideally, licensing authorities should also publish a five-to-10 year roadmap setting out the proposed timing for the release of additional spectrum bands. Such a roadmap will enable Africa's mobile operators to effectively plan their networks and raise the investments required to make best use of this spectrum.

4.1.4 The benefits of exclusive spectrum licensing

The licensing of chunks of spectrum to individual service providers has enabled the mobile industry to connect billions of people to voice, messaging and internet services over the past two decades. Although unlicensed spectrum has a role to play, a transparent and stable licensing framework, which prioritises exclusive access rights, has been proven to attract investment and enable end-users to receive a high quality of service.

Exclusive licensing also reduces interference between radio signals, while unlicensed models can result in too many networks competing for the same spectrum, jeopardising the quality of service for end-users. For example, competing Wi-Fi networks in cities often interfere with each other, making it difficult for users to access reliable connectivity.

Networks that depend on unlicensed spectrum face numerous risks, deterring investment by their principal backers and preventing an ecosystem from forming around them. As a service provider will have limited control over the quality of connectivity it can offer customers, it is difficult to build a business case for a large scale wireless network in unlicensed frequency bands. Moreover, the service provider cannot be sure how long unlicensed spectrum will be available for, given that a national regulatory body could decide to reform or reallocate it to a new use. In essence, unlicensed spectrum creates uncertainty that deters investment.

4.1.5 Securing spectrum for the future

Data traffic on mobile networks in Africa is set to grow rapidly over the next decade. This is a global phenomenon that is challenging governments everywhere. The ITU predicts that mobile broadband networks will need between 1340MHz and 1960MHz of spectrum to meet the anticipated demand in 2020.

In most countries, that equates to an additional 600–800 MHz to be made available for potential future mobile use by 2020. Ideally, this new spectrum should comprise a mixture of coverage (i.e. lower frequency) and capacity (i.e. higher frequency) bands to ensure networks can provide high-speed, cost-effective services in rural and metropolitan areas, as well as deep inside buildings. The spectrum must also be harmonised globally, or at least regionally, to drive the economies of scale required for low-cost consumer devices and to enable roaming and minimise cross-border interference.

The next opportunity to identify additional harmonised spectrum for mobile broadband is at the World Radiocommunication Conference in 2015 (WRC-15) in Geneva, where it is set to be the top agenda item. The outcome of WRC-15 will be the single most important factor determining the future availability of affordable, ubiquitous, high-speed mobile broadband services. Governments in SSA need to play a full and active role in the WRC-15 conference and are encouraged to do so in a regionally-harmonised manner. The decisions made will impact the wealth, well-being and future prospects of African countries and their citizens for many years to come.

In the absence of new spectrum allocations at WRC-15, governments will struggle to make new mobile spectrum available as data traffic rises, resulting in a poorer experience for end-users and potentially more expensive mobile services. Spectrum planning is a long-term activity that extends well beyond the typical political cycle. But it should not be postponed. It takes about eight to 10 years to re-allocate, migrate existing users and re-license spectrum, so governments need to take steps now to avoid a future capacity crunch, rather than reacting when it is too late to meet growing consumer demand.

Through the GSMA, mobile operators are calling for four new bands to be allocated to mobile services and harmonised worldwide (see graphic). Together, these new bands will provide the mobile industry with the means to improve both coverage and capacity.

The GSMA is working towards securing four key bands to satisfy the coverage and capacity spectrum requirements for 2020 and beyond. These are:

- **UHF band (470-694 MHz)**
- **L-band (1350-1400 and 1427-1518 MHz)**
- **2.7 GHz band (2.7 - 2.9GHz)**
- **C-band (3.4-3.8 GHz and 3.8-4.2 GHz)**

4.2 Achieving the right balance between taxation and growth

Across SSA, the mobile industry makes a major contribution to government revenues through a combination of direct taxation, license fees and other levies, such as universal service funds. While such income can help governments to pursue their immediate socio-economic objectives, policymakers need to be careful not to hamper the mobile industry's ability to drive economic growth. Experience in both industrialised and emerging markets shows that excessive taxes and fees on mobile services limit access to broadband and hold back the broader economy.

Disproportionate taxation of the mobile sector deters investment in mobile networks and increases the cost of mobile services for individuals and businesses, thereby limiting use of mobile services and curbing economic activity.

The uptake and usage of mobile services in some economies in the region are being held back by counterproductive taxation. In Tanzania, for example, mobile operators are subject to 10 different taxes, along with regulatory fees and charges that are increasing the total cost of mobile ownership for citizens and creating barriers to affordability, according to an upcoming study conducted by Deloitte on behalf of the GSMA.

Taxes account for about 35% of the costs of mobile ownership in Tanzania; this is the second highest level in Africa, and almost double the global average.

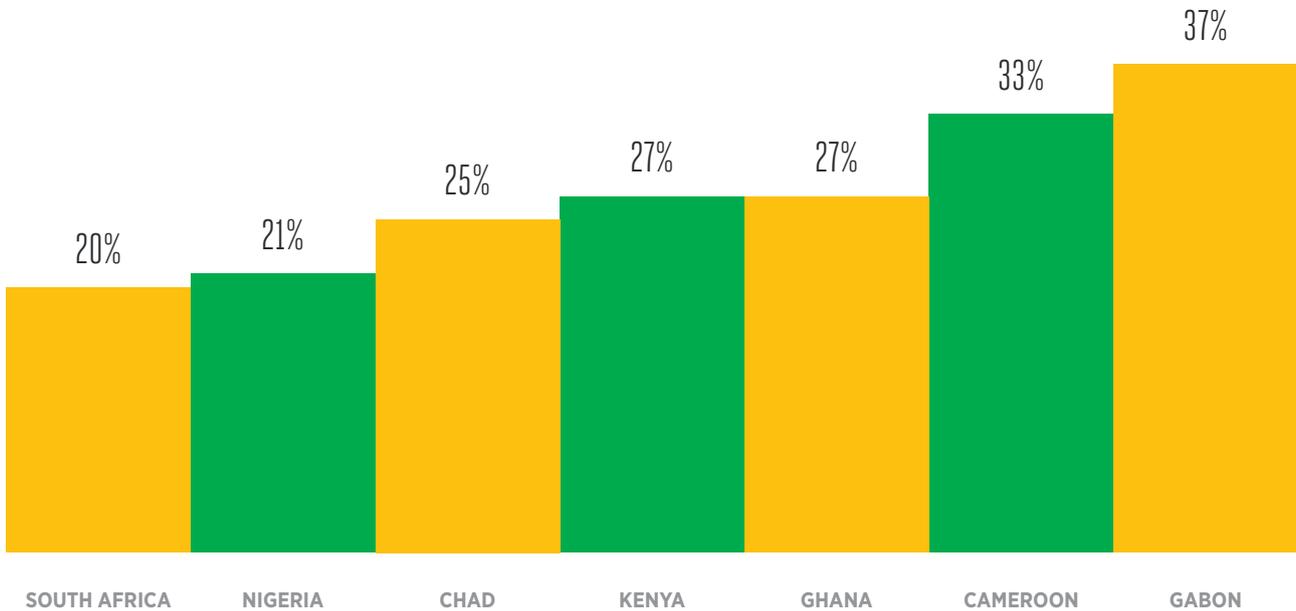
Rolling back these taxes would benefit Tanzania's economy. The Deloitte study found that removing the airtime excise on mobile broadband would generate an additional US\$365 million in annual GDP by 2020, and create an additional almost 15,000 jobs. Reducing the airtime excise on all mobile services to 10% would increase Tanzania's GDP by US\$549 million in 2020, and increase employment by up to 27,000.

Tanzania is not alone in this respect. In Gabon and Cameroon, more than US\$3 in every US\$10 of mobile revenue is transferred to the government in the form of taxes⁴⁴. There are a number of highly taxed mobile markets in the region, including for example Ghana, Kenya and Chad; all of which have a mobile service's burden of over 25% of revenues.

44. http://www.gsma.com/publicpolicy/wp-content/uploads/2014/02/Mobile-taxes-and-fees-A-toolkit-of-principles-and-evidence_fullreport-FINAL1.pdf

Source: GSMA, Deloitte analysis

Tax as a proportion of total mobile revenues - selected countries



Chad, Ghana and Kenya, in particular, levy significant sector-specific taxes and fees on the mobile industry. Such sector-specific taxes are typically reserved for potentially harmful products and services like tobacco and alcohol, rather than sectors that are crucial to the overall health of the economy, such as mobile services.

Moreover, these special taxes are sometimes imposed inconsistently, penalising and deterring long-term investors. For example, if mobile-specific taxes are not also applied to companies providing Voice over Internet Protocol (VoIP) or other communications services over the internet, they can distort the market and damage the business

case for investment in mobile broadband networks. Additionally, in many countries in SSA, mobile taxes have increased over time. Frequent tax increases create uncertainty for investors and reduce margins, thereby increasing the risk of investing in Africa's mobile networks.

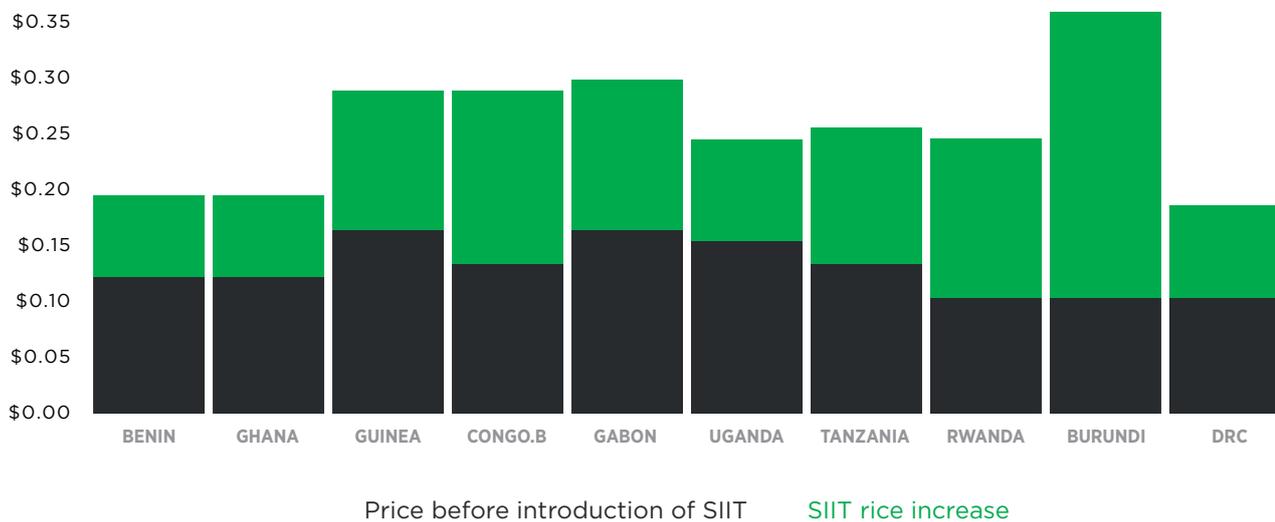
4.2.1 New taxes curb international calls

Some of the sector-specific taxes levied on the telecoms industry are making it expensive for Africans to do business across borders, holding back international trade. Over the past five years, 15 African countries have imposed an additional telecoms-specific tax, in the form of a surtax on international incoming traffic (SIIT), according to a report published by the GSMA in September 2014. The SIIT typically mandates a fixed price that operators must charge for international inbound termination, of which the government takes a set amount, often sharing a portion of the amount with a third party that monitors call traffic.

The report found that the SIIT has caused the price of terminating international incoming calls to increase by an average of 97% (see graphic). In Burundi, the price has climbed 247%. These increases in the cost of termination drive up retail prices for consumers making calls to users in countries where SIIT is imposed. The average price per minute to African countries that have implemented a SIIT is 28% higher than those countries that have not introduced the tax, according to the report. In some cases, the impact has been dramatic. For example, the cost of calling Ghana, which has imposed SIIT, from the UK is now 200% higher than the cost of calling Nigeria, where SIIT is not imposed.

Source: Deloitte analysis based on data provided by local mobile operators

Impact of SIIT on the IIC termination prices



Crucially, the price rises resulting from the SIIT deter individuals and businesses from making calls to individuals and businesses in the African countries imposing this tax. The report estimates that 1.2 billion minutes have been lost and the direct costs to the economies across the region amount to US\$78 million. Mobile operators across SSA are concerned that governments have not fully considered these direct costs and indirect costs resulting from the SIIT.

Moreover, regional integration and intra-Africa trade is suffering as a result of such potentially short-sighted regulation. Figures from mobile operators indicate that nearly 40% of all international incoming traffic is from countries in the region. In some countries, such as Tanzania, the proportion is over 50%, while in the DRC and Uganda, 48% of calls originate within Africa.

In many cases, the SIIT is also proving to be expensive to collect. Governments often use a third party to measure the number of international

inbound minutes terminated by each operator and bill the operators accordingly. The tax charges collected in this way are then shared with the third party that carries out the measuring function. The amount shared with the private party constitutes a significant proportion (up to 50%) of the tax revenue. Such information could be collected from the operators directly using their own traffic recording systems, and operators are concerned that third parties can access subscribers' private information, some of which is unrelated to international call monitoring.

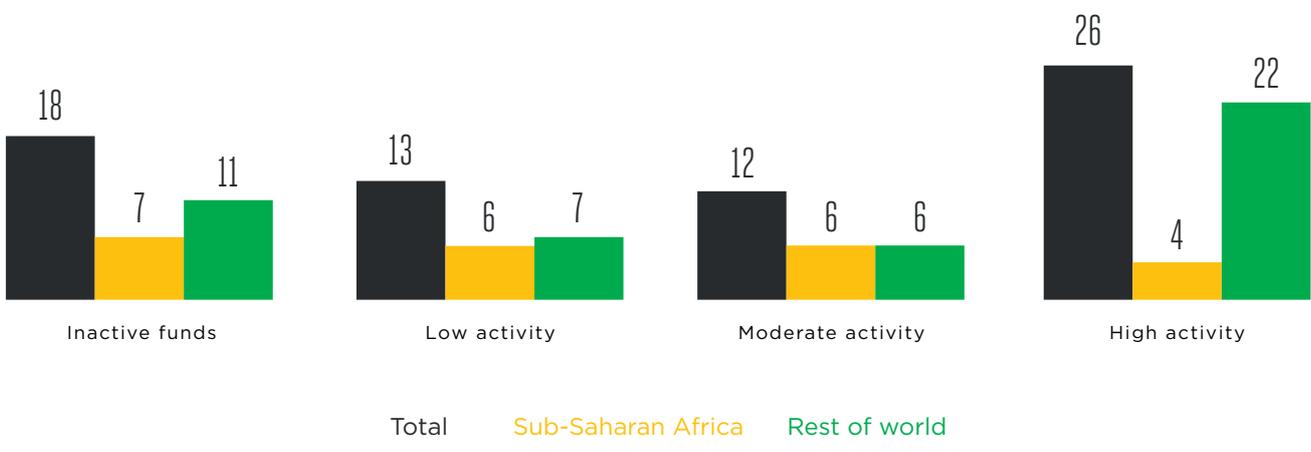
4.3 Evaluating universal service funds

In aiming to extend connectivity to the entire population, many African governments have established so-called universal service funds (USFs). These USFs generally draw on a levy imposed on telecoms operators. However, most of these funds are failing to meet their objectives due to significant deficiencies in fund structure, management and operation, according to a report published by the GSMA in September 2014, which examines USFs in 23 countries across SSA and compares them with 46 USFs in the Arab States, the Americas, Europe and Asia Pacific.

More than one third of the 23 USFs covered in the study have yet to disburse any of the levies collected and none of the funds would appear to disburse all that they collect. The study found that 13 of the 23 USFs are either 'inactive' or have a 'low activity' level. In addition, these USFs can have a significant impact on mobile operators' ability to invest in network infrastructure. More than half of the USFs (12 out of 23) in SSA apply levies of 2% or more of operator revenues.

Source: Deloitte analysis based on data provided by local mobile operators

USF fund activity levels



In many cases, the underlying legal frameworks for USFs in SSA are flawed in that they are not technology neutral or service-flexible, excessively bureaucratic or have insufficient oversight. Political intervention or interference from other government agencies can affect the fund's performance or its ability to function at all (this is the case in Mali, for example), resulting in extensive delays in decision making. At the same time, many USFs, such as those in South Africa, Nigeria and Zimbabwe, suffer from (or have been accused of) poor or ineffective administration with a number of funds currently embroiled in disputes between the fund administrators and mobile operators.

Overall, project and financial reporting for most funds is extremely inadequate, the study found. Out of all the funds surveyed within the region, Ghana and Uganda appear to be the countries that come the closest to reflecting best practice in the development and administration of USFs. To its credit, Nigeria has recognised the need for a major restructuring and re-orientation of its USF and is in the process of effecting major changes.

In the same vein, South Africa put a halt to the gross mismanagement of its USF and has also engaged in a positive major overhaul of the system.

In any case, evidence from around the world suggests that USFs are generally an inefficient way to extend connectivity to a greater proportion of the population. Alternative mechanisms, such as the imposition of license conditions on operators, the establishment of new plans or funds that are separate from the existing USF, or private/public partnerships (such as those in Brazil and Finland), can be more effective.

The study recommends that, where feasible, completely inactive funds should be disbanded and the money returned to the operators who paid the levies in the first place. If disbandment is not practicable, governments could gradually reduce the levy collected and gradually phase out inactive, or low-activity funds. Alternatively, USFs could be reformed and restructured to create functional and effective investment support vehicles for unserved and underserved areas in Sub-Saharan Africa.

4.4 Delivering a high quality of service

In competitive markets, service providers generally have to deliver a high quality of service to retain and attract customers. However, some regulators in SSA are intervening by imposing minimum standards relating to quality of service. Some of these regulations are unnecessarily complex, involving the measurement of a large number of often overlapping parameters, in some cases more than 30 parameters.

These regulations are proving hard to implement effectively and fairly. A lack of a standardised, objective measurement methodology has sometimes resulted in different interpretations of performance indicators and often leads to discrepancies in the results claimed by the regulatory authority and those measured by mobile operators. Regulators also often attribute cross-network call failures to the originating network, despite not having a clear indication of where the call failed.

In most markets, quality of service regulations create an unnecessary layer of cost and bureaucracy. Competitive markets, which are subjected to minimal regulatory intervention, are best placed to efficiently deliver the quality of mobile services that customers expect. Many mobile operators promote their network quality as a competitive differentiator in the hope of attracting customers from rivals.

More broadly, regulators need to be aware that the quality of service experienced by mobile consumers is affected by many factors, some of which are beyond the control of operators, such as the device type, third party interventions, application and propagation environments. Lastly, mobile operators are confronted with continually-changing traffic patterns and congestion, within the limits imposed by finite network capacity, where user traffic can have a significant effect on overall network performance.



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