The Mobile Economy
Sub-Saharan Africa 2015

GSMA Intelligence

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai and the Mobile 360 Series conferences.

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Executive Summary

The mobile industry in Sub-Saharan Africa continues to scale rapidly, reaching 367 million subscribers in mid-2015. Migration to higher speed networks and smartphones continues apace, with mobile broadband connections set to increase from just over 20% of the connection base today to almost 60% by the end of the decade. Falling device prices are encouraging the rapid adoption of smartphones, with the region set to add more than 400 million new smartphone connections by 2020, by which time the smartphone installed base will total over half a billion.

However, subscriber growth rates are set to slow sharply over the coming years, with growth in the second half of this decade set to be around 6% compared to 13% in the first half. Just under half of the population will have subscribed to a mobile service by 2020, highlighting the challenges that remain in bringing connectivity to unconnected populations across the region.

Mobile operators' revenue growth is slowing across Sub-Saharan Africa, reflecting slowing subscriber growth but also the impact of external factors such as growing competitive pressures and regulatory action. From a compound annual growth rate (CAGR) of almost 7% for 2010–2015, growth is set to slow to 5% out to 2020. The challenge for operators is to continue to monetise the ongoing growth in data traffic and encourage uptake of data-centric services by consumers, while expanding mobile coverage to underserved areas, at a time when traditional revenues are under pressure.

Tower sharing is now a major feature of the mobile industry in Sub-Saharan Africa, driven by network coverage obligations attached to licences, and cost-reduction pressures as the decline in revenue growth increasingly affects margins. Despite revenue and margin pressures, operators across the region continue to invest heavily to expand network coverage and deploy mobile broadband networks. Capital investment in 2014 totalled $9 billion and is set to reach $13.6 billion (24% of total revenues) by 2020.

The mobile industry remains a key driver of economic growth and employment across the region, making an important contribution given the population growth and high unemployment levels. In 2014, the broader mobile ecosystem generated 5.7% of GDP in Sub-Saharan Africa, a contribution of just over $100 billion in economic value. Migration to mobile broadband and the growth of new services will see this figure increase to 8.2% of GDP by 2020, reflecting how increased access to mobile services generates regional growth and development.

The mobile ecosystem supported 4.4 million jobs in the region in 2014, a figure that will increase to more than 6 million by 2020. The mobile sector also makes a substantial contribution to the funding of the public sector, with approximately $15 billion raised in 2014 in the form of general taxation, which is set to rise to $20 billion by 2020. It also makes further contributions in the form of licence and regulatory fees and spectrum auction payments.

Technology innovations have gained momentum in Sub-Saharan Africa over the last five years. Nairobi in Kenya – referred to as 'Silicon Savannah' – has been the epicentre of this development and has been leading innovations in areas such as mobile money (M-Pesa) and crowdsourcing (Ushahidi). A number of incubators and accelerators have sprung up across the region, and a flourishing app economy is emerging in the region.

Mobile technology plays a central role in addressing a range of socio-economic developmental challenges across the region, particularly digital and financial inclusion. Greater digital inclusion will drive economic and infrastructure development, increasing productivity and employment across the economy, and will improve access to vital services such as education and healthcare.

By mid-2015, 200 million individuals across the region were accessing the internet through mobile devices, a figure that will almost double by 2020. Despite this progress, more than 60% of the population will still lack internet access by the end of the decade. Improving the affordability of mobile services and extending network coverage to rural areas are particular challenges, given the high levels of poverty and the large proportion of the population living in rural areas. There is also a gender dimension to the connectivity gap, with African women currently 13% less likely than African men to own mobile phones. Operators, other ecosystem players, governments and regulators all have a role to play in addressing these challenges.

Sub-Saharan Africa continues to lead the world in the adoption of mobile money services. At the end of 2014, more than one-fifth of mobile connections in the region were linked to a mobile money account, with more registered mobile money accounts than banks accounts in a number of countries. An enabling regulatory environment is essential for continued growth of mobile money services and further financial inclusion.
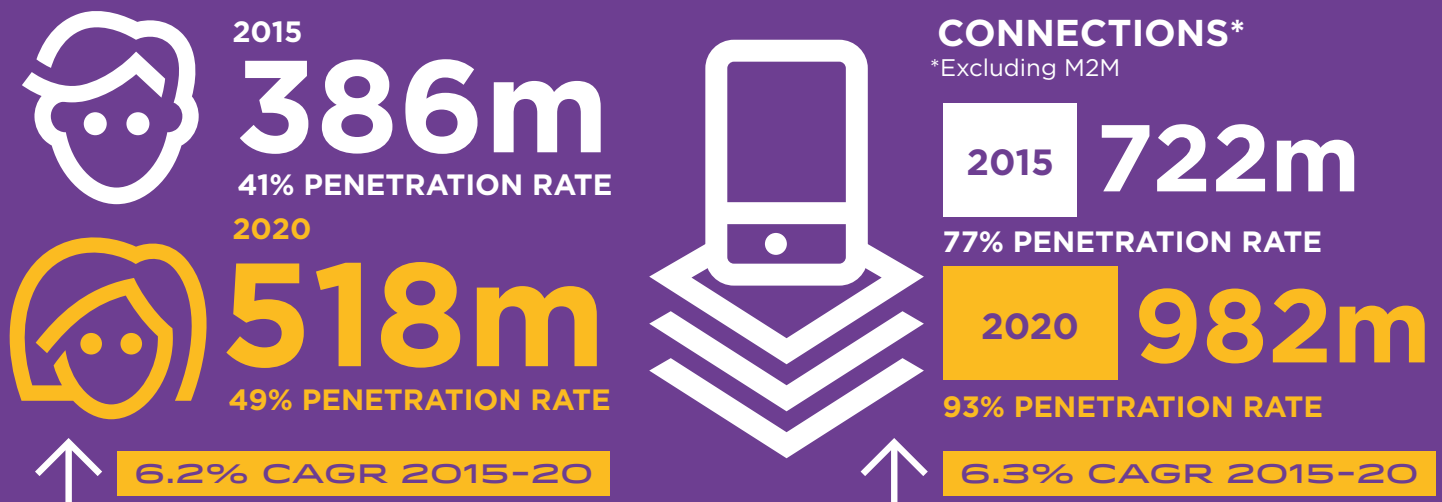
The ongoing vibrancy of the mobile economy in Sub-Saharan Africa depends heavily on the actions of the region's policy-makers and regulators. If governments can create a flexible, forward-looking and fair regulatory environment, the region will enjoy many more benefits. Through well-designed regulatory frameworks, governments can nurture and encourage the innovation enabled by mobile technologies and services.

Policy-makers and regulators in Sub-Saharan Africa have several major levers at their disposal to drive the development of their digital economies. Firstly, they could release more internationally harmonised spectrum for mobile broadband services, thereby fuelling investments in both greater capacity and wider coverage. Secondly, they could introduce incentives to encourage mobile operators to deploy infrastructure in remote and economically challenging areas. Thirdly, they could revise their taxation policies to encourage adoption and usage of mobile services, together with greater investment in networks. Finally, they could hone their competition policies to improve the business case for rolling out new digital infrastructure and increasing connectivity.

With digital services enriching and enhancing the daily lives of people around the world, governments in Sub-Saharan Africa need to make use of these policy levers sooner rather than later. Underpinned by enlightened regulation, a vibrant mobile economy can continue to generate substantial socio-economic benefits for people across the region.

MOBILE ECONOMY SUB-SAHARAN AFRICA

Unique subscribers and SIM connections

2015
386m
41% PENETRATION RATE

2020
518m
49% PENETRATION RATE

↑ 6.2% CAGR 2015-20

CONNECTIONS*
*Excluding M2M

2015 **722m**
77% PENETRATION RATE

2020 **982m**
93% PENETRATION RATE

↑ 6.3% CAGR 2015-20

Accelerating moves to mobile broadband networks and smartphone adoption

Mobile broadband connections

24% 2015 → 2020 **57%**

Mobile broadband connections to increase from 24% of total in 2015 to 57% by 2020

Smartphones

2015
160m
2020
540m

By 2020, there will be 540m smartphones, growth of 380m from the end of 2015
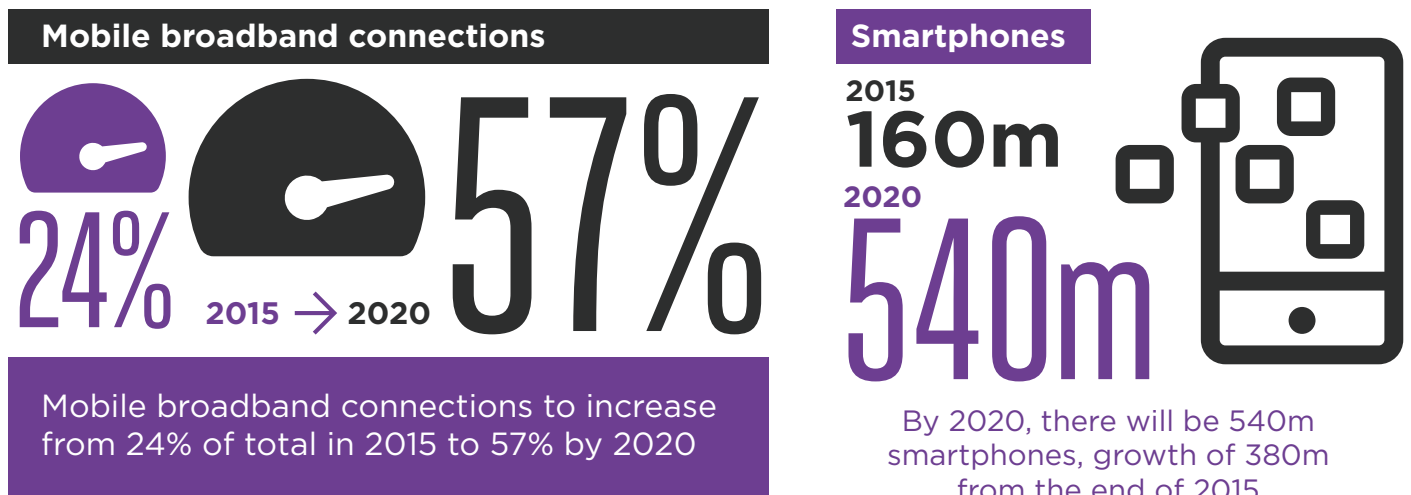
Data growth driving revenues and operator investments

Operator recurring revenues
$40bn 2015
$51bn 2020
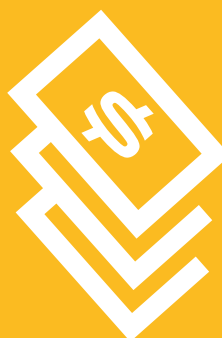
2015-20
5% CAGR

Operator capex of up to
$72bn
for the period 2015-20

Mobile contributing to economic and social development across the region
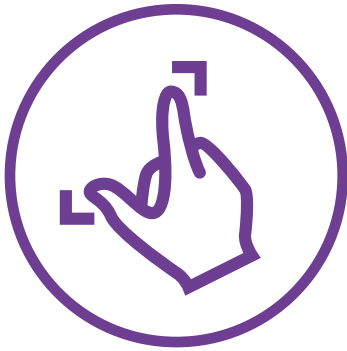
Delivering digital inclusion to the still unconnected populations

Mobile internet penetration 23% in 2015, 37% in 2020

Delivering financial inclusion to the unbanked populations

135 live services across the region as of December 2014

Delivering innovative new service and apps

Number of M2M connections to reach 30m by 2020

Mobile industry contribution to GDP

2014 **$102bn**

2014 5.7% GDP

2020 **$166bn**

↑ **8% GDP in 2020**

Public funding

$15bn 2014

$20bn 2020

Mobile ecosystem contribution to public funding before regulatory fees

Employment

Jobs directly supported by mobile ecosystem

2m JOBS 2014

2.7m JOBS 2020

Plus an additional **3.4 MILLION** indirect jobs supported by 2020

1 Mobile market regional overview

1.1 Subscriber growth is slowing

Sub-Saharan Africa had 367 million unique subscribers and 680 million connections (excluding M2M) as of the second quarter of 2015. The region's subscriber base recorded the fastest growth during the first half of this decade, with a CAGR of 13% compared to the global CAGR of 6% over the same period. This was partly due to low base effect, with less than a quarter of the population having a mobile subscription in 2010. Sub-Saharan Africa overtook Latin America in terms of unique subscribers during 2014 to become the third biggest region, behind Asia Pacific and Europe, and now accounts for 10% of the global subscriber base.

Source: GSMA Intelligence

Unique subscriber growth in Sub-Saharan Africa

	Unique subscribers (M)	Share of global subscribers	Penetration

2010: 200 — 7% — 25%
2011: 235
2012: 272
2013: 309
2014: 348
2015: 386
2016: 417
2017: 445
2018: 471
2019: 495
2020: 518 — 11% — 49%
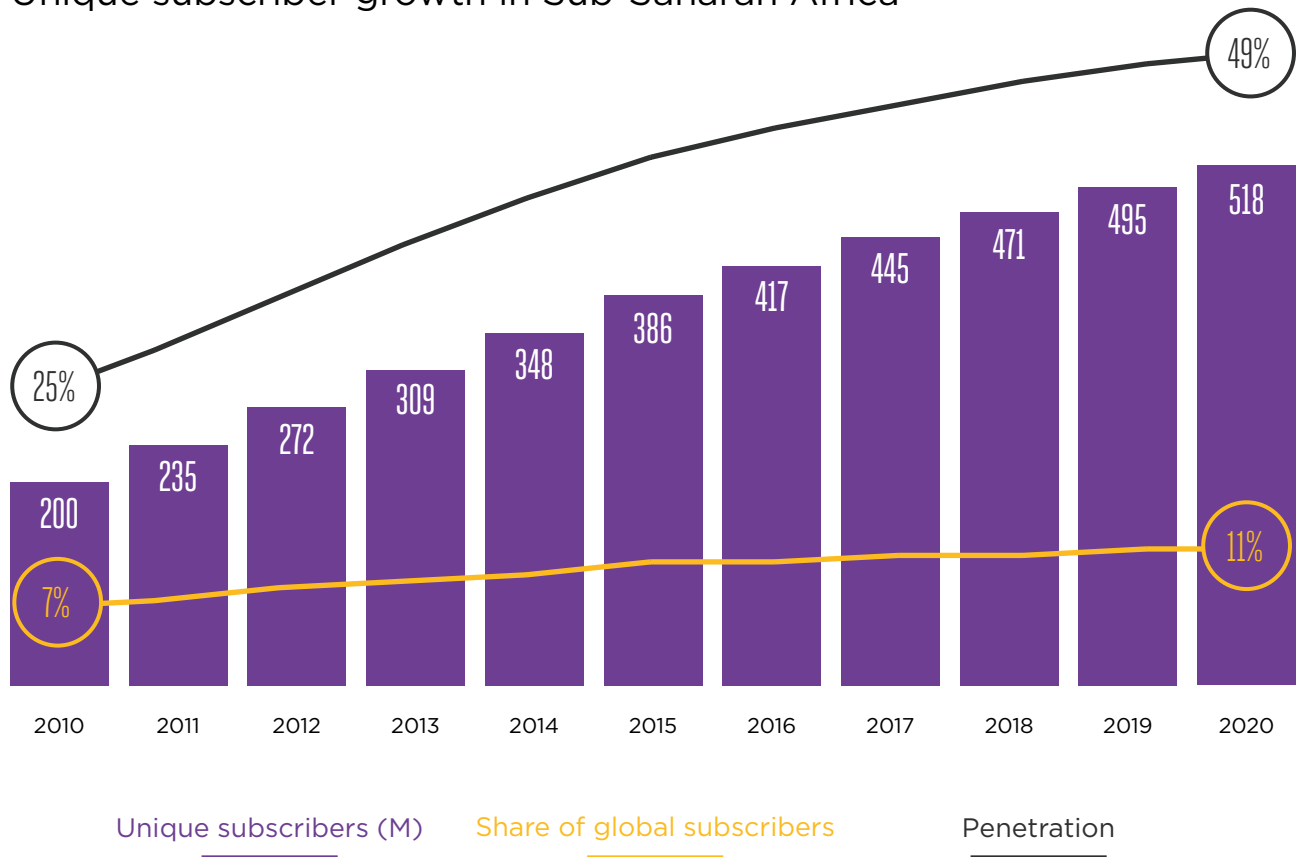
The region will record a unique subscriber CAGR of just over 6% in the second half of this decade, with the addition of 135 million subscribers. This will take the regional base to more than half a billion by 2020. By this date, just under half the population will have subscribed to a mobile service, against the global average of almost 60%. The slowing subscriber growth, despite still relatively low mobile penetration, underscores the existence of significant barriers to the take-up of mobile services. These include cost, coverage, and technical literacy and confidence for large swathes of the population, especially in rural areas where more than half of the population lives.

Source: GSMA Intelligence

Subscriber CAGR by region

- CAGR 2010-15
- CAGR 2015-20
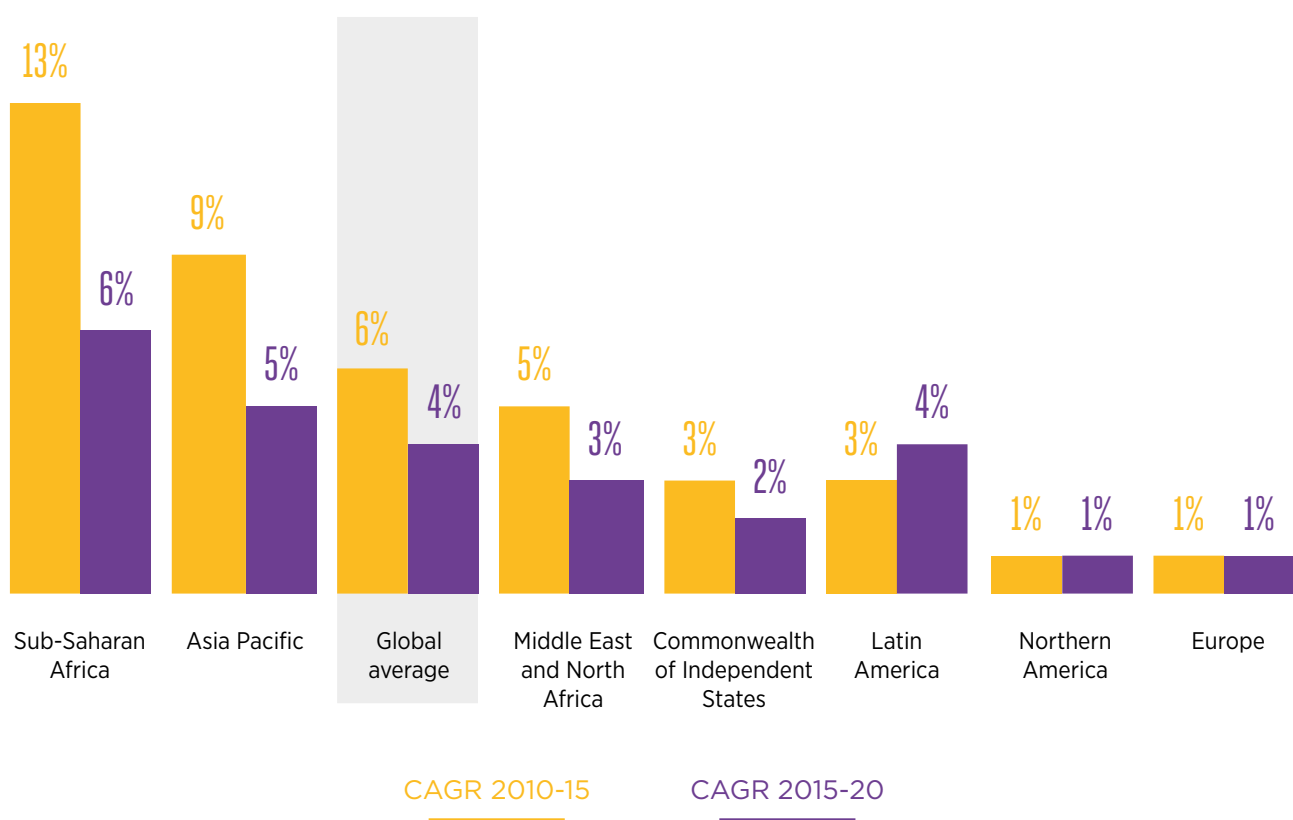
Another factor limiting subscriber growth is the relatively weak business case for rural network rollout; low ARPU levels from rural consumers make it hard to justify the high costs of network deployment and maintenance in remote communities. Mobile operators and regulators will need to take the necessary steps to reduce these barriers in the coming years to bring the benefits of mobile to the unconnected.

Mobile penetration rates in two of the most populous countries in the region – Ethiopia and Nigeria – stand at 23% and 31% respectively. These two countries alone, with a combined population of almost 300 million, will account for 40% of the total number of new subscribers in the region in the period to 2020. Other countries expected to record strong subscriber growth during the same period include Cameroon, Kenya, Mozambique, Tanzania and Uganda.

1.1.2 Consolidation is occurring in some markets

Sub-Saharan Africa has a number of highly competitive markets, with several featuring five or more operators. There are also a few outliers, such as Ethiopia, where the incumbent operator still has a monopoly. The regional average Herfindahl-Hirschman Index (HHI)[1] is 4,834, the lowest globally, reflecting the intensity of competition, which continues to weigh on prices.

Although low penetration rates suggest significant subscriber growth potential in most markets, the negative impact of low prices on operators' margins and their ability to invest in network expansion has raised the prospect of consolidation in the region. Consolidation can help operators move to more

sustainable business models and support more efficient investment. There have been a few instances of consolidation in recent years, most notably in Tanzania (Tigo acquired Zantel in 2015), Kenya (Safaricom and Airtel jointly acquired Yu's assets in 2014), Republic of the Congo (Airtel acquired Warid Telecom in 2014) and Uganda (Airtel acquired Warid Telecom in 2013). Other fragmented markets where operators are also considering consolidation to achieve an efficient market structure include Côte d'Ivoire and the Democratic Republic of the Congo (DRC).

1.2 Transition to mobile broadband is well under way

The region is seeing continued migration to higher speed mobile broadband networks. Commercial 3G networks had been launched in 41 countries across Sub-Saharan Africa as of June 2015, while 4G networks had been launched in 23 countries.

One-fifth of mobile connections in the region are now based on 3G, up from just 5% in 2010. 3G adoption in the region will exceed the global average by 2017 and account for more than half of total connections by 2020. The main factors driving the uptake of 3G are the

expansion of network coverage, falling device prices and the launch of the technology in new markets. For example, Airtel Africa added 783 3G sites across its 17 markets in the region during the first quarter of 2015. In Cameroon, Nexttel launched the country's first commercial 3G network in September 2014, while MTN, which launched its 3G network in March 2015, has announced plans to extend coverage to 75% of the population by 2018.

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1.   HHI: A commonly accepted measure of market concentration, represented on a scale of 0 (evenly distributed competition) to 10,000 (no competition).

# 1.3 4G adoption is slow, but there are a few regional outperformers

4G is still at a nascent phase in the region, accounting for just under 1% of the connection base, compared to a global average of 11%. Factors limiting 4G adoption in the region include network coverage, unavailability of 4G spectrum, an underdeveloped device ecosystem and the resultant high costs of ownership of mobile data connections.

Source: GSMA Intelligence

Africa: Technology shift ongoing

Percentage of connections
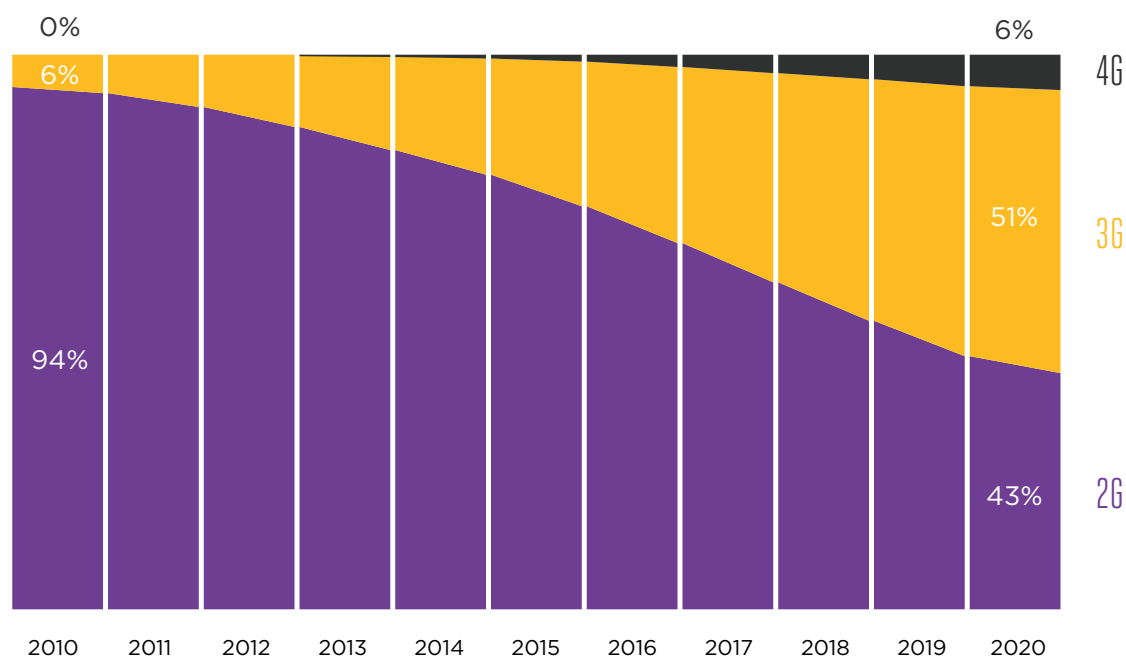
Nevertheless, 4G is gaining traction in several early-adopter markets, particularly Angola, Mauritius, Namibia and South Africa. This has been helped by the establishment of enabling regulatory and competitive environments that encourage investment. In South Africa, Vodacom's 4G network now covers 40% of the population, providing a solid platform for growth. The operator launched the region's first commercial voice-over-LTE (VoLTE) service in April 2015, partly to differentiate its service following the launch of LTE

Advanced (LTE-A) by Telkom in December 2014.

4G adoption for the region as a whole will rise to account for 6% of connections by 2020. Fifteen new commercial 4G networks were launched in the last year, including for the first time in Ethiopia, Kenya and Rwanda. In the technology-leading markets such as Angola, South Africa and Zimbabwe, 4G will account for around one-fifth of total connections by 2020.

1.4 Smartphone adoption is accelerating as device costs decline

The growth of 3G connections in Sub-Saharan Africa largely reflects the rising smartphone adoption rate, which has doubled in the last two years to 20% of total connections. In comparison, the global average is just over 40%. The adoption rate, which is set to accelerate further to one-third of connections by 2017 and more than half by the end of the decade, is benefitting from the increasing availability of low-cost devices.

The average selling price (ASP) of smartphones has fallen significantly in most markets across the region, with more devices now available in the sub-$100 price range. In March 2015, Orange announced plans to launch a sub-$40 smartphone running on the Firefox OS in Africa. The low-cost device market is dominated by Asian vendors, such as Gionee, Huawei and ZTE.

However, other global vendors are also expanding in the region with similar pricing strategies. In August 2015, Google extended its Android One program to Sub-Saharan Africa with the launch of the Hot 2 smartphone. The device will initially be sold for $90, but Google is aiming to bring the cost of the handset down to the $50 mark within the next three years.

Despite the shift in the region towards smartphones and mobile broadband, nearly 450 million connections will still be based on feature phones by 2020. Affordability remains a key limiting factor for many consumers in the region, especially poorer rural dwellers who still struggle to afford data-enabled devices and tariffs, despite falling prices.

1.5

Sub-regional groupings
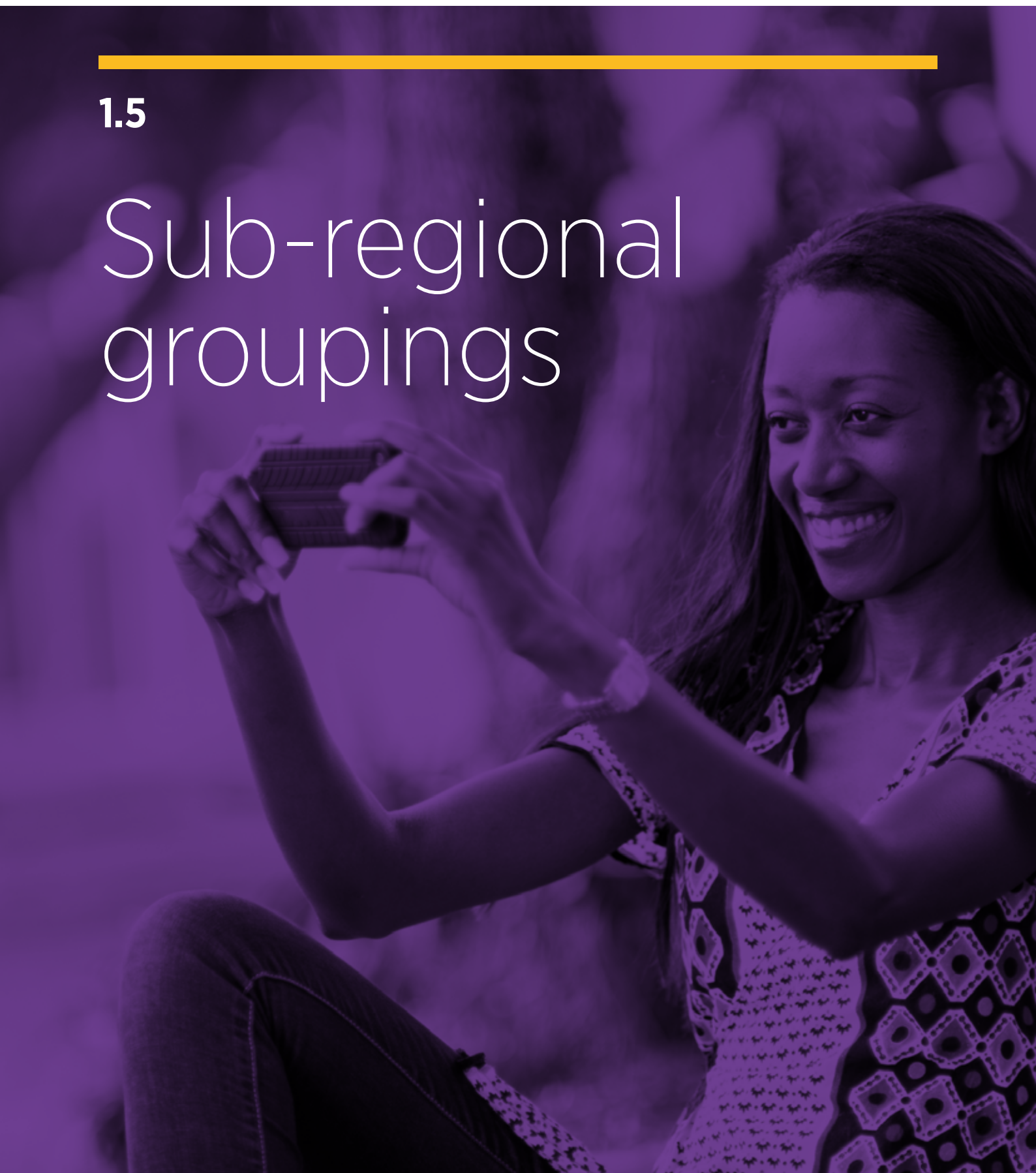
1.5.1 East Africa Community

The East Africa Community (EAC) is a sub-regional block of five member states, with a population of 153 million.

Fewer than four in 10 people in the EAC block owned a mobile phone at the end of 2014. The main barriers to further subscriber growth relate to access and affordability, especially for consumers in rural areas where around two-thirds of the population live. Kenya has the highest penetration rate of 42%, while Burundi has the lowest at 17%. The penetration rate is expected to rise over the next five years, but will continue to lag the regional average.

The EAC is seeing a rapid transition to mobile broadband, with the proportion of 2G connections expected to decrease from just over eight out of 10 connections at the end of 2014 to less than half of total connections by 2020. The rollout of 3G and 4G networks has played a major role in this transition;

3G services are available in all five countries in the sub-region, and commercial 4G services have been launched in four countries. By 2020, the sub-region is forecast to have nearly 17 million 4G connections, equivalent to 10% of the total connections base. The recent launch of a 4G network in Kenya and the ambitious expansion plans of the government-backed single wholesale network (SWN) in Rwanda will be the main growth drivers in the coming years.

Smartphone adoption in the sub-region is benefiting from the expansion of mobile broadband networks, as well as the fall in device costs. The smartphone adoption rate is set to accelerate from around 11% of connections in 2014 to more than 50% by 2020.

Source: GSMA Intelligence

EAC subscriber growth

EAC technology mix

EAC smartphone connections

Smartphone connections (M)

Smartphone adoption

Share of regional smartphone connections
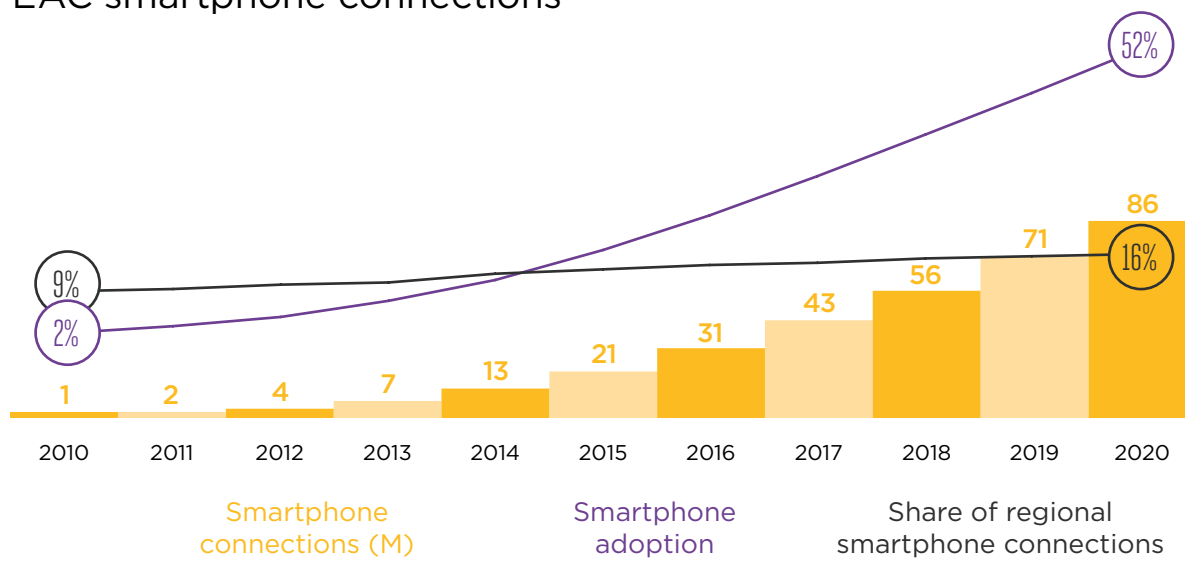
1.5.2 The Economic Community of Central African States

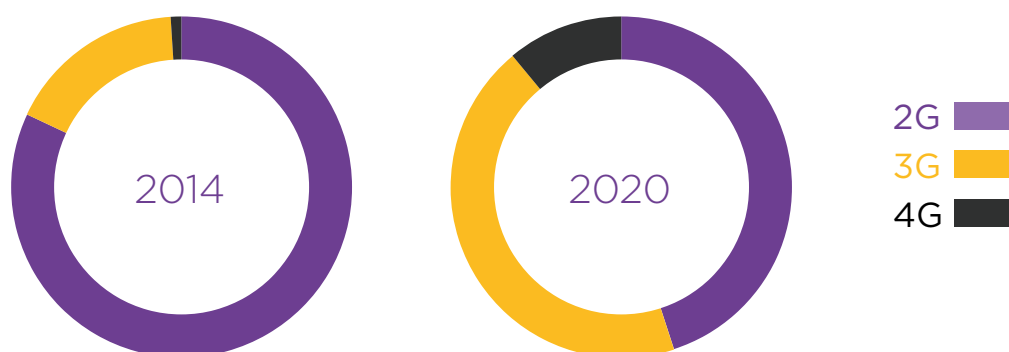The Economic Community of Central African States (ECCAS) has 10 member states, with a population of 146 million.
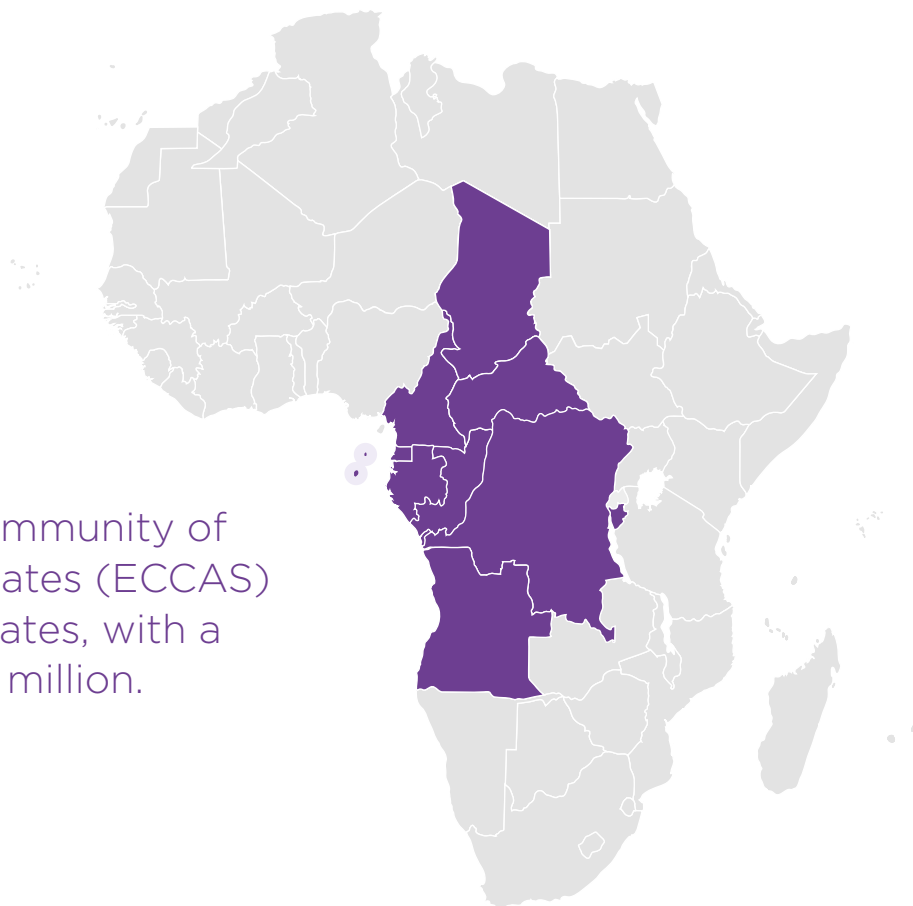
The mobile penetration rate in ECCAS reached 38% at the end of 2014, compared to the regional average of 42%. However, the sub-region will record strong subscriber growth over the next six years, at a CAGR of 11%, to close the gap. The two most populous countries in the sub-region – Cameroon and the DRC – will account for more than half of total new subscribers over the period to 2020.

The transition to mobile broadband is gaining pace in the sub-region, although more than 90% of connections are currently 2G. Angola and Gabon are early adopters of 4G, and their combined 4G connection base will rise to more than 5 million by 2020. Commercial 3G networks have recently been launched in Cameroon and Congo Republic – two countries that will also contribute significantly to overall mobile broadband adoption in the sub-region.

Smartphone adoption in ECCAS reached 15% at the end of 2014. The sub-region will record the fastest growth in smartphone adoption in the coming years, driven by the recent 3G network launches in the region. By 2020, smartphones will account for 54% of total connections in ECCAS.

ECCAS subscriber growth

SUBSCRIBER PENETRATION (%)

SSA

50%

ECCAS

49%

32%

29%

UNIQUE SUBSCRIBERS (M)

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
15	19	23	29	36	43	50	57	64	72	79
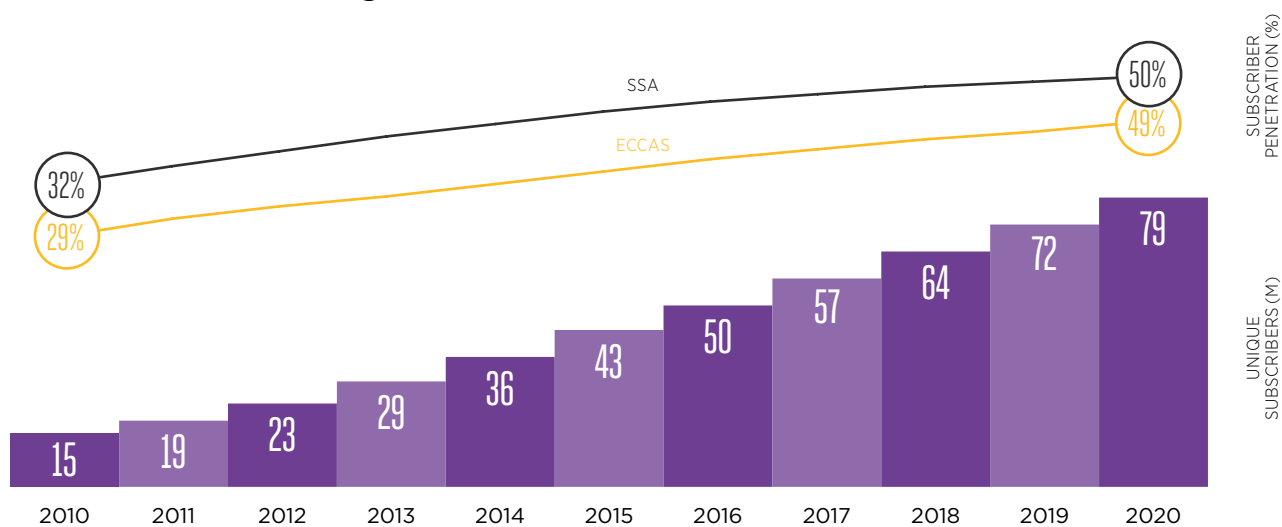
ECCAS technology mix

2014

2020

2G
3G
4G

ECCAS smartphone connections

54%

8%

3%

15%

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	2	5	8	13	20	30	40	52	66	80

Smartphone
connections (M)
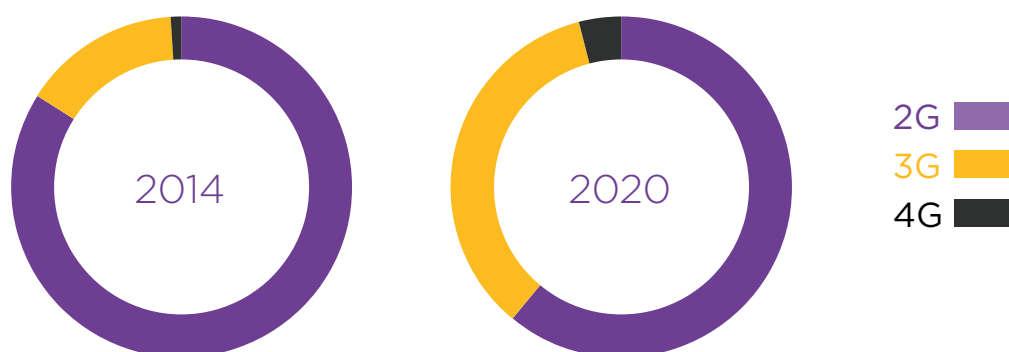
Smartphone
adoption

Share of regional
smartphone connections
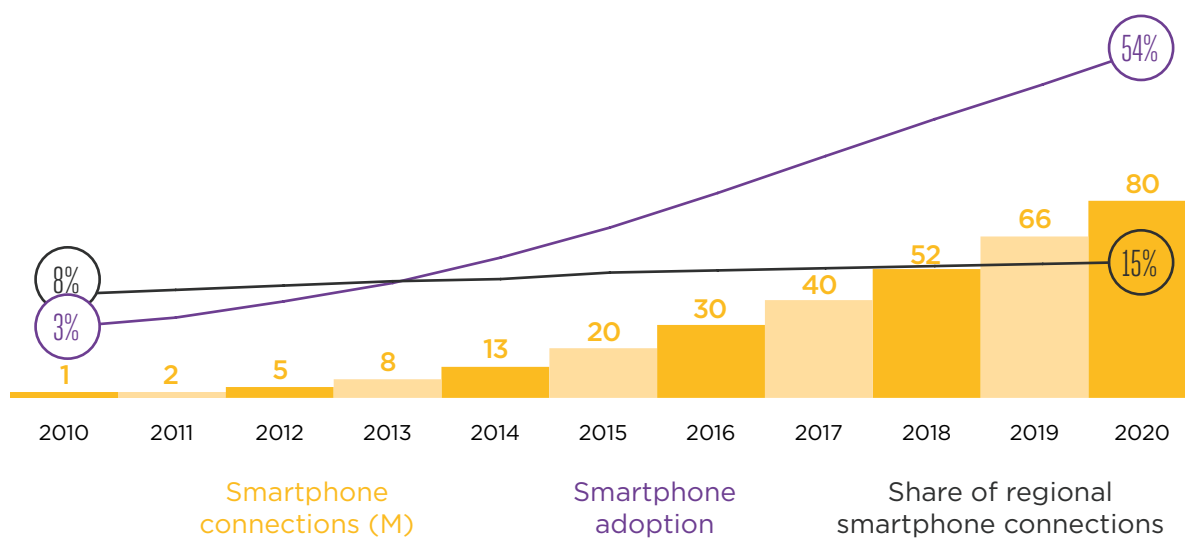
1.5.3 The Economic Community of West African States
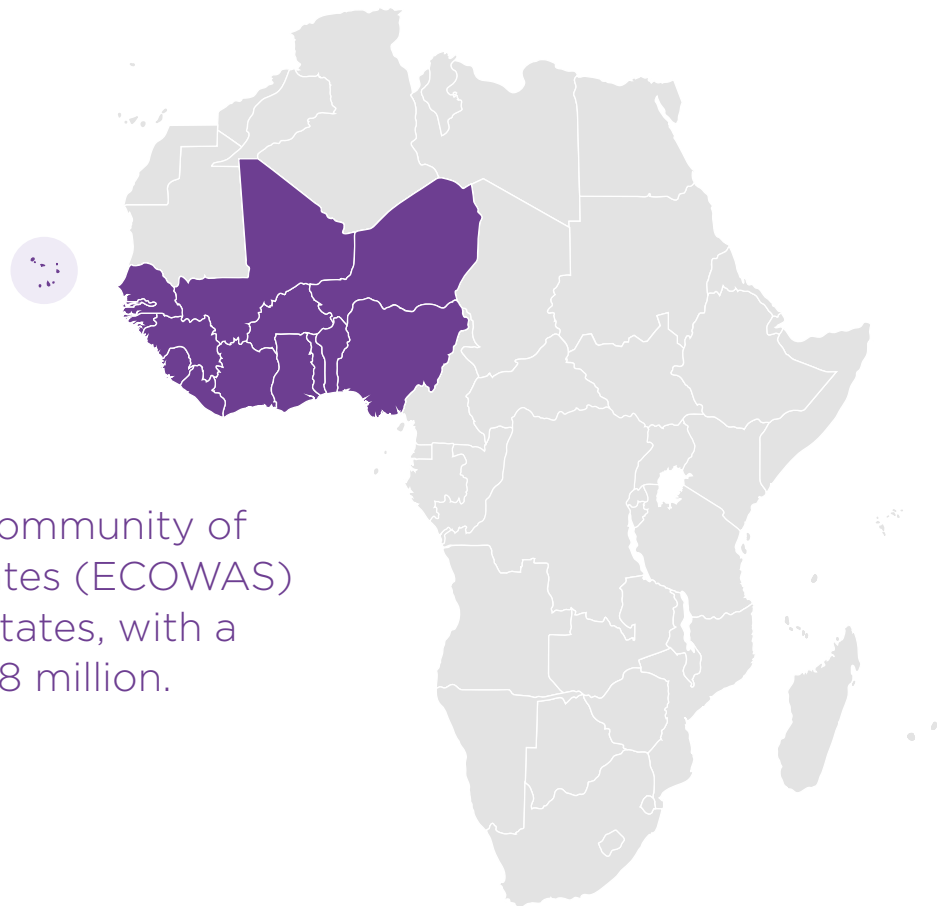
The Economic Community of West African States (ECOWAS) has 15 member states, with a population of 328 million.

The ECOWAS sub-regional block is the most populous in Sub-Saharan Africa, and is home to around 40% of mobile subscribers in the region. The overall mobile penetration rate is higher than the regional average, but varies significantly between the individual countries, from 17% in Niger to 68% in Mali. Nigeria had 85 million subscribers as of June 2015 and is the largest market in ECOWAS, accounting for more than half of the sub-region's subscriber base.

2G is the dominant technology in the sub-region, accounting for 90% of connections. The deployment of 3G networks is gaining pace; around 40% of connections will be based on 3G technology by 2020.

The sub-region will however have the lowest 4G adoption rate by the end of the same period, with particular challenges around spectrum availability. Although data-only operators have launched 4G networks in Côte d'Ivoire, Ghana and Nigeria, services are largely limited to a few major cities and accessed through data cards as opposed to smartphones.

Smartphones accounted for nearly one-fifth of total connections in the ECOWAS block at the end of 2014. The sub-region accounted almost half of the total number of smartphones in Sub-Saharan Africa as a whole. Smartphone adoption in ECOWAS will reach over half of total connections by 2020.

ECOWAS subscriber growth

SUBSCRIBER PENETRATION (%)

UNIQUE SUBSCRIBERS (M)

ECOWAS

SSA

30%   51%
25%   49%

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
83	98	116	135	149	163	176	187	198	207	216
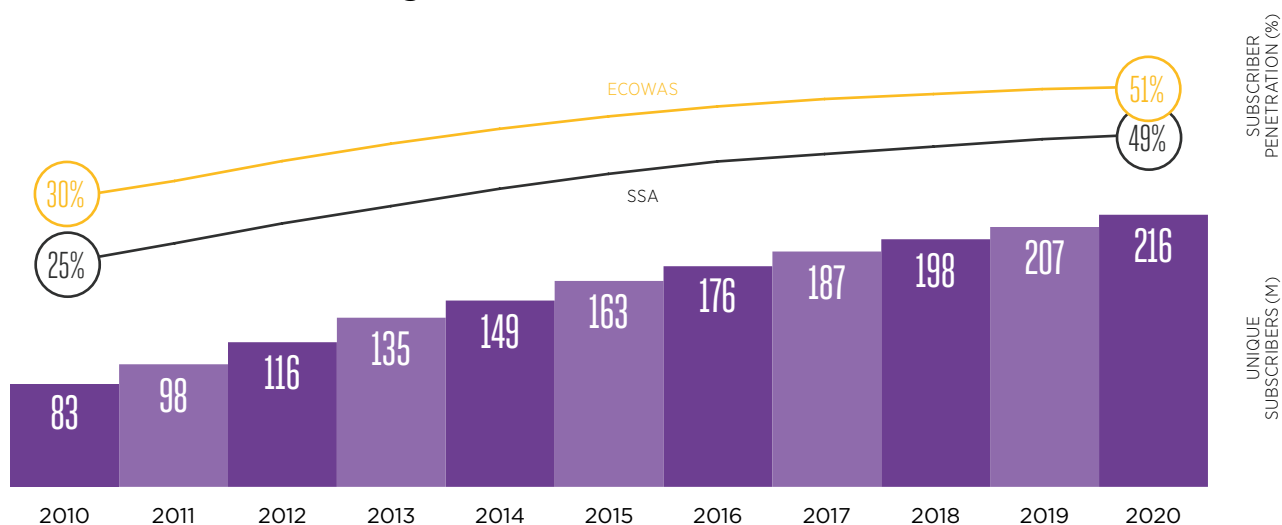
ECOWAS technology mix

2014

2020

2G
3G
4G

ECOWAS smartphone connections

38%   52%
42%

3%

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
5	10	20	32	50	72	97	125	156	190	227

Smartphone
connections (M)

Smartphone
adoption

Share of regional
smartphone connections

1.5.4 The Southern Africa Development Community

The Southern Africa Development Community (SADC) has 15 member states, with a population of 295 million.

The SADC regional block hosts some of the most developed mobile markets in Sub-Saharan Africa, including South Africa, Mauritius and Angola. More than half of the population in the SADC own a mobile phone, well above the regional average. However, there are significant variations in penetration levels within the block; mobile penetration rates range from 19% in Madagascar to more than 70% in Botswana and Mauritius. South Africa is the largest mobile market, accounting for nearly one-third of total subscribers in the sub-region, with 38 million unique subscribers as of June 2015.

Technology migration is well under way in the SADC, with mobile broadband now accounting for nearly a quarter of total connections. This is set to rise to about two-thirds of connections by 2020. South Africa will account for more than half of new 4G connections over the next five years, reflecting an established 4G ecosystem and continued investment in infrastructure rollout by operators.

SADC has the second biggest smartphone market in the region, and the highest smartphone adoption rate at a quarter of total connections. The total number of smartphones is forecast to reach 198 million by 2020, taking the adoption rate to nearly 60%.

SADC subscriber growth

SADC

54%

SSA

49%

36%

25%

SUBSCRIBER PENETRATION (%)

UNIQUE SUBSCRIBERS (M)

| 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| 76 | 88 | 98 | 107 | 121 | 132 | 140 | 147 | 153 | 159 | 164 |

SADC technology mix

2014

2020

2G
3G
4G

SADC smartphone connections

53%

59%

35%

4%

| 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| 8 | 13 | 20 | 29 | 43 | 63 | 87 | 113 | 141 | 167 | 192 |

Smartphone
connections (M)

Smartphone
adoption

Share of regional
smartphone connections

1.6 Revenue growth is declining

Revenue growth in Sub-Saharan Africa recovered after the global financial crisis but has been slowing in recent years. Although subscriber growth has also slowed over the same period, a number of other factors have also played a role. These include cuts to mobile termination rates, intense price competition and the depreciation of many local currencies. The declining growth also reflects the take-up of mobile services by new subscribers o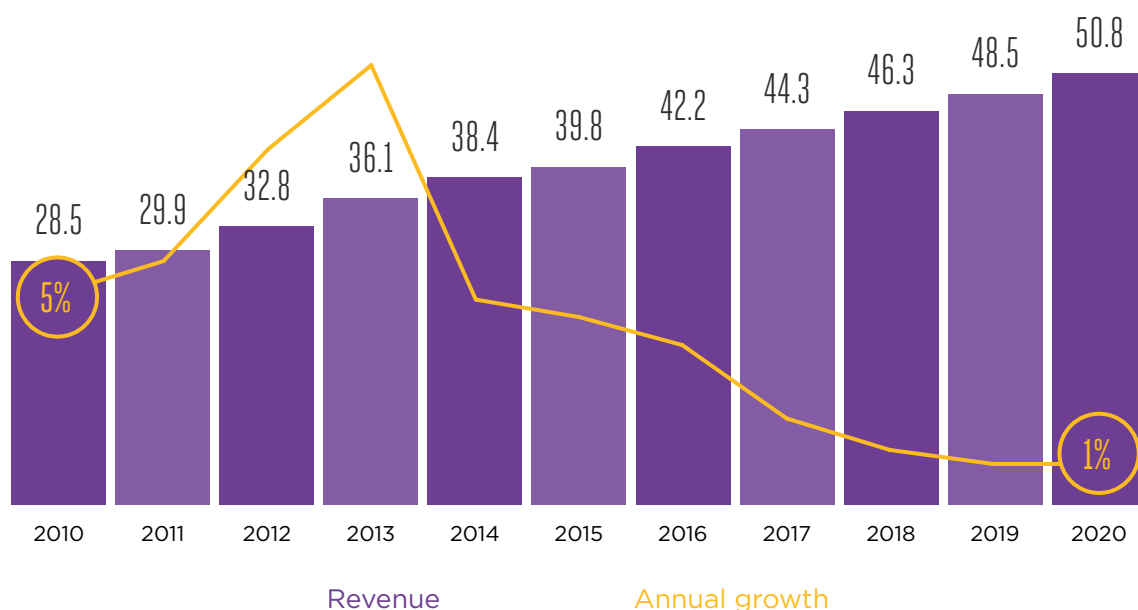n lower income levels, especially in rural areas, who spend less on communication services than many existing subscribers.

Source: GSMA Intelligence

Sub-Saharan Africa revenue growth

$ billion

Revenue growth is forecast at a CAGR of 5% per annum out to 2020, down from just under 7% in the first half of the decade. This reflects a number of factors, including the slowdown in subscriber growth but also the uptake of IP-based voice and messaging services from the major international players, such as WhatsApp and Skype. Services developed by local players, such as Mxit and 2go, have also begun to gain traction. Countries with high smartphone adoption rates are increasingly susceptible to revenue cannibalisation from the use of internet-based voice and messaging services. For example, in South Africa, where smartphone adoption is 30%, Vodacom has seen a steady decline in its voice and messaging revenues since 2010. In contrast, Safaricom in Kenya, where smartphone adoption is 15%, continues to record positive voice and messaging revenue growth (Safaricom recorded a 3.7% year-on-year growth in voice revenue and 14.8% year-on-year growth in SMS revenue in financial year 2014/15).

The challenge for operators is to continue to monetise the growth in data traffic and the growing uptake of data-centric services by consumers. Data revenues now account for more than 10% of recurring revenues in many countries in the region, and more than a third of revenues in more advanced countries such as South Africa.

1.6.1 Tower sharing takes root in Sub-Saharan Africa as operators seek cost efficiencies

Tower sharing is now a key feature of the mobile industry in Sub-Saharan Africa. Many of the region's leading operators have divested significant portions of their tower portfolios to independent tower companies (towercos) in recent years. Most tower-sharing deals in the region are commercially oriented rather than mandated by regulators. Deals have been driven by network coverage obligations attached to licences and cost-reduction pressures as the decline in revenue growth increasingly weighs on margins. Documented examples from Asia and Europe suggest capex savings of around 40–50% (mostly from combining new sites and towers) and opex savings of 20–30% (mostly from fuel and other running costs).

Source: TowerXchange

Towers owned or managed by towercos
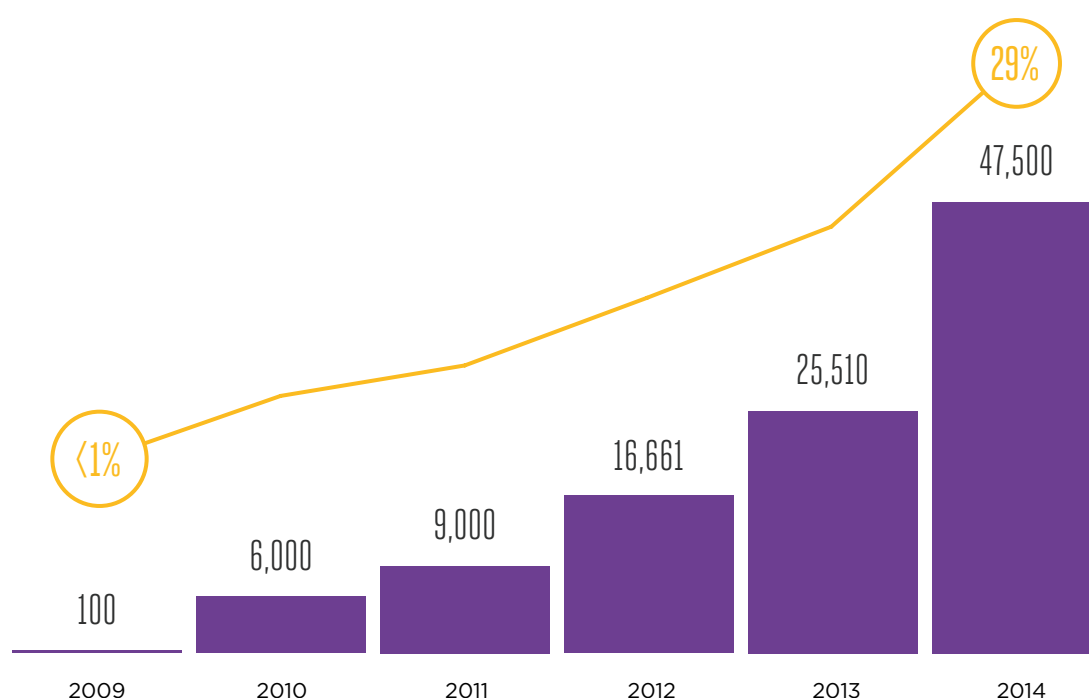
Funds realised from the sale of tower assets are usually deployed in other priority areas that can improve service quality and operational efficiency, such as investing in next-generation technology and deleveraging through debt reduction. Between 2010 and 2014, towercos operating in the region acquired approximately 47,500 towers from operators, equivalent to a third of the total regional tower count, in several deals valued at more than $4 billion[2].

2. TowerXchange

1.6.2 Investment in mobile broadband networks drives capex growth

Mobile operators in the region invested $9 billion in network infrastructure development in 2014, equivalent to 21% of revenues. This was a 16% increase on the amount invested in 2013. In recent years, capex growth has been driven by mobile broadband network deployments.

The rapidly expanding tower industry is set to ease the burden of capital investments on operators in the future; a number of the recently concluded tower sale and leaseback deals stipulate the rollout of new towers in underserved areas by independent towercos. However, sustained investment in mobile broadband network development will ensure that overall capital investments continue to rise in the coming years, reaching $13.6 billion by 2020.

Source: GSMA Intelligence

Sub-Saharan Africa mobile operator capex

$ billion

6.8% CAGR 2015-20

Year	Value
2012	8
2013	8
2014	9
2015	10
2016	11
2017	12
2018	12
2019	13
2020	14
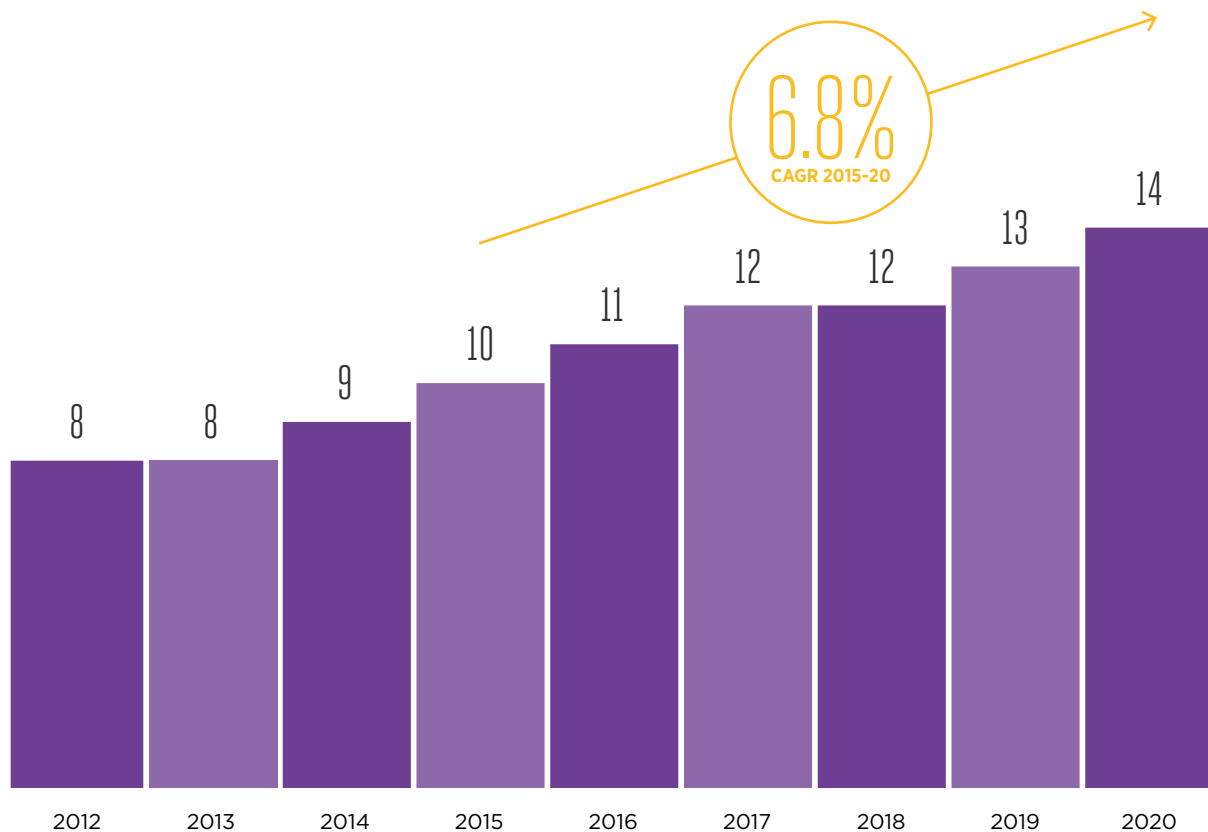
2

Mobile enabling innovation and social change in Sub-Saharan Africa

2.1 Mobile enabling innovation

Tech innovations have gained momentum in Sub-Saharan Africa over the last five years. Nairobi in Kenya – referred to as Silicon Savannah – has been the epicentre of this development and has been leading innovations in areas such as mobile money (M-Pesa) and crowdsourcing (Ushahidi). However, a number of incubators and accelerators have sprung up across the region, notably in Nigeria, South Africa, Botswana and Ghana.

A large number of tech start-ups in the region have also developed outside of incubators. Some of the biggest start-ups in Nigeria fall into this category, including Konga, Wakanow, Iroko and Paga. The outlook for start-ups in the region continues to improve, benefiting from the increasing availability of higher speed mobile broadband connectivity and further growth in smartphone adoption. Analysts predict that venture-capital funding in tech start-ups across the African continent is expected to exceed half a billion dollars by 2018.

Source: The Next Africa ©Aubrey Hubrey and Jake Bright, Crunch Base, TNA Analysis

Venture capital funding in African tech start-ups

$ million

| 2012 | 2013 | 2014 | 2018 (Est.) |
| 41 | 128 | 414 | 608 |
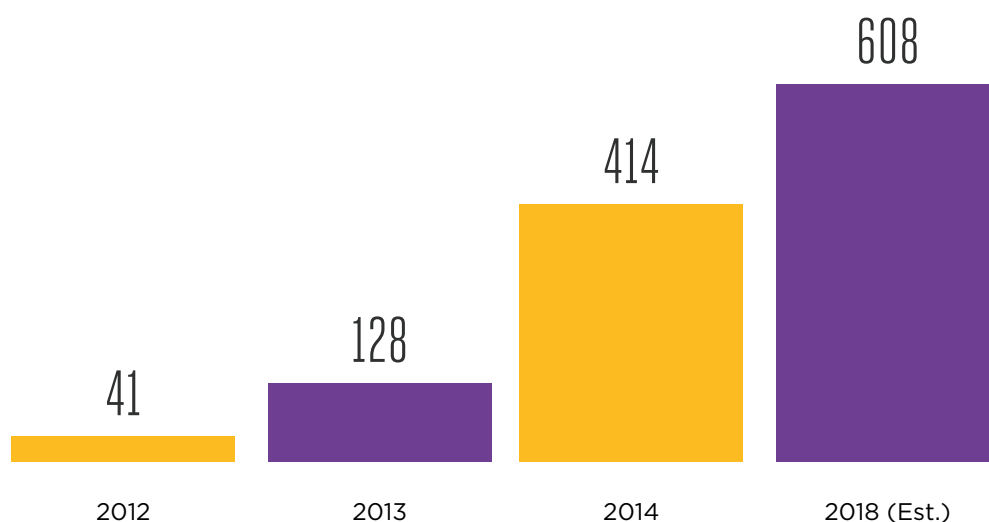
Note: Excludes debt, grant and private equity investments

Research by GSMA[3] involving 300 interviews with tech start-ups in Kenya found that only 11% have secured partnerships with mobile operators. However, this will likely grow in the coming years as mobile operators play an increasingly central role in the region's start-up ecosystem. In October 2014, Millicom launched the Millicom Foundation to support digital innovators in Africa and Latin America through a $10 million budget and mentoring programmes. Its affiliate Tigo has launched an accelerator programme in Rwanda. In November 2014, Safaricom launched the $1 million Spark Venture fund to support technology start-ups in Kenya. More than 200 start-ups had submitted enquiries and applications as of June 2015. In Nigeria, Airtel launched an initiative called 'Catapult-a-Startup' in December 2014 to inspire innovation and assist start-up mobile app developers. Meanwhile Orange launched Digital Ventures, a funding vehicle for start-ups, in

January 2015, with support available to start-ups in all geographical regions.

Governments across the region are keen to develop technology hubs and provide an enabling policy environment to support tech innovation. The Botswana Innovation Hub is a government-backed initiative that is now transitioning to a more sustainable model. The World Bank is also involved in the project through a reimbursable advisory services contract aimed at promoting economic diversity and competitiveness in Botswana's economy. The government of Kenya, in its five-year strategic plan, has committed to launching a tech hub in each of the 47 counties in the country, while the Information Technology Developers Entrepreneurship Accelerator (iDEA) incubator in Nigeria has received seed funding from the government to support more than 100 start-ups.

2.2 The African app economy

The rise in smartphone adoption and mobile broadband usage over the next five years will stimulate use of mobile apps, particularly among the increasingly tech-savvy youth segment, and support the emergence of a local app economy that will develop content and services for domestic consumers.

A survey by GeoPoll and World Wide Worx in April 2015 found that South Africa leads in the number of app downloads in the region, reflecting the high rate of smartphone adoption in the country. The pace of downloads is increasing in other markets, such as Ghana, Kenya and Nigeria, as more consumers are connected to mobile broadband. Social networking and instant messaging apps from global internet players are very popular among smartphone users in the region.

However, there is growing interest from local consumers in home-grown apps. Several popular local apps have originated from South Africa and Nigeria, and are now gaining traction in other countries in the region. These include social networking and messaging apps Mxit, 2go and How Far, and entertainment apps

Simfy Africa, Spinlet, iRokoTV, SOLO and iROKING. 2go has more than 50 million registered users across Africa while How Far, which launched in Nigeria in February 2015, recorded more than 10,000 downloads in the Google Play Store within its first five months. Beyond entertainment and social networking, other industries that will provide the relevant content for the African app economy include news and media, e-commerce, real estate and hospitality.

The sharing economy in Sub-Saharan Africa is still nascent but already attracting the interest of global players such as Uber and AirBnB. Uber launched its service in the region in 2012, starting in South Africa and expanding into Nigeria in 2014. Uber is also present in Kenya and plans to expand into other countries in the region. Local taxi hailing start-ups such as Sasa cabs in Kenya and Tranzit in Nigeria, as well as Brazilian cab service Easy Taxi, have also emerged as key players in the region.

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3. Digital Entrepreneurship in Kenya 2014, GSMA, 2014

2.3 Mobile commerce on the rise

Digital commerce is on the rise in the region, supported by growing internet penetration. Consumer research carried out by Ipsos in March 2015 showed that 20% of South African internet users have made purchases online and another 48% expect to do so in the future[4]. Mobile commerce will be central to the evolution of the digital commerce market in Sub-Saharan Africa, as the majority of internet users in the region will access the Web through mobile devices. Another survey by In Mobi in 2014 (which includes data from 14,000 users across 14 countries, including Nigeria, Kenya and South Africa) predicted that 83% of consumers plan to conduct mobile commerce in the next 12 months, an increase of 15 percentage points on the 2013 figure.

A number of established digital commerce sites are present in the region, some of them offering cross-border transactions. One particular success story is Jumia, which was founded in 2012 with funding from Rocket Internet. The firm has expanded across the region from its original base in Nigeria, with local sites in several countries, including Kenya, Tanzania, Cameroon, Senegal, Uganda and Ghana. Mobile is a key part of Jumia's strategy. It has partnered with MTN and Millicom to drive future growth by increasing traffic from its mobile users through promotions, joint marketing campaigns, cross-selling, and payment facilitation. The latter is particularly important considering the limitations of online payment methods in the region, and the potential for mobile operators to provide fast and secure payment services for buyers and sellers.

4. Source: Ipsos study conducted on behalf of PayPal and First National Bank

2.4 Mobile enabling digital inclusion

Mobile remains the key platform to bring internet access to populations across Sub-Saharan Africa. There is limited fixed line infrastructure in the region, and where it does exist it is largely unaffordable to local populations. The ITU estimates that the cost of fixed broadband services is higher than the target level (a maximum of 5% of GNI per capita in 2015[5]) in most countries in the region. With mobile broadband prices already more than $10 per month lower than fixed prices (and more than $50 per month lower in the DRC and Zambia), mobile technology is crucial to overcoming the affordability barrier, considering income levels in the region.

At the end of 2014, a fifth of the population in Sub-Saharan Africa had access to the mobile internet, including about 13% that could access high-speed broadband services through mobile phones. In contrast, less than 0.5% of the population had access to fixed broadband services. The GSMA expects mobile internet access in the region to increase further over the period to 2020, with 200 million more individuals gaining internet access, taking the penetration rate to just under 40% of the population.

Despite the significant progress, six out of ten people in the region will still be unconnected by 2020, with Sub-Saharan Africa continuing to lag well behind the global average. This highlights the existence of significant barriers to adoption. African women are particularly price sensitive and are currently 13% less likely than African men to own mobile phones. In some countries, such as Niger, this number rises to 45%. Similarly, women are using mobile internet less than men; for example, 43% of Kenyan women report trying the internet on a mobile device, compared to 61% of Kenyan men.[6]

The GSMA launched its Digital Inclusion programme in April 2014 to expand global connectivity and increase mobile internet adoption. In collaboration with mobile operators, governments, internet players and non-government organisations, the programme aims to address three key barriers to mobile internet access.

Source: GSMA Intelligence

Mobile internet subscriber penetration

	Sub-Saharan Africa	Developing countries	World
2014	23%	29%	33%
2020	37%	45%	49%
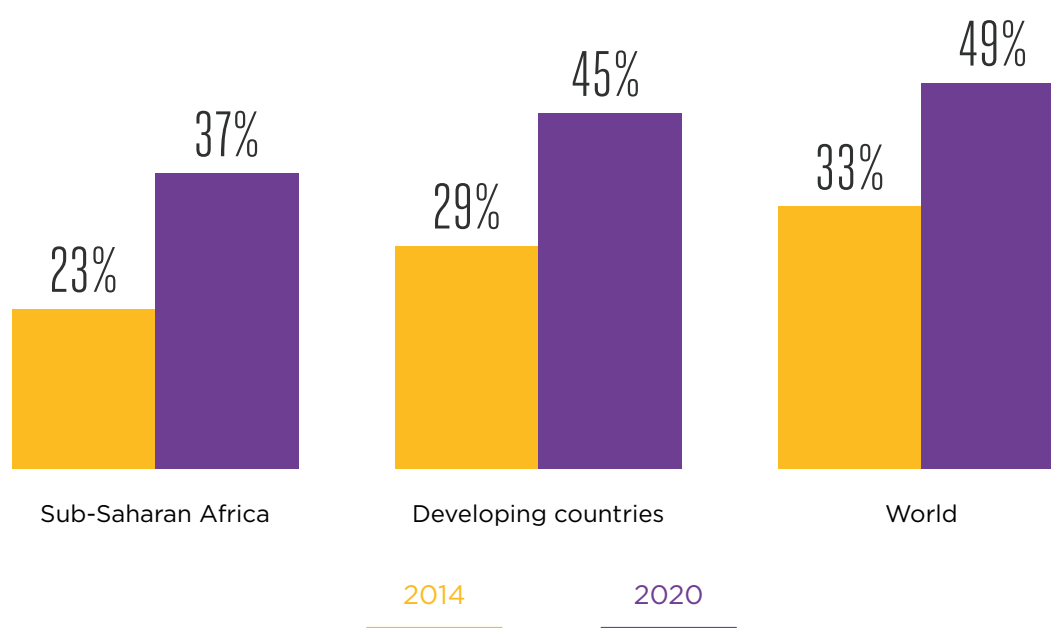
5. GNI: gross nation income per capita, which is GPD plus the income received from overseas
6. Bridging the gender gap: Mobile access and usage in low- and middle-income countries, GSMA, 2015

2.4.1 Addressing the coverage gap

The majority of unconnected people in Sub-Saharan Africa live in rural and geographically remote areas. The main challenge to extending mobile broadband coverage to the unconnected is the cost of rolling out and maintaining network infrastructure in thinly populated areas where the majority of consumers are typically on low incomes.

A recent report by GSMA[7] analysed three broad strategies to address the coverage gap: network sharing, government support and alternative technologies. Some of these are discussed in more detail in the final section of this report.

Mobile operators are employing a range of solutions to tackle the challenge of off-grid connectivity, including the increasing use of green options such as solar power,

wind, water, biomass and fuel cells. One company that has developed a solution to help mobile operators extend coverage to remote communities is Africa Mobile Network (AMN). The firm finances, builds and operates solar-powered mobile base stations in remote and unconnected communities with populations of 4,000 or more. AMN's first base station was launched in Benin in January 2014 in partnership with local operator Bell Benin Communications (BBCom). The site connected between 6,000 and 7,000 people to voice and data services for the first time. AMN plans to extend its solution to more than 12 other countries in the region, including Angola, Côte d'Ivoire, Ghana, Nigeria, Zambia and Zimbabwe.

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7.   Closing the network 'coverage gaps' in Asia, GSMA, 2015

2.4.2 Improving affordability

The declining ASP of smartphones has played an important role in improving the affordability of mobile services. Sub-$100 smartphones are increasingly available though have yet to reach mass-market adoption. In June 2015, Chinese-based vendor Xinwei Telecom launched mobile phones in the sub-$20 range in Malawi supporting voice calls, videos and internet browsing.
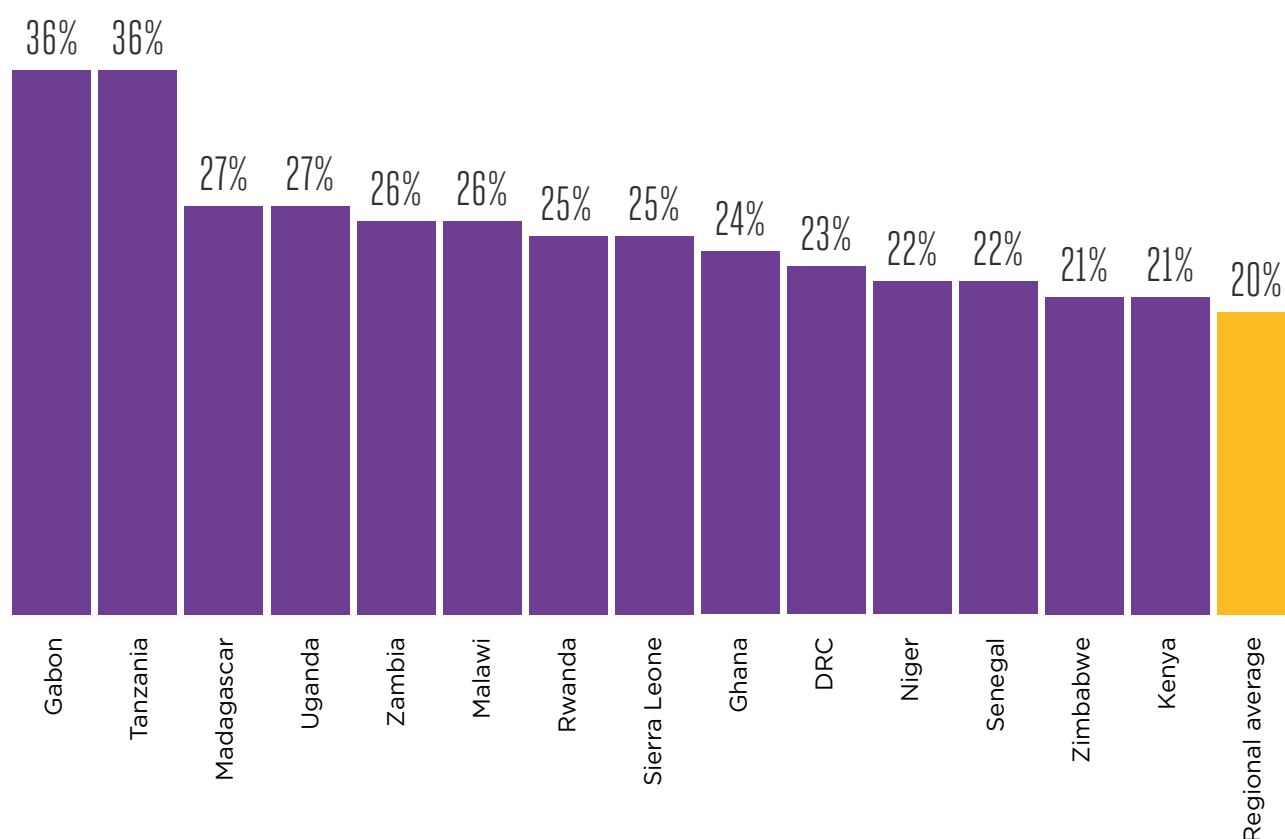
Among the biggest barriers to greater digital inclusion are taxes levied specifically on the mobile sector, such as airtime excise and SIM taxes. Such taxes run counter to the widely recognised principles of taxation outlined by the International Monetary Fund and other expert organisations.

Mobile-specific taxes place a disproportionate burden on poorer Africans, including women who tend to earn less than men, excluding them from the benefits of digital and financial inclusion. By pushing up prices, mobile-specific taxes artificially lower consumption of mobile services. In many countries, taxes account for an excessive proportion of the total cost of owning a mobile device and mobile services.

Source: GSMA Digital inclusion and mobile sector taxation 2015

Consumer taxes as a proportion of total cost of mobile ownership 2014

Country	Percentage
Gabon	36%
Tanzania	36%
Madagascar	27%
Uganda	27%
Zambia	26%
Malawi	26%
Rwanda	25%
Sierra Leone	25%
Ghana	24%
DRC	23%
Niger	22%
Senegal	22%
Zimbabwe	21%
Kenya	21%
Regional average	20%

Excessive taxes on operators' revenues reduce incentives for investment in infrastructure and quality of service improvements. In Tanzania, operators paid more than $540 million in taxes in the 2013/14 financial year, accounting for almost 50% of their revenues. Although the turnover of the mobile sector directly contributes 3.8% of Tanzanian GDP, it provides over 11% of Tanzanian tax revenues.[8]

As well as paying national taxes, operators often face high administrative costs due to multiple taxes and complex taxation. For example, Nigeria's mobile operators must engage with – and frequently pay – local authorities and regulatory bodies. In some cases, the national telecommunications regulator has found that these taxes are actually illegal. Added to these costs, mobile operators also pay a number of fees to the national telecommunications regulator, and an Education Tax and Information Technology Development Levy that apply only to select industries.

Taxation in Ghana

A recent study conducted for the GSMA by Deloitte has looked in detail at how the tax system could be reformed to make mobile affordable for the average Ghanaian. The study shows the following:

- Taxes account for almost a quarter of the cost of mobile ownership in Ghana, significantly above the regional average.

- Mobile is one of the more heavily taxed sectors in Ghana, and mobile operators pay $650 million in taxes each year, representing about 40% of total revenues in the sector.

- Mobile handsets are subject to taxes of up to 37.5%, through VAT, the National Health Insurance Levy (NHIL) and customs duties, which were reintroduced in 2013.

- Mobile services such as calls, SMS and data usage are subject to VAT, NHIL and an additional Communications Services Tax (CST) of 6%.

- The government has raised the possibility of an additional tax of GHS5 ($1.35) on the activation of SIM cards.

Source: Digital inclusion and mobile sector taxation in Ghana, GSMA, 2015

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8. Digital inclusion and mobile sector taxation in Tanzania, GSMA, 2015

2.4.3 Digital literacy and local content

Low literacy – traditional, basic mobile, mobile technical, mobile internet and advanced mobile internet literacy[9] – acts as a barrier to increasing mobile internet adoption. Nearly 40% of adults in Sub-Saharan Africa are illiterate. Digital literacy[10], which is not formally evaluated in most countries, is an even bigger barrier affecting the creation and usage of local digital content. Women are more likely to cite digital literacy issues than men and also tend to exhibit less confidence with mobile devices than men.

Local content is a core part of the internet experience that consumers are seeking – whether for localised versions of global services, local entertainment packages or hyper-local information such as bus timetables or commodity prices. This trend is visible in the increasing number of locally relevant mobile offerings such as EduMe, Every1Mobile, Hivisasa and Ushahidi. In January 2015, the BBC launched the Africa edition of the bbc.com website to bring more locally created stories to users in the continent. A recently launched South African video-streaming service known as ShowMax is offering 1,000 hours of content, including local favourites in Afrikaans. The growing popularity of job-search websites in Nigeria also reflects the appetite for locally relevant content in the region.[11]

Mobile operators are working to address the issues of awareness as well as supporting programmes to boost digital literacy. In Nigeria, Airtel's 'Boost ICT Usage in Rural Areas' programme provides first-hand experience with internet services to underserved and rural consumers. The operator also runs demonstrations of internet services on smartphones and tablets on the 'Airtel ICT Train', which travels across the country. As these barriers are overcome, and users become more familiar with internet access, the importance of locally relevant content will grow.

9. Digital Inclusion, GSMA, 2014
10. A set of skills that allows a user to not only access the internet, but to navigate websites and evaluate/create information through digital devices
11. "Local content will drive Nigeria's internet penetration", Biztech Africa, 2015

2.5 Mobile enabling financial inclusion

Sub-Saharan Africa accounted for more than half of the 255 live mobile money services across the globe in 2014. Over half of all mobile operators in the region have already launched a mobile money service. Of all the regions, Sub-Saharan Africa records the highest level of mobile money penetration.

By December 2014, 23% of mobile connections in Sub-Saharan Africa were linked with a mobile money account, whereas smartphone connections only represented 16% of total connections in the region. In East Africa, the contrast is even starker, with almost one mobile money account for two mobile connections, compared to smartphone penetration of just under 13%. While the process of opening a mobile money account is different from buying a smartphone, this comparison gives an idea of the prevalence of mobile money

compared to other fast-growing products and services.[12]

Mobile money services have helped to bridge the gap in financial inclusion in the region. According to global Findex data[13], there are more registered mobile money accounts than banks accounts in Burundi, Cameroon, the Democratic Republic of the Congo, Gabon, Guinea, Kenya, Lesotho, Madagascar, Republic of the Congo, Rwanda, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. Mobile money has become a key complement to traditional banking in expanding access to financial services in a region where only a third of adults have formal bank accounts. In Kenya, access to financial services more than doubled over seven years to reach two-thirds of the population in 2013, helped by mobile financial services.

Source: GSMA Mobile Money Programme
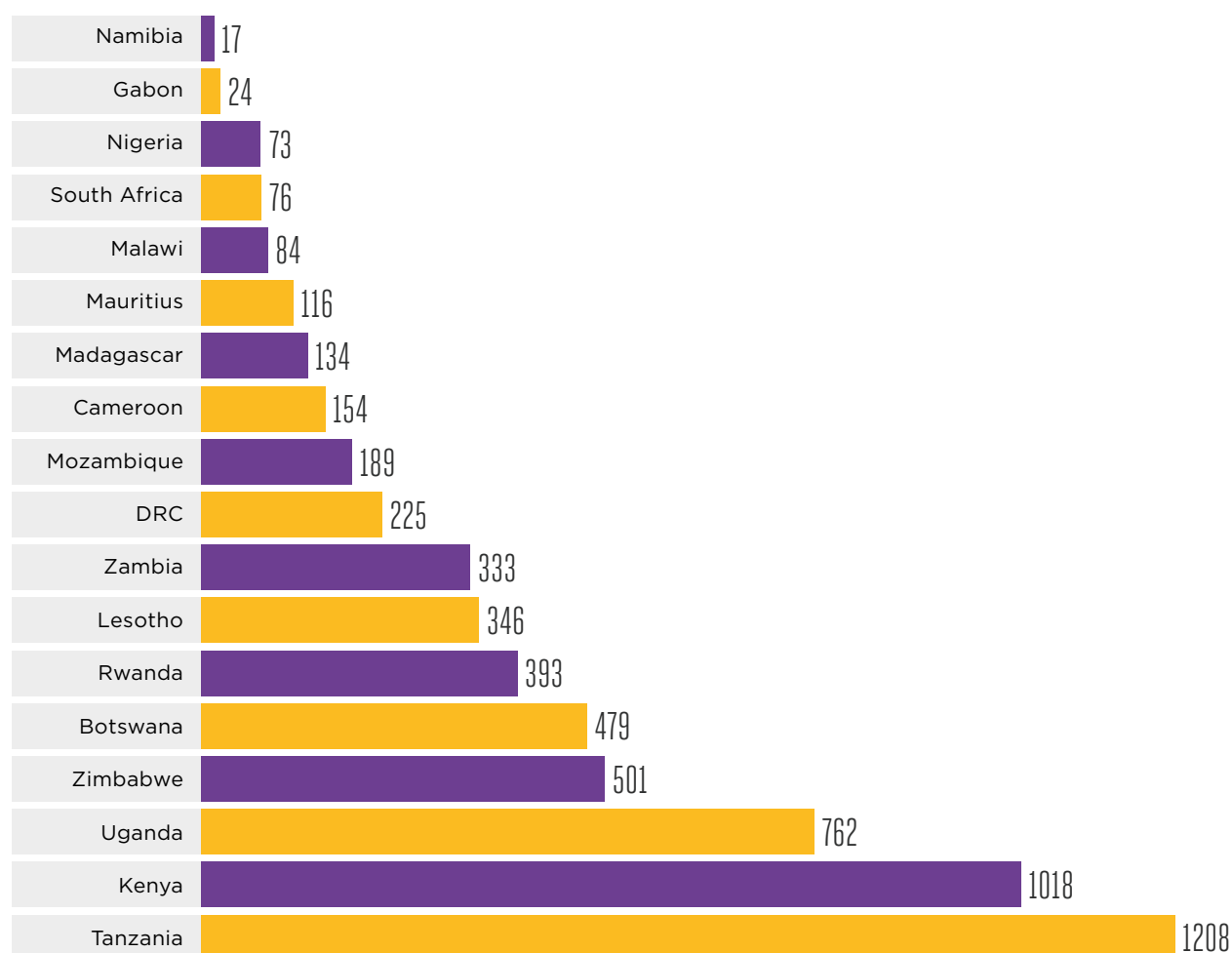
Monthly mobile money transactions

$ million

Eastern Africa   Western Africa   Southern Africa   Central Africa
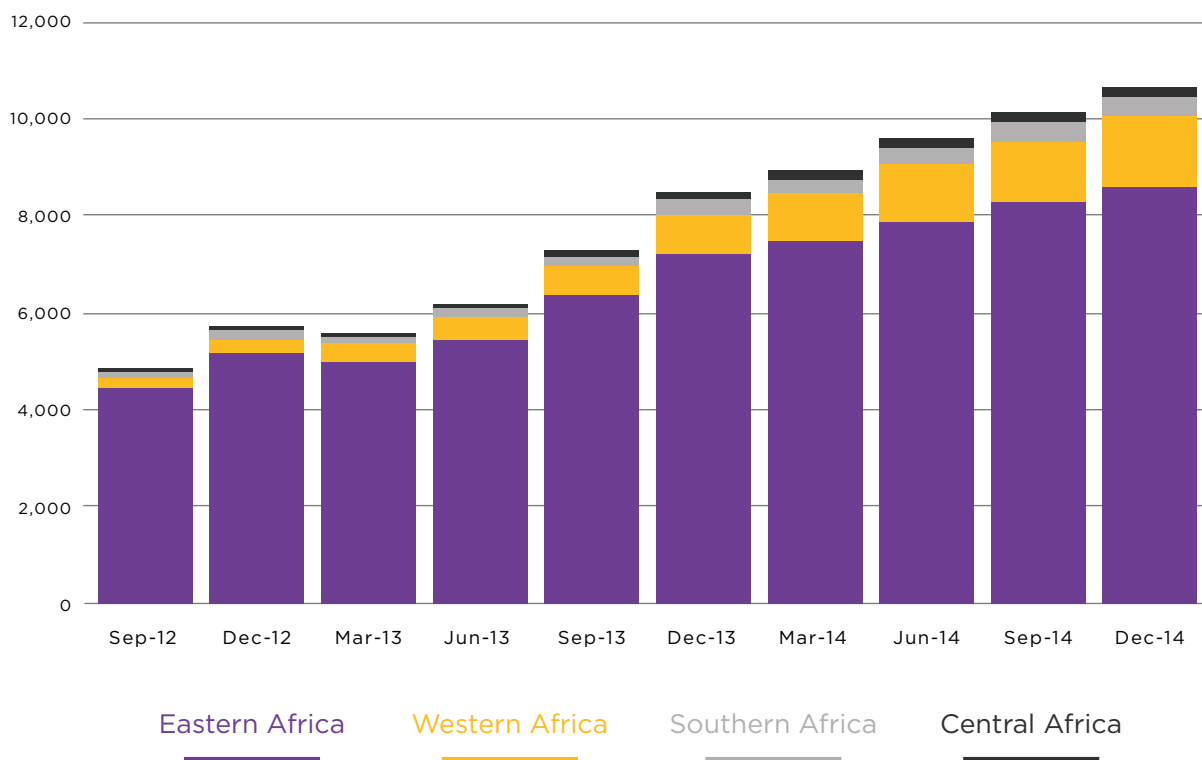
12. State of the Industry: Mobile Financial services for the Unbanked, 2014, GSMA, 2014
13. World Bank Global Findex

Number of registered mobile money accounts per 1,000 adults 2014

Country	Value
Namibia	17
Gabon	24
Nigeria	73
South Africa	76
Malawi	84
Mauritius	116
Madagascar	134
Cameroon	154
Mozambique	189
DRC	225
Zambia	333
Lesotho	346
Rwanda	393
Botswana	479
Zimbabwe	501
Uganda	762
Kenya	1018
Tanzania	1208

With an increasing number of countries in the region having two or more mobile money services, interoperability is essential if the full potential of mobile money services is to be realised. In Sub-Saharan Africa, Tanzania has taken the lead in this regard. It introduced interoperability on a market-led basis in August 2014. Tanzania is one of four markets where operators have interconnected their mobile money services, along with Indonesia, Pakistan and Sri Lanka.

Cross-border remittance models are also gaining popularity in East and West Africa. For example, Orange operates an international money transfer service that links Côte d'Ivoire, Mali and Senegal. By the second half of 2014, the value of cross-border remittances on Orange Money accounted for nearly one-fifth of all remittances reported by the World Bank between these three markets. The success of

this initiative indicates the readiness of consumers in mature mobile money markets to send and receive cross-border transfers using their mobile money account. In April 2014, MTN Côte d'Ivoire and Airtel Burkina Faso signed an agreement to interoperate their mobile money services to facilitate cross-border transfers. Orange Côte d'Ivoire and Airtel Burkina also signed a similar agreement in March 2015. In May 2015, Vodafone M-Pesa and MTN Mobile Money announced an agreement to allow customers to transfer funds between the two services. When operational, the deal will enable M-Pesa customers in Kenya, Tanzania, the DRC and Mozambique to transfer money to and from MTN Mobile Money customers in Uganda, Rwanda and Zambia.
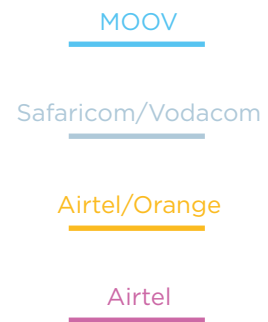
Source: GSMA Mobile Money Programme

Intra-regional corridors for cross-border mobile money remittances

West Africa

East Africa

Legend:
- Tigo
- Orange
- MTN
- Airtel/MTN
- MOOV
- Safaricom/Vodacom
- Airtel/Orange
- Airtel

Mobile money can be instrumental in developing various ecosystem services from which mobile money providers and third-party organisations can benefit, either by using it as a payment mechanism or by leveraging mobile money accounts. A mobile money ecosystem can facilitate transactions from different sectors, such as retail, utilities, health, education, agriculture and transportation in addition to credit, insurance and savings. Mobile money can also link ecosystem initiatives in different verticals. For example, mobile money users who receive their salary payment, government pension or access credit using their mobile money account could also pay a utility bill, merchant payment or school fees digitally, since funds are already available in electronic form. Collaboration between mobile money providers in the form of interoperability is essential to the development of ecosystem services across multiple verticals.

Source: GSMA Mobile Money Programme

Digital payments ecosystem
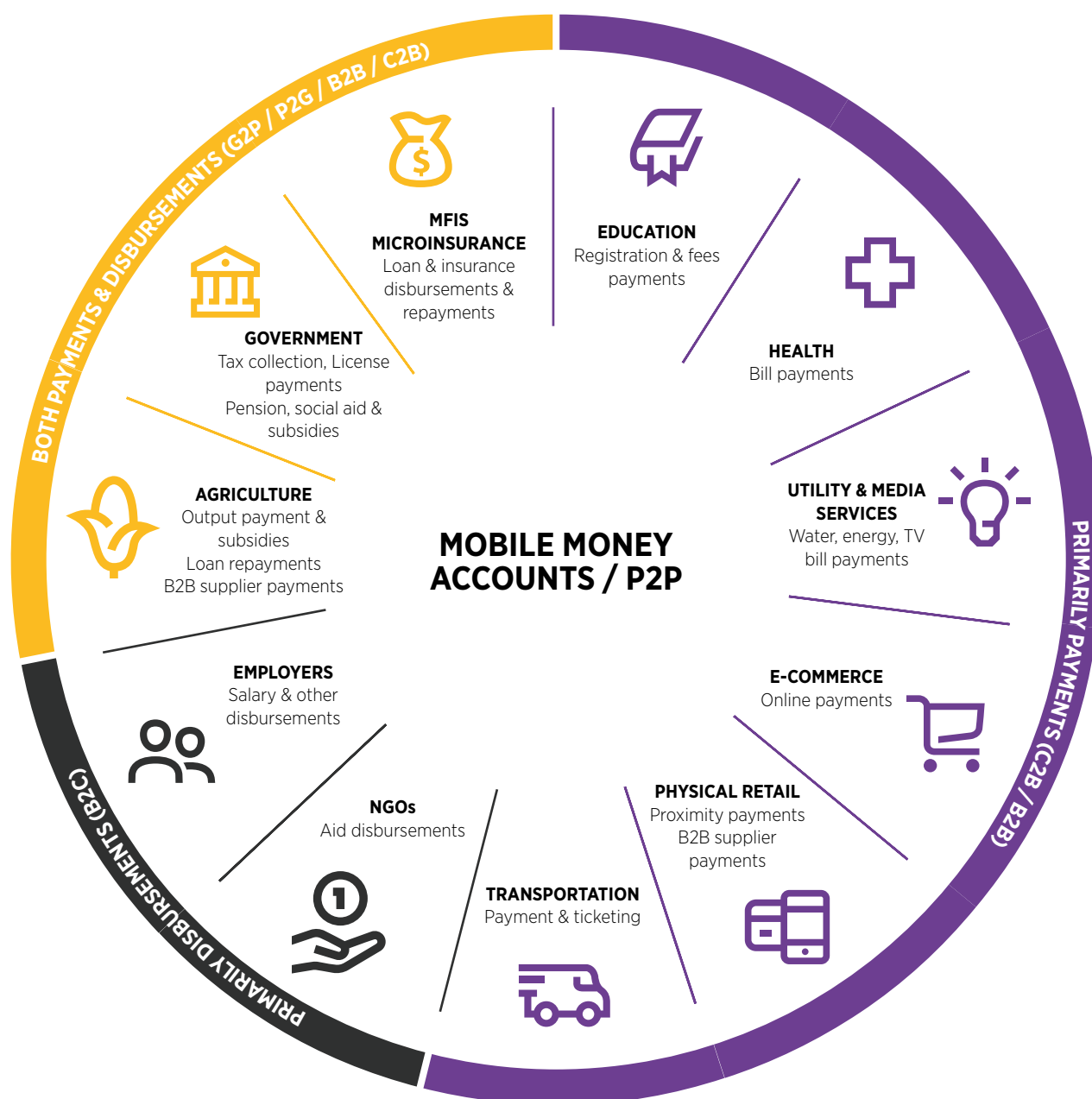
Case study: Côte d'Ivoire – mobile money

In Côte d'Ivoire, Orange, MTN, Moov and Celpaid have developed an application that allows school registration fees to be paid through mobile money, digitising person-to-government payments. It is one of the first large-scale examples of mobile operators providing ecosystem services using their mobile money platform. In 2014, the initiative enabled annual school registration fee payment for 99% of Côte d'Ivoire's 1.5 million secondary school students. This has improved cost efficiency, transparency and economic empowerment for all stakeholders, including students and their parents, the national Ministry of Education and Technical Education (MENET) and mobile money providers.

The application allows a student to select 'Registration Fee Payment' in their mobile money account menu and select 'MENET' as the payee institution. The student is then prompted to enter their student ID number and the contact number of a parent. Entering the student ID number prompts retrieval of the student record information from the MENET database in real time. If the information is correct, including the fee to be paid, the student is prompted to enter the PIN for their mobile money account to authorise the payment. The student receives an SMS receipt to confirm payment, which includes a reference code. The student must then go to the MENET website, enter their unique reference code, and print their proof of payment certificate.

The development of mobile money-based ecosystem services requires a regulatory environment that supports the growth of mobile money services and increased financial inclusion. For example, the Bank of Ghana published new and progressive guidelines for e-money issuers in July 2015, effectively replacing the 2008 guidelines for Branchless Banking. The new regulatory framework has changed the landscape for e-money issuance and mobile money services in the country by providing a proportionate, risk-based approach to regulating the industry while allowing mobile operators to participate fully through wholly-owned subsidiaries. The previous bank-led model for mobile money services did not prove to be particularly effective due to the lack of a compelling business case for extending services to the bottom of the pyramid, leading many providers to focus on services for large institutional customers and individuals with regular incomes.[14] However, the new approach allows mobile operators to take the lead in the rollout of innovative services. As a result, many new products are being launched in the market.

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14. Regulatory reform: A conversation with the Bank of Ghana on the journey towards the new guidelines for e-money issuers, GSMA, 2015

2.6 Mobile addressing social challenges

Mobile operators, governments and international development organisations have been working on a range of mobile-based solutions to address a variety of social challenges in the region. Many of these challenges arise from lack of access to essential services, such as basic education and health, due to poor social infrastructure and difficulties reaching citizens in remote communities.

GENDER GAP
3-2-1 – Madagascar

3-2-1 is a free on-demand mobile information service from HNI and Airtel in Madagascar that provides a variety of information to listeners, including a module on gender-based violence that informs what the law deems as unacceptable behaviour and where to seek help. The toll-free number, 321, is available 24 hours a day. Callers are greeted by a welcome message in their local language; there is then a series of voice prompts through the menu until they find the trusted information they need. The service has more than 200,000 unique users every month, submitting 800,000 enquiries to the service every month[15].

AGRICULTURE
Vodafone Farmers' club – Ghana, Kenya and Tanzania

Following success in Turkey, Vodafone has announced the expansion of its Farmers' club to four more countries: Ghana, Kenya, Tanzania and India. While the specific services offered by Farmers' Club vary by country, it provides information services such as farming tips and weather forecasts in local languages, virtual marketplaces in which farmers can sell their produce, and mobile money financial services and products. These services can be delivered via voice-based mobile channels such as interactive voice response (IVR) and helplines, and through SMS and rich media.

The Farmers' Club is now a live service in Ghana, where it was launched in June 2015 with the support of the GSMA as part of the Nutrition Initiative, and in partnership with local VAS provider Esoko. It is also available in Tanzania (Vodacom Kilimo Club), where the operator has offered for some time, with the support of USAID and TechnoServe, the Connected Farmer agriculture value chain platform, which comprises farming advice, market price information and mobile money capabilities for transactions. The services will be extended to Kenya in 2016.

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15. Bridging the gender gap: Mobile access and usage in low- and middle-income countries, GSMA, 2015

HEALTH

Mobile Midwife by Grameen Foundation – Ghana and Nigeria

Mobile Midwife is a free mobile service that enables women and their families to receive SMS and/or voice messages in their own language offering relevant and timely information throughout pregnancy and the first year after birth. By using IVR to deliver the information, Mobile Midwife is also able to reach women with low literacy levels. Topics include hygiene, nutrition, immunisation, malaria and warning signs. Some messages address husbands specifically and provide practical advice and information on how to support their wives.

Having started in Ghana in 2014, Grameen Foundation launched the project in Nigeria in June 2015. The service was adapted and existing content was localised to the Nigerian context to build a commercially sustainable business model. Early consumer surveys have shown positive uptake of the service[16].

UTILITIES

Persistent Energy – Ghana and Tanzania

Devergy is an energy services company that provides a reliable, affordable electricity service to low-income people in developing countries. The service is based on energy micro-grids that provide solar power to households and businesses. In Tanzania, Devergy works in partnership with Tigo Tanzania, to scale low-cost solar-PV micro-grids to provide access to basic lighting, charging and appliances to rural communities.

The product was trialled in several villages in Tanzania from 2012. The company is now proceeding with full project implementation and is seeing encouraging results.

NUTRITION

Wazazi Nipendeni – Tanzania

The Wazazi Nipendeni service offers reminders and informative text messages in Swahili to pregnant women, mothers with new-born babies and supporters/ caregivers. The objective is to promote healthy pregnancy and early childhood care behaviours. In addition, the service seeks to assist health professionals in the dissemination of information typically shared during antenatal care visits. The content promotes improved nutrition practices. For instance, nutritional messages include information on timely iron and folic acid intake, maintaining a healthy, well balanced diet and drinking clean water. These messages can include simple instructions on how to treat early pregnancy nausea, information on the importance of breast milk and how to monitor milk intake by babies.

Wazazi Nipendeni has scaled significantly since its launch in November 2012. The Healthy Pregnancy, Healthy Baby text messaging service has sent out more than 44 million messages to its 556,813 total registrants (as of the first quarter 2015). Of this total, 408,000 registrants enrolled in the service themselves.

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16. Connected Women Case Study: Grameen Foundation, GSMA, 2015

2.7 Summary of GSMA Programme activities

The GSMA has identified four key growth areas that present both significant opportunities and benefits for consumers, as well as providing clear opportunities for mobile operators to collaborate and play an active role in delivering these future opportunities and benefits.

CONNECTED LIVING

The GSMA, through its Connected Living Programme, aims to further develop the IoT market, both within the Sub-Saharan Africa region and at the global industry level. The initial focus of the Connected Living programme is to accelerate the delivery of new connected devices and services in the M2M market through industry collaboration, appropriate regulation, optimising networks and developing key enablers to support the growth of M2M in the immediate future. The ultimate aim is to enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network.

Working with its partners across the ecosystem and key verticals, the GSMA is active in a number of areas to drive forward this initiative:

- **Remote SIM provisioning for M2M:** The GSMA's vision is to unite all stakeholders behind a single, common and interoperable global embedded SIM specification to help accelerate the growing M2M market.

- **IoT business enablers:** The GSMA is working to create a sustainable M2M regulatory and policy environment that enables operators to unlock the consumer and business benefits of the IoT.

- **Secure IoT networks:** The GSMA is working to establish security requirements for how machines should communicate via the mobile network in the most secure way.

- **Mobile IoT:** The GSMA is working with mobile operators and ecosystem partners to assess solutions for low-power, wide area connections to enable further scaling of the IoT.

NETWORK 2020

The GSMA's Network 2020 programme is designed to help mobile network operators in the move to an all-IP world and help them deliver global, interconnected all-IP communications services to consumers such as voice over LTE, video over LTE (ViLTE), voice over Wi-Fi (VoWi-Fi) and RCS. Operators are in a unique position to offer secure, ubiquitous all-IP solutions with reach, reliability and richness. The transition will allow them to deliver an enhanced customer user experience that when interconnected with other operators offers truly global reach and scale. The programme is already helping operators from around the world to migrate from circuit-switched technology to an all-IP infrastructure while helping them to maintain service continuity.

The first phase of the programme focuses on helping networks deploy VoLTE and conversational video calls over LTE, VoWi-Fi and encouraging the RCS ecosystem to help operators prepare for and launch RCS-based interoperable communication solutions and VoLTE

roaming architectures for their customers around the world.

Additionally, the Network 2020 programme will work with operators to determine the technical and commercial specifications for operator-to-operator quality of service (QoS) for IP services, and encourage them to incorporate the QoS philosophy into their customer solutions. The Network 2020 programme also aims to help catalyse commercial implementations for IP interconnect solutions between operators and service/content providers.

Finally, until such time as the industry requirements and definition of 5G have stabilised, the GSMA will focus on improving the overall sustainability of the mobile telecoms sector, allowing more networks to achieve greater connection numbers by enhancing the business model for expanded coverage and offering connectivity to those in the world that currently have no connectivity at all.

DIGITAL COMMERCE

Working with mobile operators, regulators, banks, retailers, transport operators and other service providers both in Sub-Saharan Africa and across the globe, the GSMA's Digital Commerce programme is active in driving the mass adoption of SIM-secured digital commerce services globally.

The GSMA engages regularly with key government and regulatory bodies, providing advice and guidance on how to harness the potential benefits of SIM-based services in transport, retail and other sectors of the economy, and developing industry positions on aspects of policy, highlighting the impact of regulation and informing regulators' decision-making processes.

As the number of commercial mobile commerce services around the world rises, the GSMA continues to promote the use of common standards to enable the global interoperability of services and generate economies of scale, liaising with other relevant stakeholders to ensure the consistency of the overall set of specifications involved in mobile

commerce deployments. Covering many topics, these specifications set out a common framework of requirements to ensure interoperability and an efficient and consistent development and deployment of mobile commerce services.

Two areas of focus for the Digital Commerce initiative are as follows:

- **Tokenisation:** the Digital Commerce programme is working with operators from around the world to provide a tokenisation-based framework that will allow banks to put their payments cards in non-Apple phones, with a bank on-boarding model that includes the SIM playing a role as the secure element.

- **Remote payments:** the GSMA is working with operators and industry partners to improve the user experience when using mobile devices for remote payments. In addition to being technically secure, solutions need to be simple and widely distributed.

PERSONAL DATA

The GSMA's Personal Data programme is working with mobile operators that have launched identity services across the globe. The mobile industry needs to deliver common and consistent interfaces to a range of digital service providers, which at the same time need to offer seamless and convenient solutions to consumers.

The use of standards and interoperability are therefore key, in particular the need to create a common, industry-wide set of identity-related application programming interfaces (APIs). The GSMA is working closely with operators to establish a uniform set of APIs to underpin key mobile identity services.

Mobile Connect is a fast, secure login system that enables people to access their online accounts with just one click or less, and provides different levels of security from low-level website access to highly secure bank-grade authentication. People subscribed to a participating operator know that when they click on a website's Mobile Connect button they can log in to any service or activity without the need to remember complicated username and password combinations.

The GSMA recently announced that Mobile Connect trials are now under way in all regions of the world; 17 mobile operators in 13 countries have launched the service. There are plans for additional launches and beta trials over the course of the current year. For example, Etisalat Group has enabled Mobile Connect in eight markets: Benin, Côte D'Ivoire, Egypt, Gabon, Niger, Nigeria, Togo and Tanzania.

3

Mobile – a key driver of growth and employment in Sub-Saharan Africa

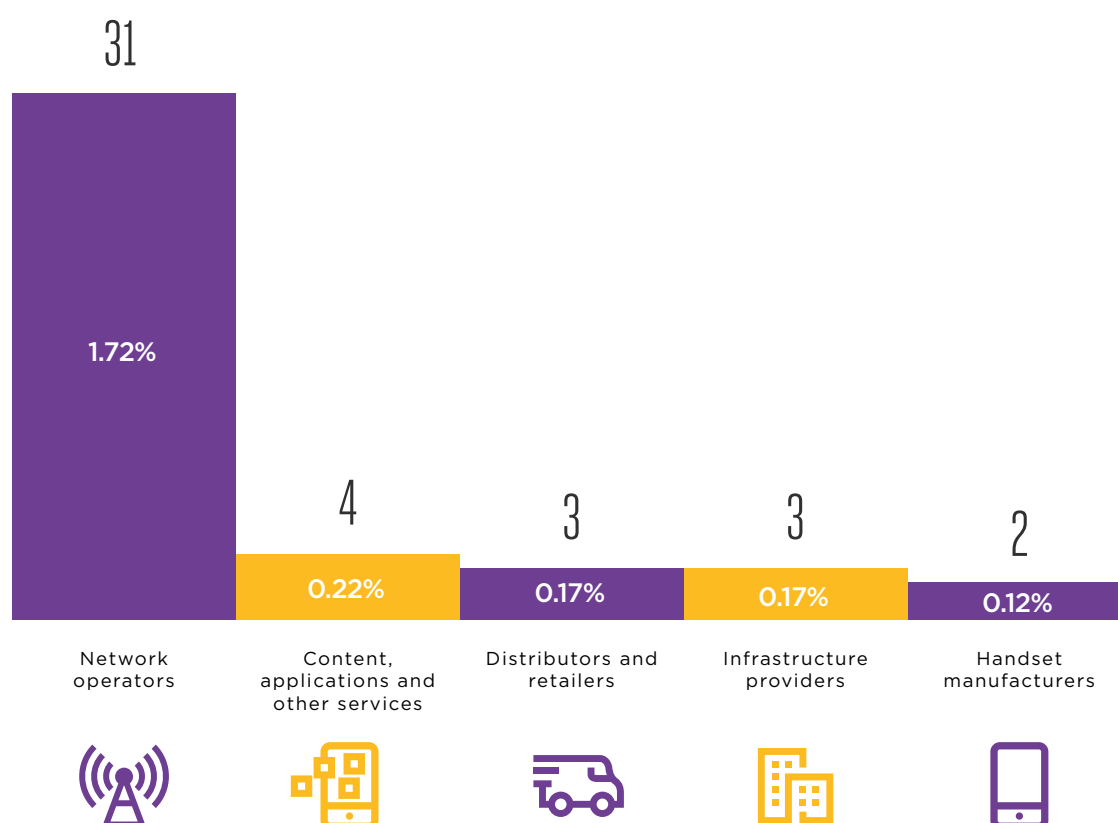## **3.1** The direct economic contribution of the mobile ecosystem

The direct economic contribution to GDP of mobile network operators and the mobile ecosystem is calculated by analysing the value added generated by companies operating in the sector across the region. Value added is estimated as the total income generated by the industry to its employees (through the payment of wages and other compensation), government (through tax contributions) and shareholders (in the form of profits). In 2014, the total value added generated by the mobile ecosystem was $43 billion (or 2.4% of GDP), with network operators accounting for the majority of this (more than 70%).

Source: GSMA Intelligence, totals may not add up due to rounding.

Direct GDP contribution of the mobile ecosystem 2014

($ billion, % 2014 GDP)

31	4	3	3	2
1.72%	0.22%	0.17%	0.17%	0.12%
Network operators	Content, applications and other services	Distributors and retailers	Infrastructure providers	Handset manufacturers

3.2 Indirect and productivity impacts of mobile technology

In addition to their direct economic contribution, firms in the mobile ecosystem purchase inputs from their providers in the supply chain. For example, handset manufacturers purchase inputs from microchip providers, and content providers require services from the IT sector. Furthermore, some of the profits and earnings generated by the ecosystem are spent on other goods and services, stimulating economic activity in those sectors. This is known as the multiplier effect. In 2014, this additional economic activity generated a further $9 billion in value add (or 0.5% of GDP) in the region.

The use of mobile technology also drives improvements in productivity and efficiency for workers and firms. These productivity impacts in Sub-Saharan Africa were worth around $50 billion in 2014 (2.8% of GDP).

Overall, taking into account the direct, indirect and productivity impacts, in 2014 the mobile industry made a total contribution of $102 billion to the Sub-Saharan Africa economy in value added terms, equivalent to around 5.7% of the region's total GDP[17].

Source: GSMA Intelligence, totals may not add up due to rounding.

Total (direct and indirect) contribution to GDP 2014

($ billion, % 2014 GDP)
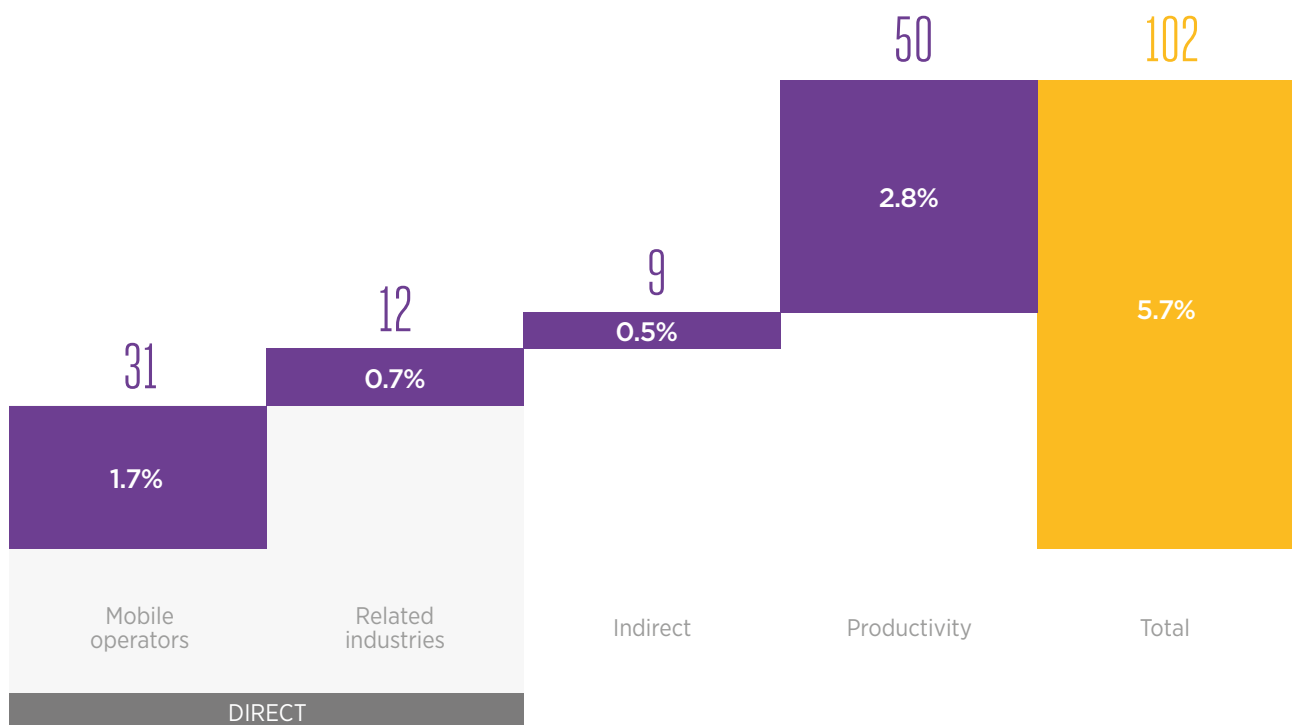
17. The overall contribution figure is significantly higher than that calculated in the 2014 report. There has been a large increase in the productivity factor, driven by a change in the methodology used to calculate GDP in Nigeria.

3.3 Employment and public funding contributions

In 2014 mobile operators and the ecosystem provided direct employment to approximately 2 million people in Sub-Saharan Africa, with the majority of these working in the distribution and retail of mobile technology. A significant proportion of jobs was also provided by mobile network operators, with around 325,000 employees.
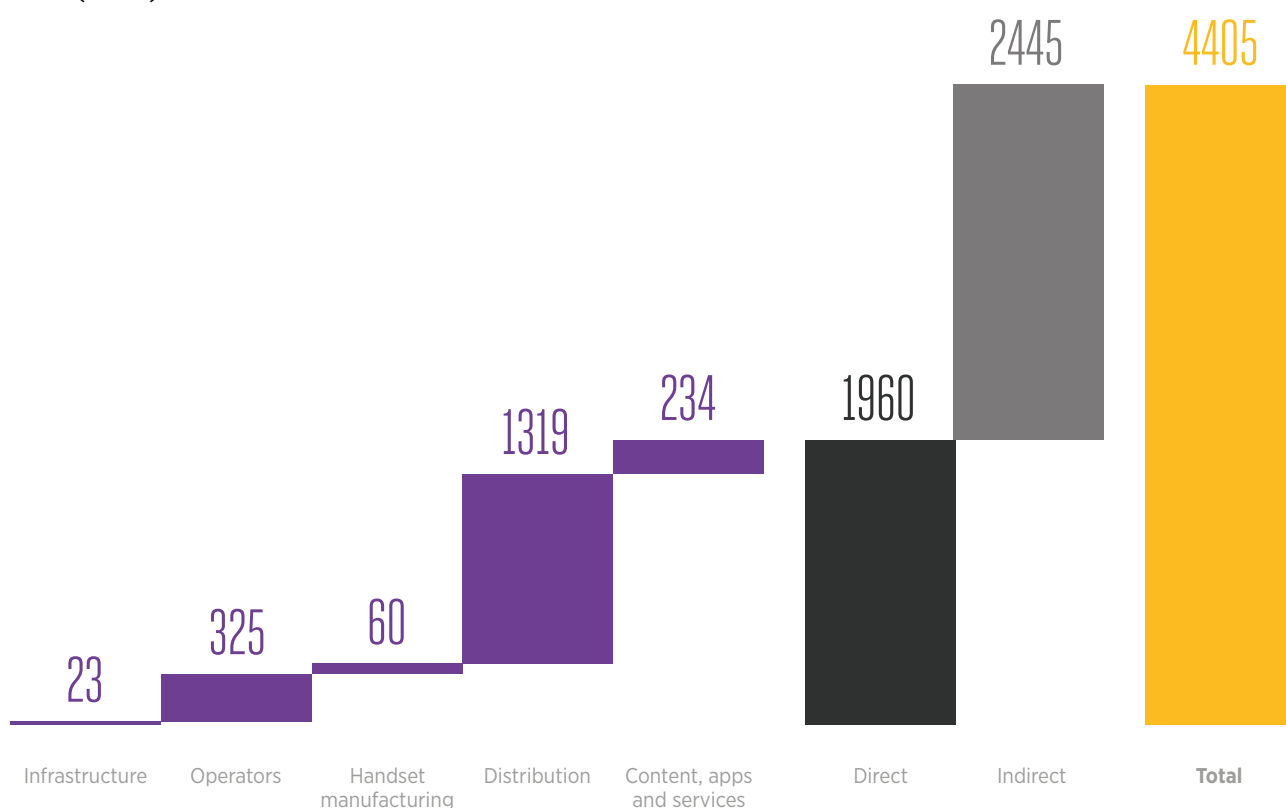
In addition to the mobile sector's direct employment, the economic activity in the ecosystem generates jobs in other sectors, particularly in the direct supply chain.

Firms that provide goods and services as production inputs for the mobile ecosystem will employ more individuals as a result of the demand generated by the mobile sector. Furthermore, the wages, public funding contributions and profits paid by the industry are spent in other sectors, providing additional jobs. In 2014, around 2.4 million jobs were indirectly supported in this way, bringing the total impact (both direct and indirect) of the mobile industry to around 4.4 million jobs.

Source: GSMA Intelligence analysis, totals may not add up due to rounding.

Employment impacts, 2014

Jobs (000s)

Infrastructure	Operators	Handset manufacturing	Distribution	Content, apps and services	Direct	Indirect	**Total**
23	325	60	1319	234	1960	2445	4405

The mobile ecosystem also makes a significant contribution to the funding of public sector activity in the region through general taxation. For most countries, this includes value-added tax, corporation tax, income tax and social security from firms and employees. We estimate that the ecosystem made a contribution to the public finances of the region's governments of approximately $15 billion in 2014.

Source: GSMA Intelligence, totals may not add up due to rounding.

Contribution to public funding by the mobile industry 2014

$ billion

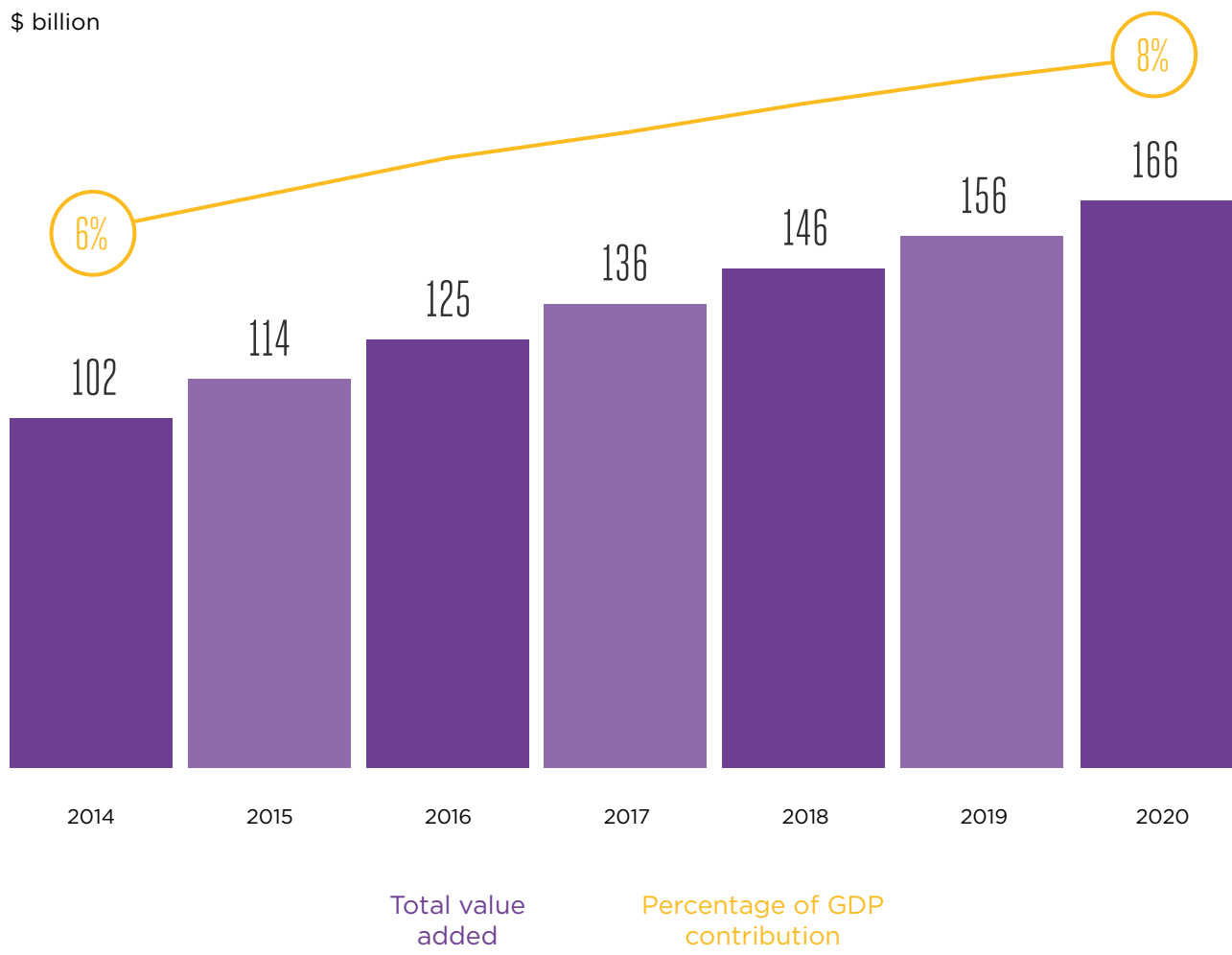| 6 | 1 | 6 | 1 | 15 |
| Mobile services VAT | Handset VAT | Corporate tax | Employee income and social security | Total tax |

3.4 Outlook and trends for 2015–2020

The economic contribution of the mobile industry in Sub-Saharan Africa will continue to increase in both absolute and relative terms. In value-added terms, the ecosystem will generate more than $160 billion by 2020, by which time it will account for more than 8% of regional GDP.

The majority of this growth will continue to be driven by improvements in productivity and efficiency, as mobile technologies connect previously unconnected populations to the internet and enable more efficient use of resources. However, as the number of subscribers continues to grow there will also be an increase in the direct contribution of the ecosystem.

Source: GSMA Intelligence

Outlook to 2020
$ billion

2014	2015	2016	2017	2018	2019	2020
102	114	125	136	146	156	166

6% 8%

Total value added **Percentage of GDP contribution**

4

Pivotal role of regulation in allowing mobile to realise its full potential

The continued vibrancy of the mobile economy in Sub-Saharan Africa depends heavily on the actions of the region's policy-makers and regulators. If governments can create a flexible, forward-looking and fair regulatory environment, the region will enjoy many more benefits. Through well-designed regulatory frameworks, governments can nurture and encourage the innovation enabled by mobile technologies and services, thereby enabling Africa to further enjoy the benefits of digitisation.

Policy-makers also play a pivotal role in determining the affordability of mobile devices and services. If Sub-Saharan Africa is to build a digital economy, governments' taxation policies need to prioritise economic growth over short-term receipts. In a similar vein, competition policies and regulatory frameworks need to be designed to encourage, rather than curtail, investment. If mobile operators are unable to make a return on their investments, they will not be able to raise the funds necessary to build the broadband infrastructure the region needs to create a vibrant digital economy.

4.1 The strategic importance of spectrum

In Sub-Saharan Africa, where fixed lines are scarce and wireless networks carry a large proportion of telecoms traffic, efficient use of spectrum is particularly important to meet the burgeoning demand for connectivity. However, in many African markets, operators lack clarity on when additional spectrum will become available to them to deploy and expand mobile coverage.

If governments hold back spectrum unnecessarily, they increase mobile operators' costs and, by extension, the retail prices paid by consumers. Conversely, access to more spectrum helps operators gain economies of scale, reducing the cost of carrying each unit of traffic.

With demand for widely available and high-quality mobile services, the mobile industry needs access to a mixture of low frequency and high frequency spectrum. The former makes it cost-effective to provide coverage over wide geographic areas, while the latter is essential to enable multiple users to have broadband access in the same cell. For example, the availability of 2x70 MHz of FDD spectrum in the internationally harmonised 2.6 GHz band can provide a major boost to capacity, helping mobile operators meet rising demand for video, audio and other multimedia services.
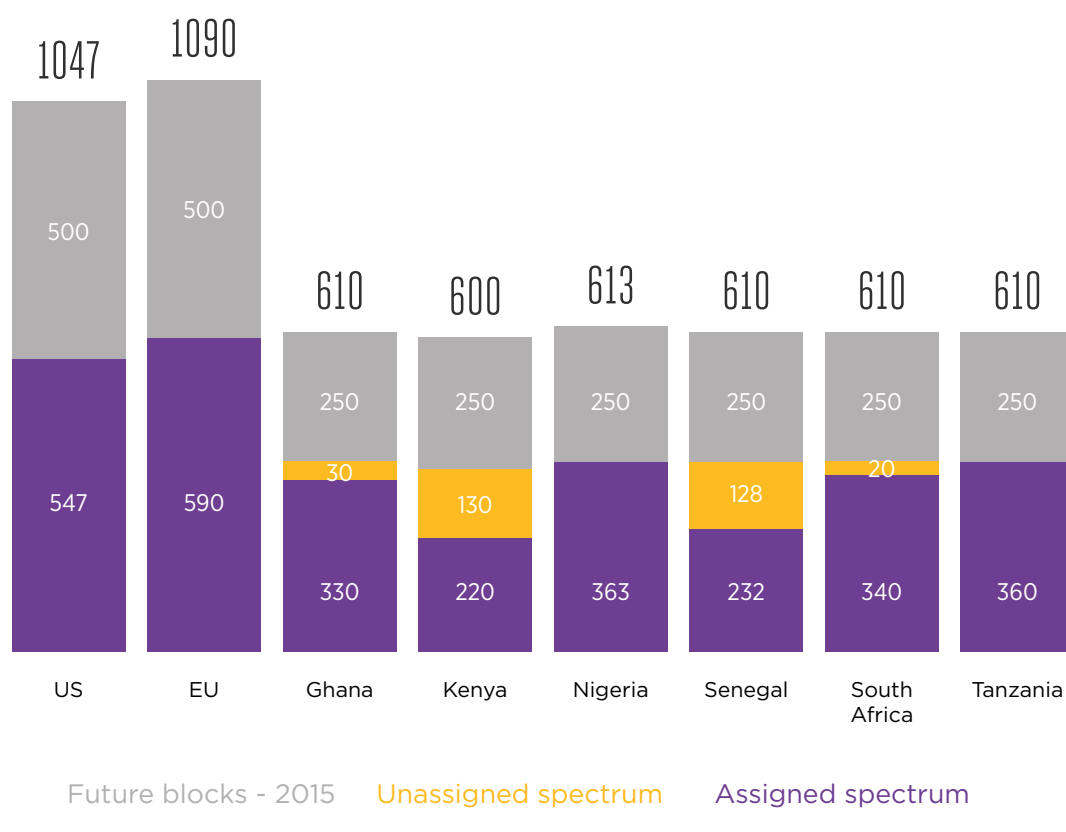
4.1.1 Realising the Digital Dividend

Across the world, many countries are already benefiting from the release of the Digital Dividend – the freeing up of spectrum in the 700 and 800 MHz bands through the switchover from analogue to more spectrally efficient digital television. These spectrum bands are well suited to providing both indoor and rural coverage. To avoid missing out on this spectrum windfall and being left behind, governments in Sub-Saharan Africa urgently need to complete the switchover from analogue to digital television.

Following the successful completion of coordination negotiations to establish a mechanism to deploy digital television in 47 Sub-Saharan Africa countries,

the ITU set a deadline for governments in the region to make the switchover by June 2015. Kenya, Lesotho, Mauritius, Mozambique, Namibia, Rwanda and Tanzania have all made significant progress towards clearing the Digital Dividend frequencies from broadcasting users. Unfortunately, most African markets are lagging behind and have not met the ITU 2015 deadline for digital migration. The urgency therefore remains. Many countries in Sub-Saharan Africa have allocated far less spectrum to mobile services than their counterparts in the EU and the US, even though the region is heavily dependent on mobile networks for internet access.

Source: Plum Consulting, regulators, operators

Quantity of spectrum assigned to IMT mobile services in EU, US and Sub-Sahara African countries (number of MHz)

	US	EU	Ghana	Kenya	Nigeria	Senegal	South Africa	Tanzania
Total	1047	1090	610	600	613	610	610	610
Future blocks - 2015	500	500	250	250	250	250	250	250
Unassigned spectrum			30	130		128	20	
Assigned spectrum	547	590	330	220	363	232	340	360

Future blocks - 2015   Unassigned spectrum   Assigned spectrum

4.1.2 Releasing spectrum efficiently

Once governments are in a position to make spectrum available for mobile services, they need to license the new frequencies to mobile operators in a way that maximises the positive impact on the country and its citizens. A key goal is to avoid leaving frequencies lying fallow. The more spectrum is used, the more socio-economic value is created. Spectrum licence terms should therefore be designed to encourage the use of spectrum. In practice, that means incentivising the licence holder to quickly build out a radio access network. Band-agnostic coverage rollout obligations can be an effective way to prevent spectrum hoarding.

Policy-makers also need to consider how spectrum can be licensed in a way that enables mobile operators to be as efficient as possible, achieve economies of scale and thereby lower the prices of services to end users. In essence, this means maximising the amount of spectrum available and giving license-holders sufficient flexibility. Operators should, for example, be able to choose which technologies they use in which bands.

Although auctions can be an effective way to allocate spectrum when demand exceeds supply, they should not be designed to maximise the short-term proceeds: high auction prices will inevitably reduce the money available for investment in networks and could impact the retail price of services. When an obvious distribution of the available spectrum among operators can be readily identified, it may make sense to avoid an auction and thereby minimise the risk of a perverse outcome.

In the past, poorly designed auctions have meant that some governments in the region have failed to license spectrum despite an evident market need. In one case, the government held back some of the available spectrum in the hope of stimulating a more competitive bidding process. It also set very high reserve prices. This combination undermined the business case for mobile operators and the available spectrum went unsold.

4.1.3 Preparing for the next decade

In the next decade, the digital economy will require far more connectivity, which will need far more spectrum. In the final quarter of 2015, the world's governments can do the groundwork to ensure this spectrum is available. The World Radiocommunication Conference in November 2015 (WRC-15) will make crucial long-term decisions on which spectrum bands should be internationally harmonised for mobile services. The outcome of WRC-15 will play a major role in determining whether the African continent can fully benefit from digital services and applications. African governments need to play a full and active role in ensuring WRC-15 identifies the necessary spectrum.

Even after accounting for the positive impact of newer technologies, denser networks and offload to Wi-Fi, WRC-15 needs to identify an additional 600–800 MHz of spectrum for International Mobile Telecommunications. That would enable individual countries to subsequently license the new bands that will be necessary to meet demand between 2020 and 2030. As it takes about eight to 10 years to allocate new bands, free spectrum, build equipment and issue licences, it is essential that administrations act now to give themselves the flexibility they will need in the future. The countries that use the new mobile bands first will drive economies of scale for those countries that use the bands later. In other words, governments overseeing less mature mobile markets have an interest in supporting governments with higher spectrum requirements.

Although some of the mobile bands identified by WRC-15 may currently be used by incumbent services, such as television or defence applications, advances in digital technologies mean these services will require less spectrum in future. Moreover, individual governments will be able to decide on the optimum time to reallocate the spectrum to mobile services, taking into account local demand.

The spectrum identified for mobile services at WRC-15 should comprise a mixture of coverage (i.e. lower frequency) and capacity (i.e. higher frequency) bands to enable the mobile industry to provide good value, high-speed mobile broadband services in rural and metropolitan areas as well as deep inside buildings.

The GSMA has proposed that WRC-15 consider four frequency ranges within which new mobile broadband identifications could be found. These bands can also be widely harmonised around the world, enabling manufacturers to produce low-cost devices, facilitate roaming and minimise cross-border interference:

- **Sub-700 MHz** (470–694/698 MHz)
- **L-Band** (1350–1400 and 1427–1518 MHz)
- **2.7–2.9 GHz**
- **C-Band** (3.4–3.8 GHz and 3.8–4.2 GHz)

At the final meeting of the African Telecommunications Union (ATU) in Nairobi, ahead of WRC-15, the ATU agreed to support the L-band for mobile. This band has the potential for widespread global support at WRC-15, driving economies of scale that will benefit consumers in Africa and elsewhere.

But Africa's mobile industry will also need access to more high-frequency spectrum to boost the capacity available for broadband. Well suited to providing additional capacity in urban areas, C-band spectrum is currently used in Africa to provide various satellite-based services, including TV distribution. If 400 MHz of spectrum in the lower half of the C-band were reallocated to mobile broadband services, Africa would enjoy benefits of between $10 billion and $22 billion (on a purchasing power parity basis), according to a study by Frontier Economics for the GSMA. The study found that the costs of the reallocation would be between $300 million and $1.1 billion. The future demand for satellite services could be met through a combination of the remaining 400 MHz of the C-band, use of alternative frequency bands, such as the Ka band and the Ku band, or by migrating to alternative platforms.

4.2 Extending mobile coverage

Mobile operators have dramatically expanded cellular coverage in Sub-Saharan Africa over the past decade. But the challenges posed by the terrain, lack of infrastructure and sheer distances involved mean that many communities still lack coverage. Policy-makers can help address these challenges in a number of ways, such as attaching coverage obligations to spectrum licences, promoting voluntary infrastructure sharing and providing financial incentives to mobile operators.

Operators need low frequency spectrum to cover large geographic areas cost-effectively. Policy-makers

who decide to license low-frequency spectrum with an obligation to cover a certain proportion of the population within a specific timeframe should balance this with a lower spectrum price.

Network rollout requirements and coverage obligations attached to new mobile licences have been successfully used both in Europe and in emerging markets. Assuming the process is completely transparent, mobile operators' bids in the auction process will reflect the need to meet these coverage obligations.

4.2.2 Promoting voluntary infrastructure sharing

Policy-makers can also consider allowing operators to share, on a voluntary basis, the infrastructure required to provide coverage in areas that would otherwise be uneconomical. In many countries around the world, operators have voluntarily entered into commercially

negotiated agreements to share certain parts of their network infrastructure. To facilitate voluntary network sharing between mobile operators, governments may need to remove specific administrative and regulatory barriers.

4.2.3 Providing financial support

For some rural and remote areas, a government may need to financially support network rollout (assuming the wider social and economic benefits, in addition to the service revenues, exceed the costs of doing so). Governments could, for example, offer indirect public support in the form of fiscal incentives to promote rural coverage. These may include reducing the tax burden faced by operators rolling out network infrastructure in uneconomic areas of the country, including a reduction of import tariffs on certain types of network equipment used to serve these areas.

Alternatively, a government can award public funds directly to operators. Funds could be allocated on the basis of a public tender to cover a specific geography. This funding would bridge the gap between costs and margins, making the area viable to cover. In some cases, governments could bring broadband connectivity closer to rural customers by supporting or co-funding the construction of backhaul links.

Spotlight on Tanzania: leading the way in harnessing the digital dividend

At the end of 2012, more than two years before the ITU deadline, Tanzania became the first country in mainland Sub-Saharan Africa to switch off its analogue television signal. The digital terrestrial signal, which went live in late 2010, now achieves almost the same population coverage as the earlier analogue signal (about 24%). The country successfully avoided the cost of running analogue and digital broadcasts in parallel for an extended period.

A study by Analysis Mason[18] found that a key factor was the clarity and firmness of Tanzania's regulator and the government. This encouraged investment by the private sector and avoided an excessive burden on public finances; the only costs to the public purse were set-top box tax exemptions and a public awareness campaign.

Tanzania's experience gives policy-makers across Africa further insight into the practical challenges involved in a digital switchover. After studying the process in Tanzania, Analysis Mason concluded that mitigation strategies to reduce the impact on viewers may be more practical and economical than trying to ensure 100% adoption of digital services prior to analogue switch-off. For example, switching off the analogue signal in smaller towns first, rather than in an area where more viewers are affected, is one possible strategy; temporarily restoring the analogue signal after switch-off is another. Tanzania's experience also highlights the importance of consumer education to a successful digital switchover.

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18. Case study of digital TV switchover in Tanzania, Analysys Mason, 2013

4.3 Maintaining healthy competition

Having fuelled the growth of Africa's mobile industry over the past two decades, competition is generally a good thing. However, excessive competition between telecoms operators can impact the funds available for investment in networks and innovation, ultimately harming users of mobile services. At the same time, the rise of lightly regulated, IP voice and messaging services can make it harder for telecoms operators to build a business case for more investment.

4.3.1 The case for consolidation

In many countries in Sub-Saharan Africa, four or more mobile operators are competing for customers. In many markets around the world, including some in Africa, mobile operators have moved to consolidate the sector and improve the business case for further investment. When assessing whether to approve mobile mergers and what remedies, if any, are needed, competition authorities should carefully consider the impact on investment.

Research by Frontier Economics for the GSMA[19] found that the dynamic efficiencies resulting from investment in mobile markets play a much larger role in determining outputs, including prices, in the mobile sector than they do in many other industries. This is because major technology changes occur every seven to eight years in mobile, rather than every 30 or 50 years, as happens in many other industries. For example, the vast majority of the reduction in unit prices in Europe between 2004 and 2014 can be explained by investments in new technologies.

Frontier Economics found no evidence that unit prices in mobile markets with three players are systematically higher than those in four-player markets, which is a fundamental prediction of the GUPPI framework currently used by some competition authorities. In fact, proposed remedies, which are intended to address anticipated competition problems, can prevent the realisation of the benefits that would have resulted from the merger. Remedies that reduce either the incentive or ability of the merging parties to invest are likely to harm consumers in the market in question.

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19. Assessing the case for in-country mobile consolidation, GSMA, 2015

4.3.2 The need for regulatory neutrality

Fair competition is the best way to stimulate innovation and investment for the benefit of consumers and to spur economic growth. To that end, regulators need to apply the principle of 'Same Rules for the Same Service'. In the digital economy, the intensifying competition between different types of service provider calls for a move towards shared rules that are lighter touch than those applicable in less competitive environments.

In many markets, mobile network operators face mounting competition from new online service providers governed by different, laxer rules. This unfair competition can have an impact on mobile operators' revenues and ability to invest. In the mobile sector, all equivalent consumer voice and messaging services should be subject to the same regulatory and fiscal obligations, regardless of the underlying technology, geographic origin or whether they are delivered by a mobile operator or Internet-based service provider. Moreover, applying the Same Rules for the Same Service principle would actually improve consumer

confidence and trust in Internet-based services by ensuring a consistent approach to issues such as transparency, quality of service and data privacy. Consistent application of regulatory obligations will also support legitimate law enforcement and national security activities.

While the same rules should apply to the same services, these are not necessarily the rules that apply today to telecommunications services. There is a need for a forward-looking regulatory framework for communications services that is fit for purpose for a digital world. This framework must be driven by clear policy requirements around consumer protection, innovation, investment and competition. By adopting a policy framework built around the Same Rules for the Same Service principle, national governments and regulators will enable an environment of fair and sustainable competition that promotes the best interests of consumers and fosters economic growth.