

A photograph of a man with glasses, smiling and looking down at his smartphone. He is wearing a light-colored button-down shirt and a watch on his left wrist. The image is overlaid with a semi-transparent magenta and blue gradient.

# **The Mobile Economy** **Sub-Saharan** **Africa** **2019**



The GSMA represents the interests of mobile operators worldwide, uniting more than 750 operators with nearly 400 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 the industry-leading MWC events held annually in Barcelona, Los Angeles and Shanghai, as well as the Mobile 360 Series of regional conferences.

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# Contents

	<b>EXECUTIVE SUMMARY</b>	<b>2</b>
<b>1</b>	<b>THE MOBILE MARKET IN NUMBERS</b>	<b>6</b>
1.1	Sub-Saharan Africa will have over 600 million unique subscribers by 2025	7
1.2	Where will the next 167 million subscribers come from?	7
1.3	3G takes the lead, while 4G gains traction	8
1.4	Transition from 'connected' to 'digital' consumer	9
1.5	Financial pressures continue, but outlook improving	11
<b>2</b>	<b>MOBILE IMPACT ON ECONOMIC GROWTH AND SOCIAL PROGRESS</b>	<b>12</b>
2.1	Mobile contribution to economic growth	13
2.2	Enhancing digital inclusion	16
2.3	Addressing social challenges through mobile big data	17
2.4	Supporting the SDGs through mobile-enabled services	18
<b>3</b>	<b>KEY TRENDS SHAPING SUB-SAHARAN AFRICA'S DIGITAL LANDSCAPE</b>	<b>22</b>
3.1	Expansion of the mobile money ecosystem	23
3.2	The rise of the platform economy	25
3.3	Transformative technologies	29
<b>4</b>	<b>POLICIES FOR SUSTAINABLE DIGITAL PROGRESS</b>	<b>32</b>
4.1	The need for technology-neutral spectrum licensing	33
4.2	Creating an effective framework for spectrum auctions	35

# Executive Summary



## Half the population in Sub-Saharan Africa will subscribe to mobile services by 2025

By the end of 2018, there were 456 million unique mobile subscribers in Sub-Saharan Africa – an increase of 20 million over the previous year and representing a subscriber penetration rate of 44%. Around 239 million people, equivalent to 23% of the population, also use the mobile internet on a regular basis.

Sub-Saharan Africa will remain the fastest growing region, with a CAGR of 4.6% and an additional 167 million subscribers over the period to 2025. This will take the total subscriber base to just over 600 million, representing around half the population.

Nigeria and Ethiopia will record the fastest growth rates between now and 2025, at 19% and 11% respectively. Across the region, the demographic bulge will result in large numbers of young consumers becoming adults and owning a mobile phone for the first time. This segment of the population will account for the majority of new mobile subscribers and, as ‘digital natives’, will significantly influence mobile usage patterns in the future.



## 3G takes the lead as 4G begins to gain traction

During 2019, 3G will overtake 2G to become the leading mobile technology in Sub-Saharan Africa, with just over 45% of total connections by the end of the year. 3G adoption has doubled over the last two years as a result of network coverage expansion and cheaper devices. The planned KaiOS ‘smart feature phone’ initiative, fronted by some of the region’s leading operators, is set to give impetus to smartphone adoption. The number of smartphone connections in the region reached 302 million in 2018; this will rise to nearly 700 million by 2025, an adoption rate of 66%.

Sub-Saharan Africa lags other regions in 4G adoption. By the end of 2018, 4G accounted for 7% of total connections, compared to the global average of 44%. The high cost of 4G-enabled devices and delays in assigning 4G spectrum to established service providers in some markets have been among the factors holding back 4G uptake. This is beginning to change though, with new 4G spectrum assignments in several countries over the last 12 months and a marked increase in network deployment. Seven LTE networks have been launched in the region since the start of 2019, including in Ghana and Burkina Faso. 4G adoption will overtake 2G in 2023 and rise to 23% of connections by 2025.



## Mobile contributing to economic growth and job creation

In 2018, mobile technologies and services generated 8.6% of GDP in Sub-Saharan Africa, a contribution that amounted to over \$144 billion of economic value added. The mobile ecosystem also supported almost 3.5 million jobs (directly and indirectly) and made a substantial contribution to the funding of the public sector, with almost \$15.6 billion raised through taxation. By 2023, mobile's contribution will reach almost \$185 billion

(9.1% of GDP) as countries increasingly benefit from the improvements in productivity and efficiency brought about by the increased take-up of mobile services.

The informal economy accounts for a large part of the mobile ecosystem in Sub-Saharan Africa. Almost 1.2 million of the 1.7 million directly employed by the mobile ecosystem are informally employed in the distribution and retail of mobile services.



## Mobile enabling digital disruption in key sectors

Mobile-enabled platforms are increasingly disrupting traditional value chains in different verticals across the region. These platforms – mostly developed by a rapidly expanding local tech start-up ecosystem – aim to eliminate inefficiencies in conventional business models, as well as extend the reach of services and provide greater choice to customers.

Sub-Saharan Africa remains a hotbed for mobile money services. By the end of 2018, there were 395.7 million registered mobile money accounts in the region, representing nearly half of total global mobile money accounts. The region is now served by more than 130 live mobile money services, many of them led by mobile operators, and a network of more than 1.4 million active agents.



## Promoting policies for sustainable digital progress

With mobile technology at the heart of Sub-Saharan Africa's digital journey, it is essential for policymakers in the region to implement policies and best practices on key enablers of sustainable growth in the mobile industry. Arguably the most significant enabler is radio spectrum. Efficient and effective management of this vital but finite resource is key to maximising the opportunities that mobile connectivity can bring to society.

This is especially important as the region transitions from 2G to next-generation mobile broadband networks. While high mobile broadband speeds and increased mobile data consumption have been proven to generate economic benefits, they also require adequate and sufficient spectrum to function effectively and attract the necessary investment for network infrastructure development.

# Sub-Saharan Africa

## Unique mobile subscribers



2018

456m



44% PENETRATION RATE (% of population) 50%

CAGR 2018-25

623m 4.6% ↑

2025

## Mobile internet users



2018

239m

23% PENETRATION RATE (% of population) 39% CAGR 2018-25

483m 10.6% ↑

2025

## SIM connections

Excluding cellular IoT



2018

774m



74% PENETRATION RATE (% of population) 84%

CAGR 2018-25

1.04bn 4.3% ↑

2025

## Operator revenues

2018

\$42bn

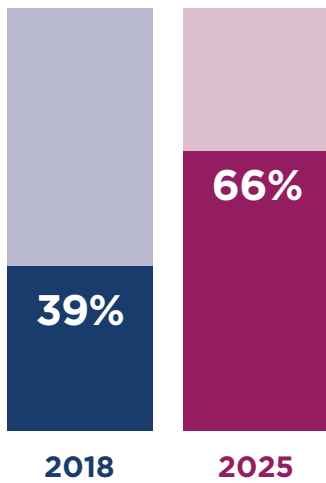
2025

\$51bn

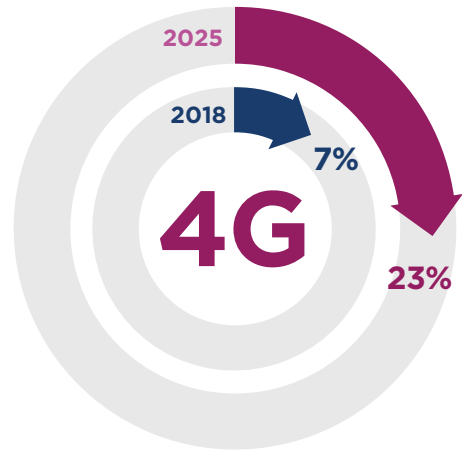
Operator capex of \$15.2 billion for the period 2019-2020

# Smartphones

Percentage of total connections\*



## 4G percentage of total connections\*



5G connections in 2025  
(3% of total connections) **28m**

\*Excluding licensed cellular IoT



## Mobile industry contribution to GDP



**\$144bn** 2018

**\$185bn** 2023

## Public funding

Mobile ecosystem contribution to public funding (before regulatory and spectrum fees)

**\$15.6bn**

2018



## Employment

2018

**500,000**



**Jobs**

formally supported by the mobile ecosystem

Plus 1.2 million informal jobs



# 01 The mobile market in numbers



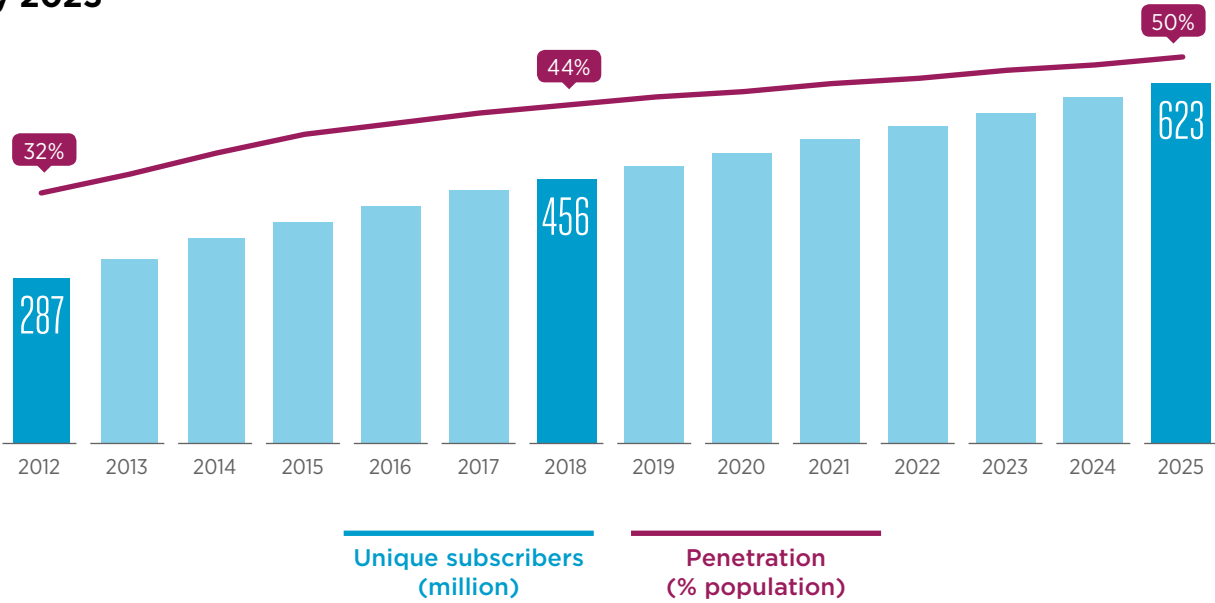


# 1.1 Sub-Saharan Africa will have over 600 million unique subscribers by 2025

Figure 1

Source: GSMA Intelligence

Half the population in Sub-Saharan Africa will subscribe to mobile services by 2025



# 1.2 Where will the next 167 million subscribers come from?

Figure 2

Source: GSMA Intelligence

Nearly 170 million new subscribers by 2025; half from five markets

Subscribers (million)

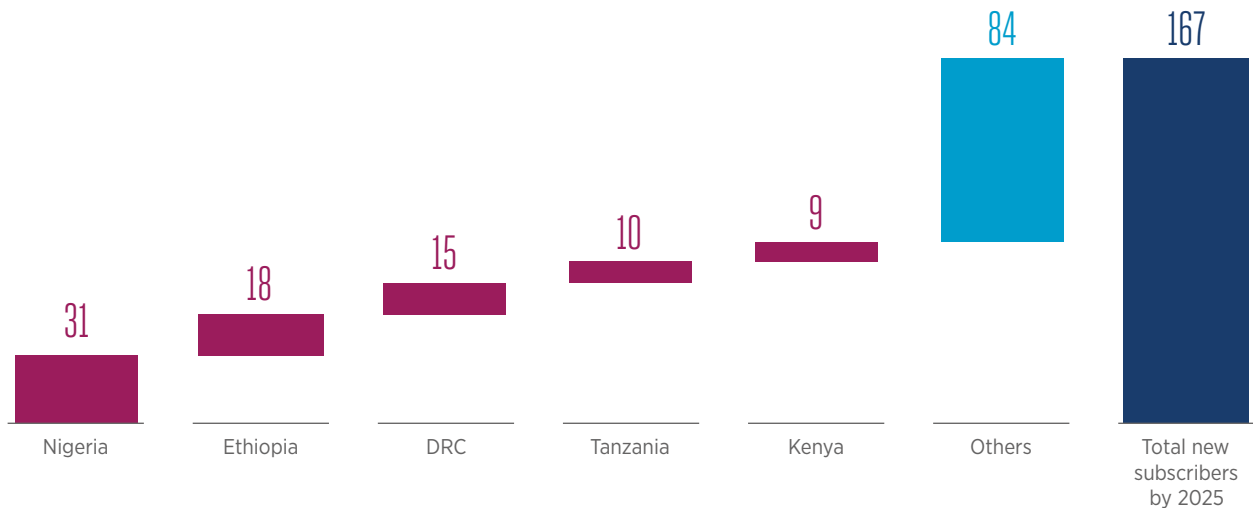
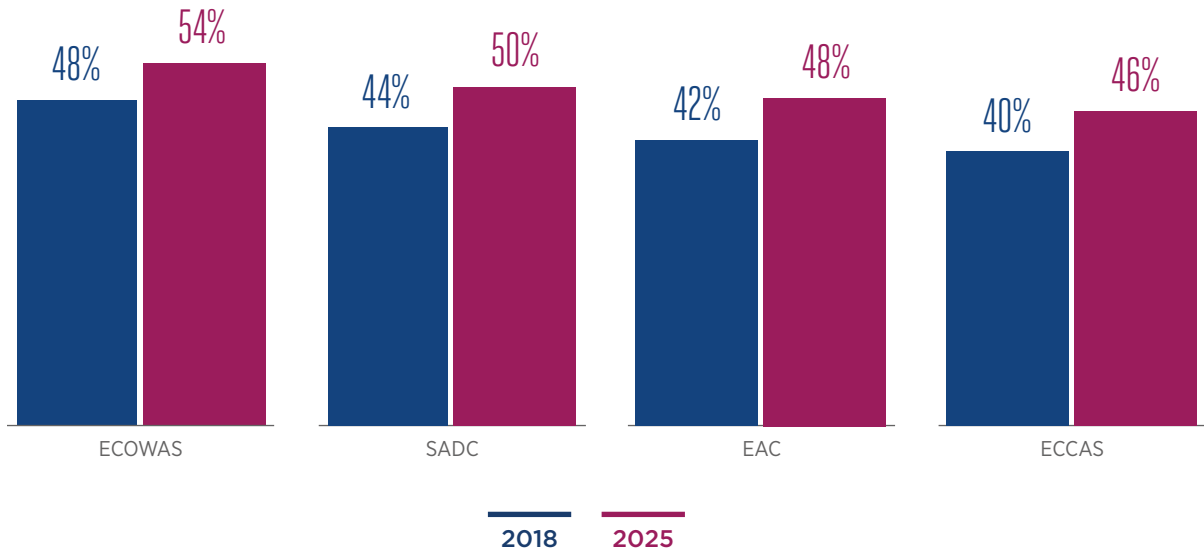


Figure 3

Source: GSMA Intelligence

### Subscriber penetration growth will be fairly equal among all RECs: ECOWAS will continue to lead

Subscriber penetration



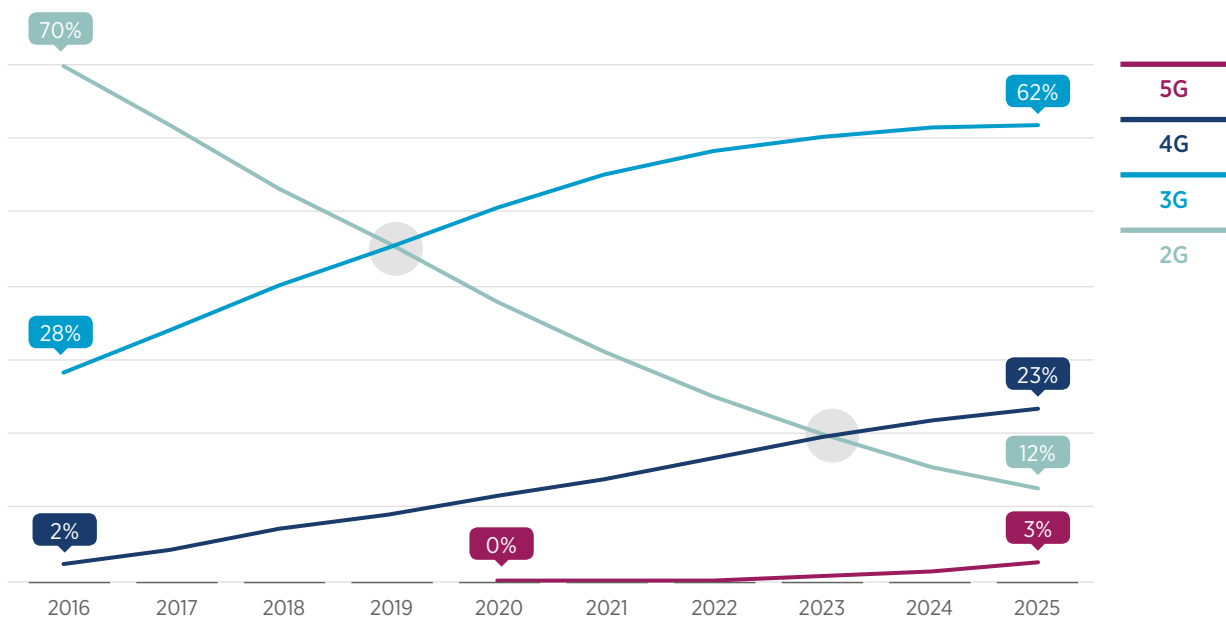
## 1.3 3G takes the lead, while 4G gains traction

Figure 4

Source: GSMA Intelligence

### 3G takes the lead in 2019; 4G overtakes 2G by 2023

Percentage of connections (excluding licensed cellular IoT)





## 1.4 Transition from ‘connected’ to ‘digital’ consumer

Figure 5

Source: GSMA Intelligence

**By 2025, rapid mobile internet uptake will see adoption in SADC and EAC overtake ECOWAS and ECCAS respectively**

Mobile internet users as a percentage of population



Figure 6

Source: GSMA Intelligence

### Smartphone connections will more than double by 2025: EAC will see the largest incremental growth, led by Rwanda and Tanzania

Percentage of connections (excluding licensed cellular IoT)

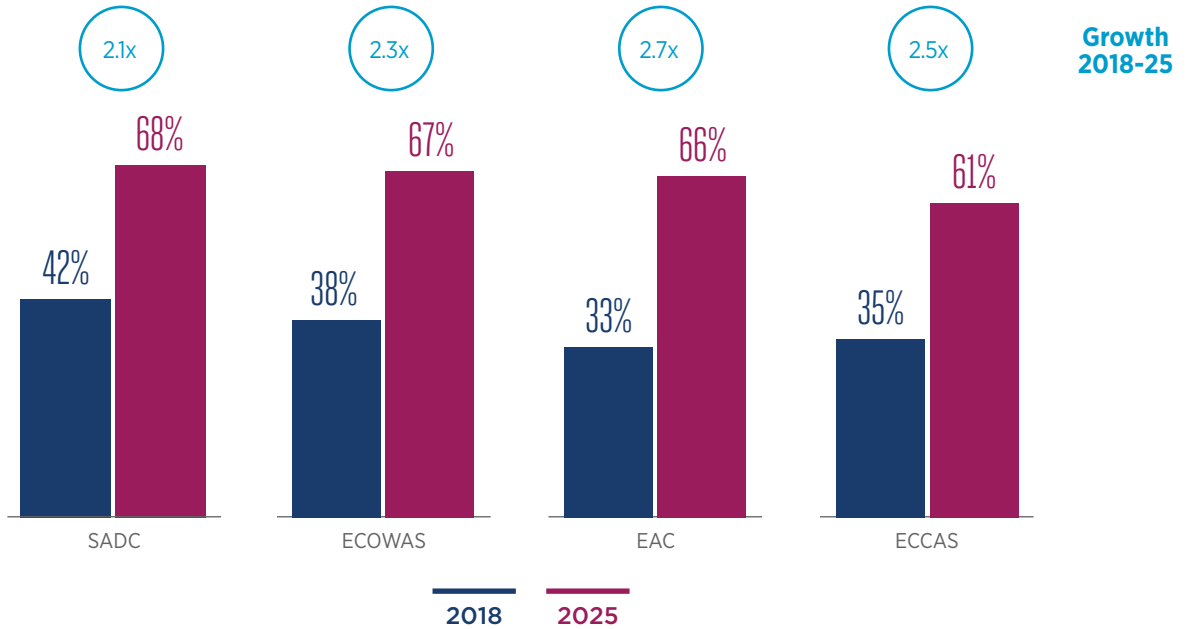
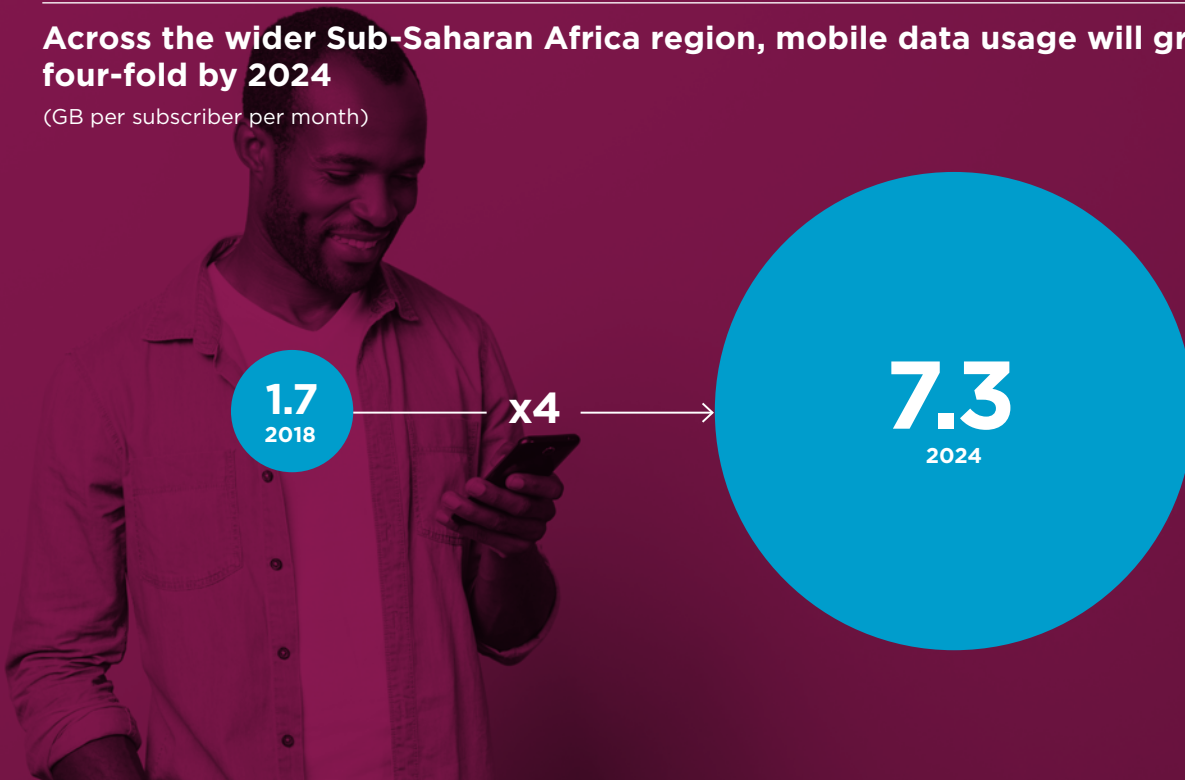


Figure 7

Source: Ericsson, GSMA Intelligence

### Across the wider Sub-Saharan Africa region, mobile data usage will grow four-fold by 2024

(GB per subscriber per month)



## 1.5 Financial pressures continue, but outlook improving

Figure 8

Source: GSMA Intelligence

**Currency fluctuations and irregular connections growth are resulting in near-term revenue growth volatility, but should stabilise post-2020**

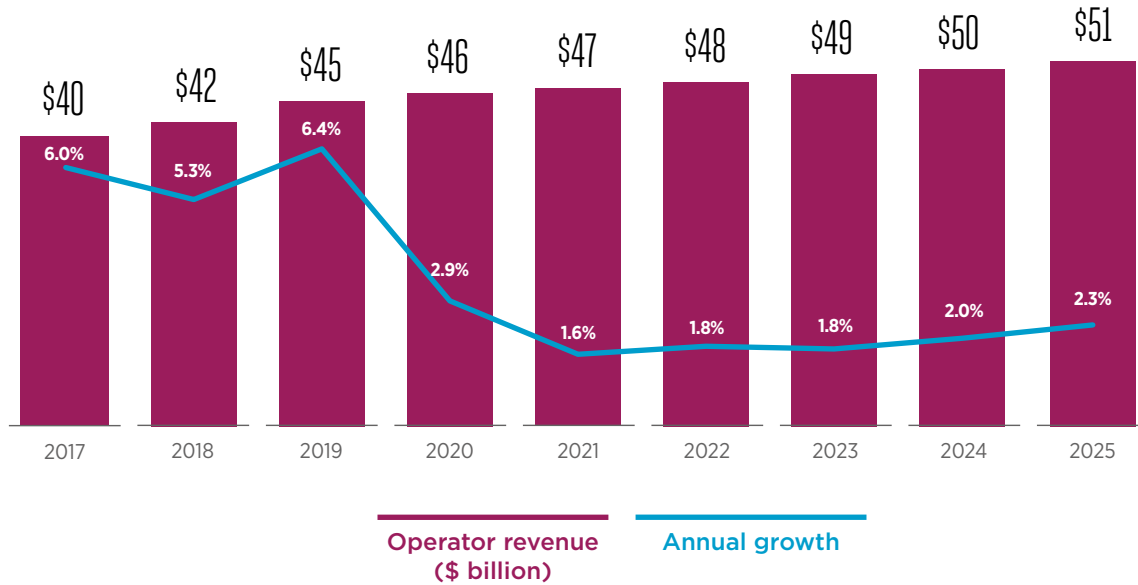
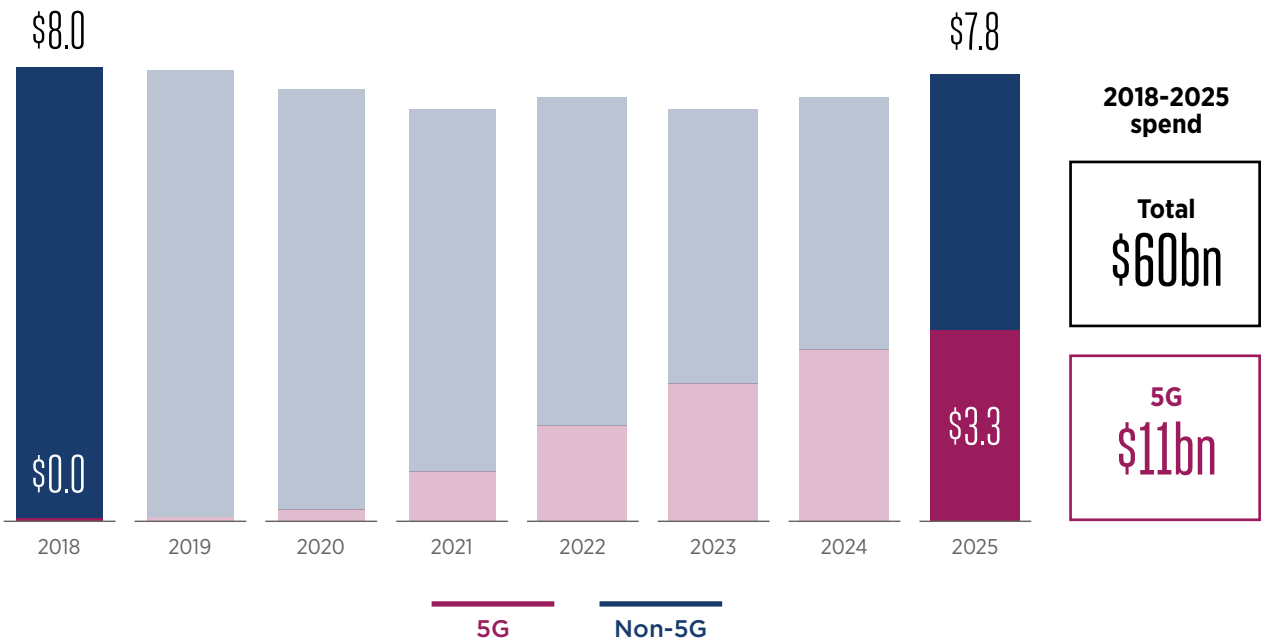


Figure 9

Source: GSMA Intelligence

**By 2025, mobile operators in Sub-Saharan Africa will invest \$60 billion in their networks - almost a fifth will be on 5G**

Capex (\$ billion)



# 02

## Mobile impact on economic growth and social progress



## 2.1 Mobile contribution to economic growth

In 2018, mobile technologies and services generated 8.6% of GDP in Sub-Saharan Africa – a contribution that amounted to \$144.1 billion of economic value added. The mobile ecosystem also supported almost 3.5 million jobs (directly and indirectly) and made a substantial contribution to the funding of the public sector, with almost \$15.6 billion raised through taxation. By 2023, mobile’s contribution will reach almost \$185 billion (9.1% of GDP) as countries

increasingly benefit from the improvements in productivity and efficiency brought about by the increased take-up of mobile services.

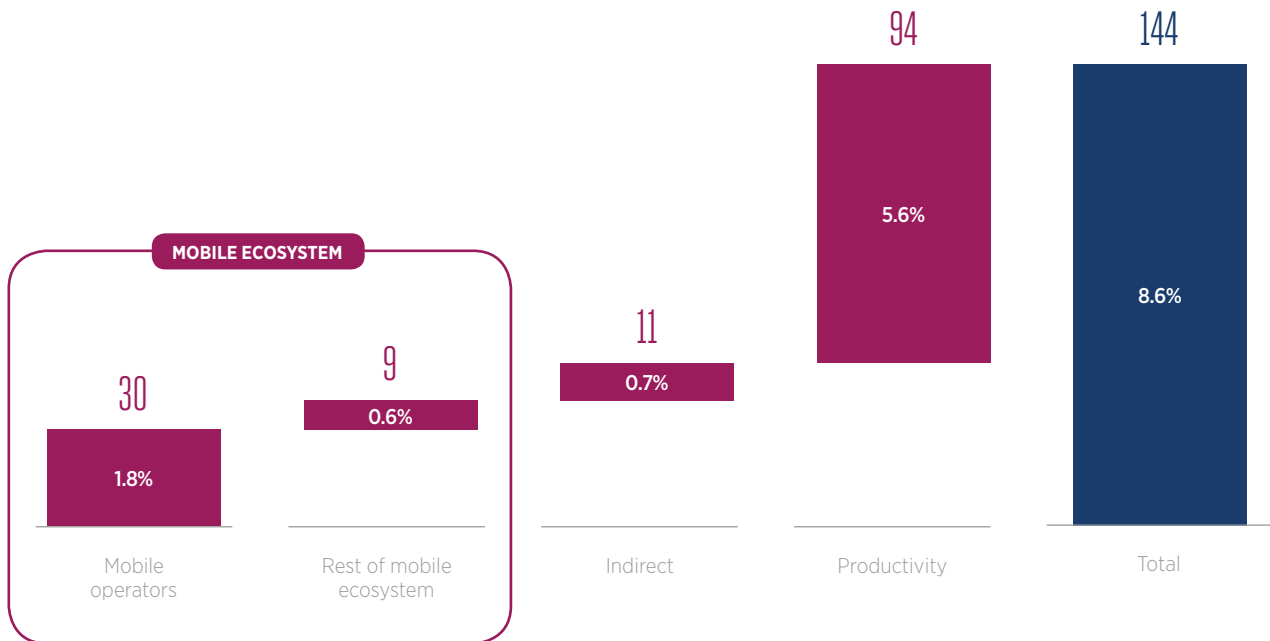
The informal economy accounts for a large part of the mobile ecosystem in Sub-Saharan Africa. Almost 1.2 million of the 1.7 million directly employed by the mobile ecosystem are informally employed in the distribution and retail of mobile services.

Figure 10

Source: GSMA Intelligence

### The mobile ecosystem contributed \$144 billion to the Sub-Saharan African economy in 2018, of which \$39 billion was a direct contribution

\$ billion, % GDP, 2018



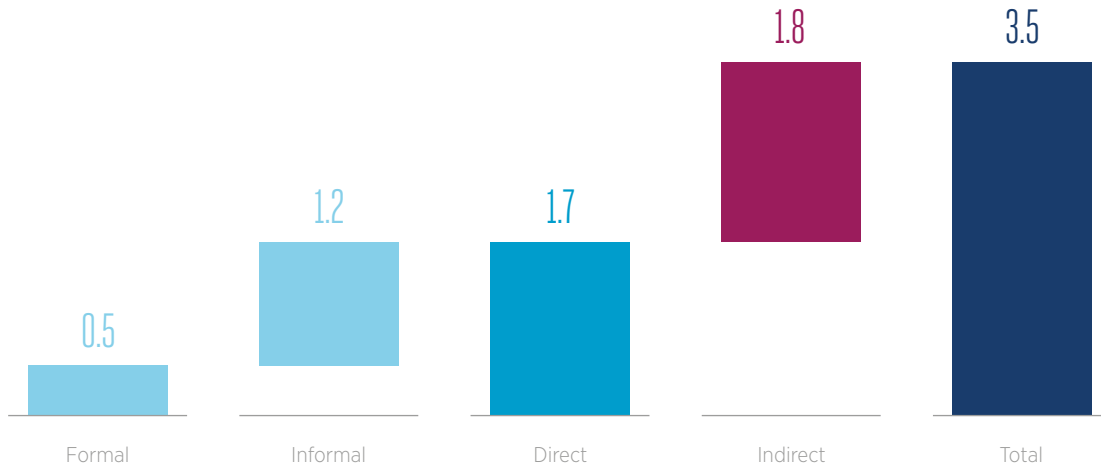
Note: totals may not add up due to rounding

Figure 11

Source: GSMA Intelligence

### The mobile ecosystem formally employs almost 500,000 people in Sub-Saharan Africa, 1.2 million informally and supports another 1.8 million jobs in other parts of the economy

Employment impact (jobs, millions)



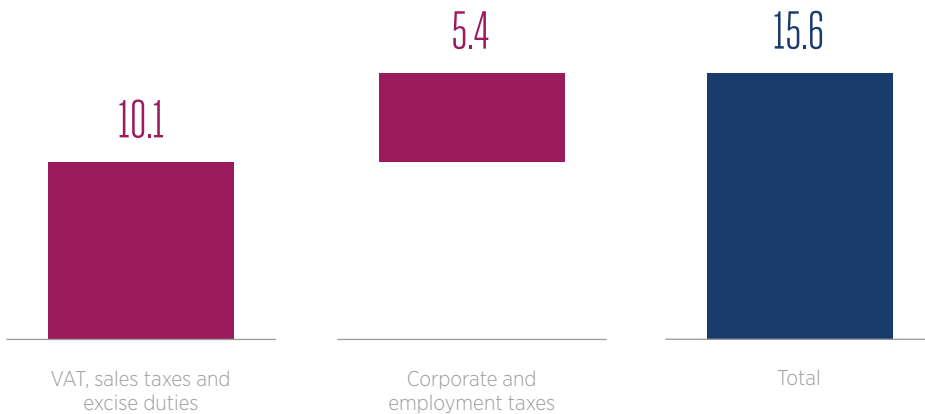
Note: totals may not add up due to rounding

Figure 12

Source: GSMA Intelligence

### In 2018, the mobile ecosystem contributed almost \$15.6 billion to the funding of the public sector through consumer and operator taxes

Fiscal contribution (\$ billion)



Note: totals may not add up due to rounding



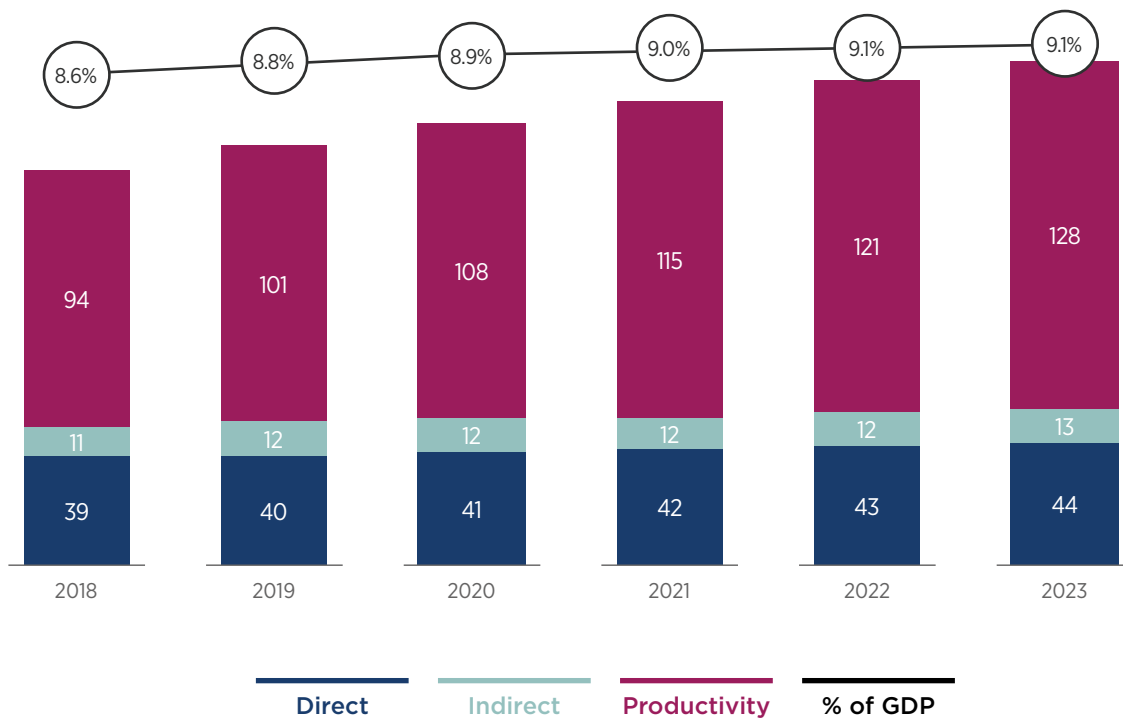


Figure 13

Source: GSMA Intelligence

**Driven mainly by productivity gains, the economic contribution of mobile in Sub-Saharan Africa will increase to almost \$185 billion in 2023**

\$ billion, % GDP



## 2.2 Enhancing digital inclusion

At the end of 2018, 239 million people across Sub-Saharan Africa were connected to the mobile internet, an increase of 35 million on the previous year. However, more than three quarters of the population remain offline. The GSMA Mobile

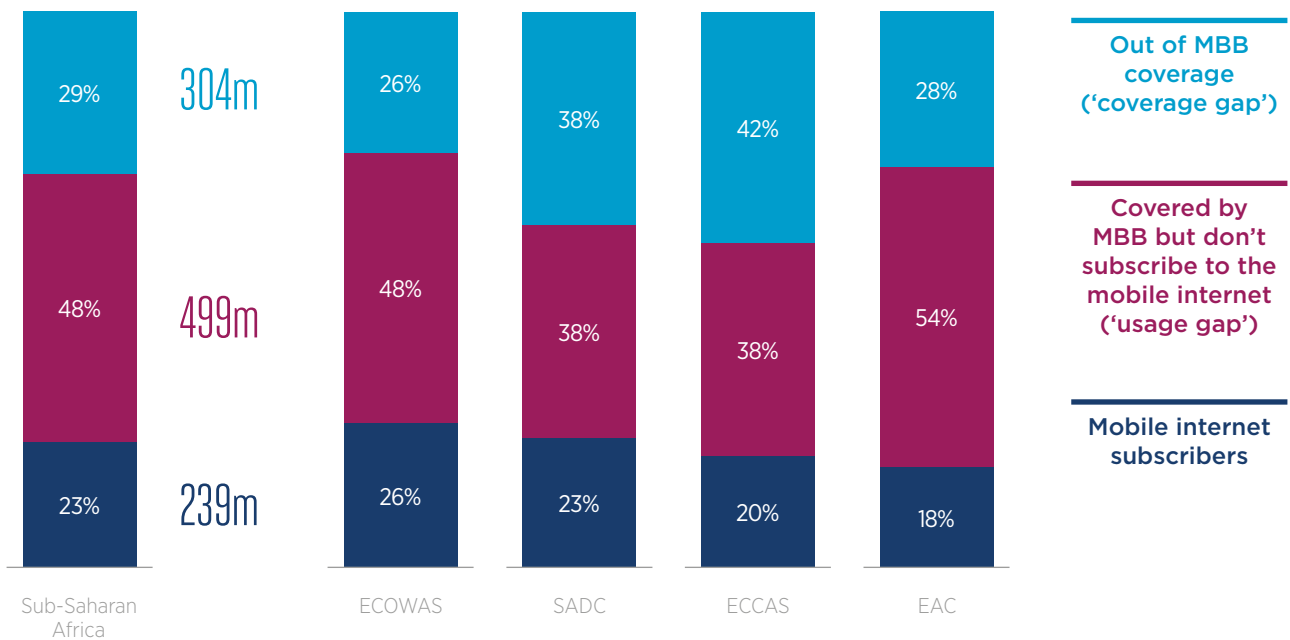
Connectivity Index<sup>1</sup> provides insight into the evolution of mobile internet adoption in the region, based on four primary enablers of digital inclusion – infrastructure, affordability, consumer readiness and availability of content/services.

Figure 14

Source: GSMA Intelligence

### Over 800 million people across Sub-Saharan Africa don't use the mobile internet; coverage is a major barrier but not the only one

Percentage of population



In the latest update to the Index, Sub-Saharan Africa saw a modest 2 percentage-point improvement in average score in 2018 over the previous year, to reach 37.8. The infrastructure and availability of content/services enablers recorded the highest rises as a result of significant investments in 3G and 4G network expansion and the increasing availability of

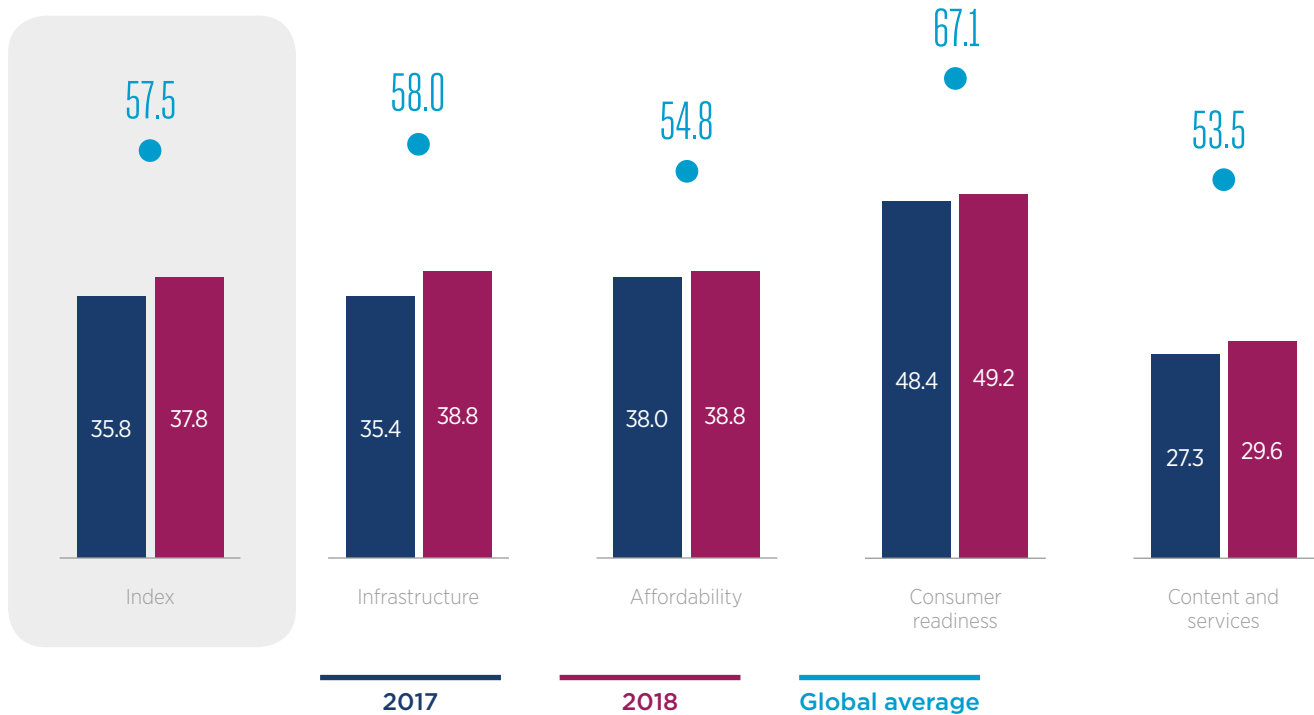
locally relevant online content. Mobile broadband (3G and above) networks now cover more than 70% of the population, while the past year has seen mobile operators and tech start-ups roll out a number of digital services across a wide range of sectors, including entertainment, commerce and financial services.

1. For more information see the GSMA report [State of Mobile Internet Connectivity 2018](#) and the Mobile Connectivity Index [website](#)

Figure 15

Source: GSMA Intelligence

## A modest improvement in aggregate score in Mobile Connectivity Index, but still some way off global average across all enablers



As these enablers of mobile internet adoption continue to improve over the next few years, almost 245 million people across the region will start using

the mobile internet for the first time. By 2025, 483 million people in Sub-Saharan Africa (nearly 40% of the population) will be mobile internet subscribers.

## 2.3

### Addressing social challenges through mobile big data

The use of mobile networks generates huge amounts of data about people's geographic location, calling and messaging behaviour. This mobile 'big data' – when aggregated, anonymised and analysed – can provide valuable and actionable insights across a wide variety of use cases. While the majority of mobile big data implementations are commercial use cases and research, pilot projects have demonstrated that qualities of mobile big data, such as frequency and high penetration rate, can also add value when addressing environmental, social and governance (ESG) challenges, from tackling environmental issues and tracking disease outbreaks to improving urban planning and responding to disasters.

The application of mobile big data for social good use cases is still at a nascent stage in Sub-Saharan

Africa. However, the potential impact is significant given the rapid adoption of mobile technologies and the lack of sufficient relevant data to support efficient solutions and actionable insights. The GSMA, through the Big Data for Social Good (BD4SG) Programme, is facilitating collaboration among stakeholders in the ecosystem and creating awareness of the potential of mobile big data solutions to help governments, public agencies and the development community capitalise on the opportunity. The GSMA has developed an online toolkit 'Mobile Insights for a Better Future: Unlocking Big Data solutions in support of the SDGs' to support successful and sustainable solutions tackling some of the world's most challenging problems: <https://bigdatatoolkit.gsma.com/>



## Ghana: tackling malaria with mobile big data

### Background

Ghana has the world's fifth worst malaria burden.<sup>2</sup> Malaria prevention and treatment efforts include the distribution of insecticide-treated mosquito nets (ITNs) and seasonal malaria chemoprevention (SMC) treatments. Between 2014 and 2016, 19.6 million ITNs were delivered to Ghana for the prevention of the disease.<sup>3</sup> The Ghana Health Service (GHS) is responsible for the government's prevention and treatment efforts, working with local and international partners to deliver treatment kits and services to malaria endemic areas.

The Ghana Statistical Service (GSS) supports the GHS and its development partners, including the World Bank, WHO and USAID, with key population and health information data and insights to aid the prevention and control of diseases. Data and insights provided to the GHS are often based on surveys and the district health information management system (DHIMS), involving a tedious and time-consuming process of manually collecting and uploading information onto a database.

### Mobile big data solution

In 2017, GSS launched an initiative in partnership with several stakeholders to use mobile big data to improve the effectiveness and accuracy of insights for malaria prevention and treatment. Analysis of aggregated and anonymised customer call data records (CDRs) provides insights on population mobility and access to basic social services. This is expected to generate positive economic value for the government and its development partners by enabling more efficient and effective distribution of equipment, personnel and other resources.

## 2.4

### Supporting the SDGs through mobile-enabled services

As the final decade of the UN Sustainable Development Goals (SDGs) approaches, mobile technology will play an increasingly important role in accelerating progress. The impact of mobile will be particularly profound in developing regions, such as Sub-Saharan Africa, which face an uphill task to achieve the goals due to acute resource and infrastructure shortages. The mobile industry's support for the SDGs is demonstrated in three main ways:

- **Deployment of infrastructure and networks:**

The mobile industry drives impact through the provision of – and investment in – high-performing mobile networks, which provide the foundations for the digital economy and act as a catalyst for a diverse and innovative range of services.

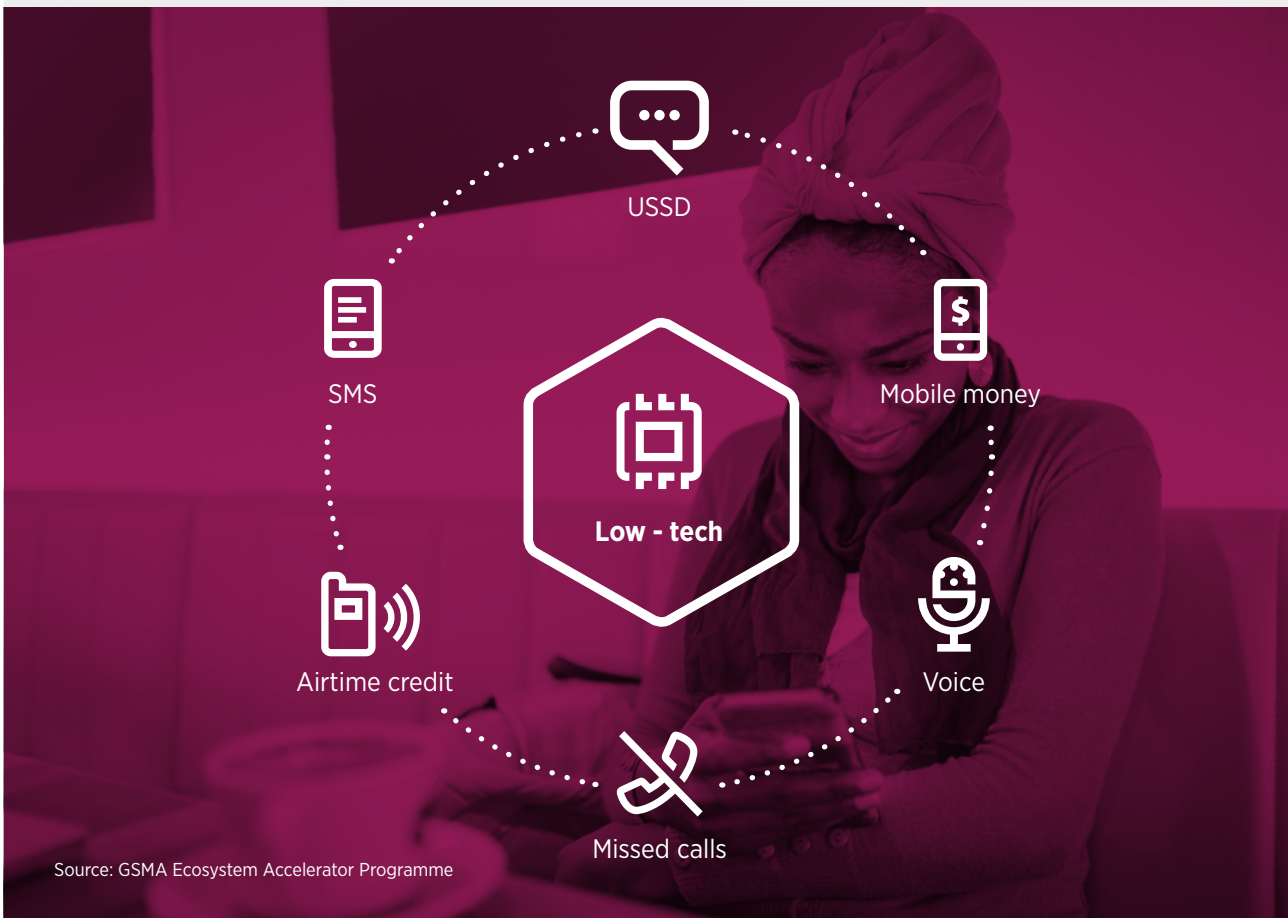
- **Access and connectivity:** Mobile operators are continuing to connect the unconnected; across Sub-Saharan Africa, the mobile industry has connected 62 million new mobile subscribers and 90 million new mobile internet subscribers since 2015.
- **Enabling services and relevant content:** Mobile connectivity continues to transform the lives of millions of people across the region, by enabling the delivery of life-enhancing services, including education, health and financial inclusion. This is especially significant given the challenge of providing services by conventional means amid considerable infrastructure and funding gaps.

2. World Malaria Report 2017, WHO  
3. World Malaria Report 2017, WHO



## Start-ups, low tech and the SDGs

Reaching those at the bottom of the pyramid – at scale – requires easily accessible and cost-effective technologies. Low-tech mobile tools meet this need and beyond. Several mobile innovations reaching scale today in Africa and Asia Pacific that are driving impact on the lives of low-income mobile users are driven by low-tech, offline solutions. Even in the age of smartphones, low-tech solutions are indispensable to addressing the SDGs.








Mobile operators play an important role in granting start-ups and third parties access to low-tech mobile channels, such as APIs and USSD, for deploying life-enhancing services with a direct impact on the SDGs.<sup>4</sup> For example, in November 2018, SMS-based weather forecasting service Iska launched in Nigeria with 9mobile, while MTN Uganda launched its mobile money API, enabling developer access to MTN Mobile Money’s proprietary software platform. Meanwhile, Orange runs the platform #303# My Store that enables developers to plug into a standardised USSD API. #303# My Store is active in Côte d’Ivoire, Cameroon and DRC, with around 50 third-party services accessible on the platform.

4. [Ecosystem Accelerator Compass: Insights on Start-ups and Mobile in Emerging Markets](#), GSMA, 2019

Table 1

## Examples of mobile-enabled services that contribute to the realisation of the SDGs

 <p><b>2</b> ZERO HUNGER</p>	<p><b>SDG 2</b> Farmcrowdy<sup>5</sup> is a digital agricultural platform for individuals and businesses to invest in farming projects. As of March 2019, Farmcrowdy had supported more than 11,817 farmers in Nigeria. In April 2019, Farmcrowdy launched Farmgate Africa, a subsidiary of the start-up that will focus on providing major processors and international buyers with the opportunity to purchase commodities directly from local farming clusters.</p>
 <p><b>3</b> GOOD HEALTH AND WELL-BEING</p>	<p><b>SDG 3</b> In Cameroon, GiftedMom<sup>6</sup> uses SMS and a smartphone application to provide information and reminders to its users about antenatal appointments, vaccination alerts, advice on health risks and complications, and information on family planning and breastfeeding. For users who cannot read or write, SMS messages can be sent via a voice application and translated into the local language.</p>
 <p><b>4</b> QUALITY EDUCATION</p>	<p><b>SDG 4</b> Kenyan start-up Eneza Education<sup>7</sup> uses low-cost mobile technology to give users educational lessons and assessments using SMS, web and Android platforms. Eneza has partnered with Safaricom in Kenya and MTN &amp; AirtelTigo in Ghana, and now has nearly 4 million users on its platform across both countries.</p>
 <p><b>5</b> GENDER EQUALITY</p>	<p><b>SDG 5</b> Mobile technology is helping women across Sub-Saharan Africa to access the internet, broaden their learning and, in turn, improve the wellbeing of their families. For example, Kasha is an e-commerce platform in Rwanda that sells health and personal care products, such as contraceptives and tampons. Customers can access Kasha via USSD or a mobile or web app.</p>
 <p><b>6</b> CLEAN WATER AND SANITATION</p>	<p><b>SDG 6</b> In Niger, CityTaps<sup>8</sup> has developed a water utility subscriber management solution. This includes a smart prepaid water meter that uses Orange mobile money and M2M technologies. The solution allows households to make micro-prepayments for their water at any time using mobile money. CityTaps also provides a software management system and a subscriber management dashboard to monitor usage and performance of the meters remotely.</p>

5. Farmcrowdy received a grant from the GSMA Ecosystem Accelerator Innovation Fund in February 2018 to develop a mobile solution aimed at allowing farmers and sponsors to interact while also delivering other services to farmers, such as information, electronic payments and training.
6. GiftedMom received a grant from the GSMA Ecosystem Accelerator Innovation Fund in November 2018 to provide personalised maternal healthcare support remotely via an app, rewarding pregnant women and nursing mothers with tokens they can use to pay for healthcare.
7. After launching its service in September 2018, Eneza Education received a grant from the GSMA Ecosystem Accelerator Innovation Fund in November 2018 to expand the solution in Côte d'Ivoire through improvements to platform quality, raising awareness through a rewards system, as well as content creation and an IVR channel.
8. In April 2018, the GSMA M4D Utilities Innovation Fund awarded a grant to CityTaps to launch 250 smart prepaid water meters in Niamey, Niger, in partnership with the local water utility, Société d'Exploitation des Eaux du Niger (SEEN) and Orange Niger. In October 2018, CityTaps raised €1 million and has received an order for 10,000 meters from SEEN to scale its service.

**7** AFFORDABLE AND CLEAN ENERGY

**SDG 7** KopaGas,<sup>9</sup> founded in 2014, makes clean, efficient liquid petroleum gas (LPG) available and affordable to low-income households through its PAYG smart metering technology, in partnership with Tanzania's leading LPG importer. As of June 2018, the company had reached more than 500 households with its pay-as-you-cook model and its gas distribution business, which accounts for 7% of LPG distributed in Tanzania.

**8** DECENT WORK AND ECONOMIC GROWTH

**SDG 8** In May 2019, Nigeria-based on-demand motorcycle taxi app Gokada secured \$5.3 million in Series A funding to expand its driver fleet and grow its team. In its 14 months of operation, the start-up has secured close to 1,000 bikes and established a training school for drivers.

**10** REDUCED INEQUALITIES

**SDG 10:** Rwanda-based start-up ARED develops solar kiosks – known as Shiriki Hubs – that are run mostly by women and people with disabilities, using a micro-franchise business model. In May 2019, ARED moved into Uganda, rolling out 10 kiosks in the capital Kampala and at refugee camps, where lower income groups can charge their mobile devices, buy airtime and access the internet.

**13** CLIMATE ACTION

**SDG 13** In Kenya, Illuminum Greenhouses' system allows smallholder farmers and farm owners to monitor and regulate conditions remotely via SMS. By controlling water via irrigation schedules, the start-up claims farmers using their greenhouses can reduce water usage by up to 60%.

**16** PEACE, JUSTICE AND STRONG INSTITUTIONS

**SDG 16** In Tanzania and Ghana, mobile-enabled digital birth registration has seen more infants registered early or on time (within the first year), in some cases almost quadrupling registration rates (from 8.9% to 30.3% in Mbeya Tanzania). In some regions in Ghana, more than 90% of births are now registered digitally, all contributing to goal 16.9 'By 2030, provide legal identity for all, including birth registration'.

9. The GSMA M4D Utilities Innovation Fund awarded grants to KopaGas in September 2015 and in May 2018 to test its PAYG cooking gas service and to roll out a cashback programme that seeks to promote positive customer behaviour and increase stickiness for Airtel and KopaGas services.

# 03

## Key trends shaping Sub-Saharan Africa's digital landscape





### 3.1 Expansion of the mobile money ecosystem

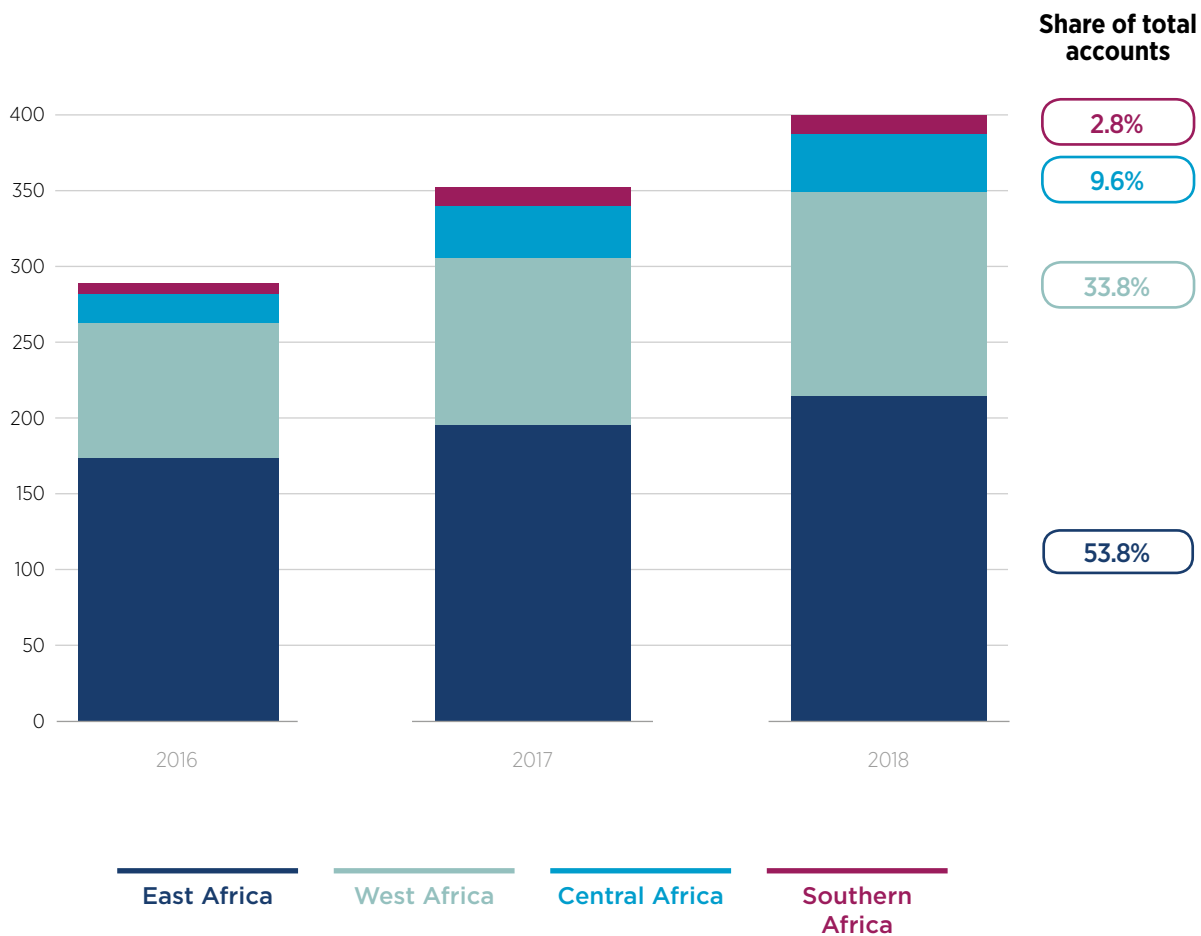
Sub-Saharan Africa remains a hotbed for mobile money services. By the end of 2018, there were 395.7 million registered mobile money accounts in the region, representing nearly half of total global mobile money accounts. The region is now served by more than 130 live mobile money services, many of them led by mobile operators, and a network of more than 1.4 million active agents.<sup>10</sup> Today, more than 60% of the adult population in a growing number of countries, including Ghana, Kenya and Zimbabwe, has a mobile money account.

Figure 16

Source: GSMA Mobile Money Programme

#### Nearly 9 in 10 registered mobile money accounts are in East and West Africa

Registered accounts (million)



10. [State of the Industry Report on Mobile Money](#), GSMA, 2019

Over the past year, several underserved markets in the region have taken steps to accelerate mobile money adoption and, by extension, financial inclusion among citizens. In Nigeria, regulatory reforms introduced in October 2018 allow mobile operators to obtain licences to operate payment service banks (PSBs), while in Ethiopia an ambitious financial inclusion strategy has been attracting investment into mobile money services. Meanwhile, the Angola national bank plans to submit new laws governing payment systems, including mobile payments, to parliament for approval in 2019.

These developments notwithstanding, future growth of mobile money services in the region will be largely driven by interoperability of mobile money services. Account-to-account (A2A) interoperability gives users the ability to transfer between customer accounts held with different mobile money providers and other financial system players. Tanzania led the way in 2014, but several countries across the region, including Kenya, Rwanda, Nigeria and Ghana, have now launched interoperability projects and use cases. Mobile money providers' integration with banks is one particular use case that has significantly increased volumes moving between mobile money and banking systems.

A next step in the interoperability journey will be implementation of innovative solutions to integrate mobile money platforms with the broader financial ecosystem. A number of options exist around

central switching infrastructure for the industry to enable nascent use cases to scale, including merchant payments and efficient connections to domestic and international financial system players. This is already happening at sub-regional levels. For example, the eight countries<sup>11</sup> of the West African Economic Monetary Union (WAEMU) are building an interoperable system that will connect 110 million people to more than 125 banks, dozens of e-money issuers, and more than 600 microfinance institutions.

However, much of the existing bank-focused infrastructure is not optimal for mobile money. In an effort to solve this, MTN and Orange, with the support of the GSMA, launched a joint venture to enable interoperable payments across Africa. Known as Mowali ('mobile wallet interoperability'), the service is open to any mobile money provider in Africa, as well as banks, money transfer operators and other financial services providers. With its pan-African footprint allowing for economies of scale and a cost-recovery commercial model, Mowali has the potential to drive down the price of services offered to lower-income customers. Additionally, Mowali could shape the future of the mobile money ecosystem in the region by creating a common mobile money acceptance brand with the potential to connect fintechs, banks, merchants and other ecosystem players to nearly 400 million mobile money accounts across Africa.

11. Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo



## 3.2 The rise of the platform economy

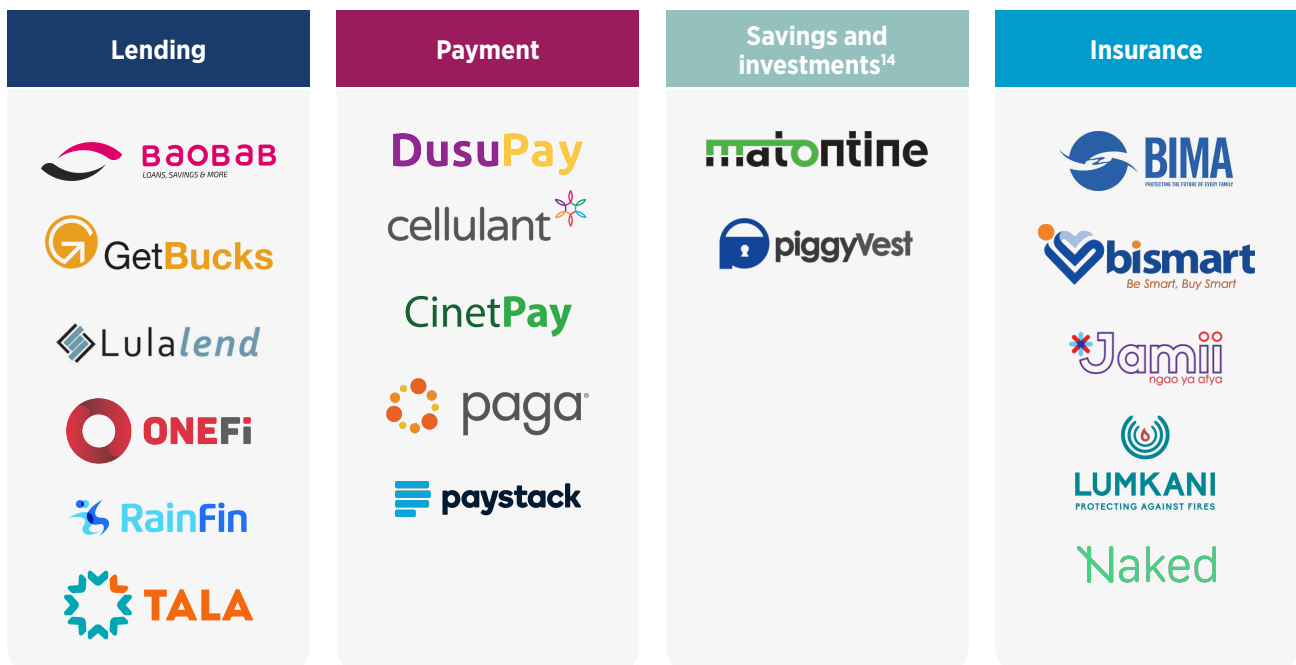
Mobile-enabled platforms are increasingly disrupting traditional value chains in different verticals across the region. These platforms – mostly developed by a rapidly expanding local tech start-up ecosystem – aim to eliminate inefficiencies in conventional business models, as well as extend the reach of services and provide greater choice to customers. Four key verticals on which mobile platforms are having a significant impact are financial services, commerce, transport and logistics

### Financial services

Over the last 12–18 months, Sub-Saharan Africa has emerged as one of the fastest growing fintech<sup>12</sup> hubs in the world in terms of investments, albeit from a low base. Investment in African fintechs nearly quadrupled in 2018 to \$357 million<sup>13</sup>, with startups in Kenya, Nigeria and South Africa accounting for

the largest share. This trend has continued into 2019, with a number of high-profile deals. For example, three Nigerian fintech start-ups – Kudi, OneFi and TeamApt – each raised around \$5 million in funding during the first half of the year.

### Emerging fintech landscape



12. Broadly defined as the application of technology in financial services

13. CB Insights

14. MaTontine received a grant from the GSMA Ecosystem Accelerator Innovation Fund in February 2018 to scale the digital platform and incorporate credit-scoring functionality to facilitate small loans and other financial services such as microinsurance from third-party providers

## Commerce

E-commerce is on the rise in Africa; e-commerce sales in the region reached \$16.5 billion in 2017 and are expected to reach \$29 billion by 2022.<sup>15</sup> This trend is primarily driven by lifestyle changes among the expanding middle class, increasing internet and smartphone adoption, and the growth of digital payment solutions.

Mobile money, in particular, has become a key enabler of e-commerce, by facilitating online payments amid low bank card penetration and the risks associated with cash-on-delivery. In Kenya, the Central Bank has attributed the growth in mobile money transactions to e-commerce adoption.<sup>16</sup> Safaricom's recent payment partnerships with PayPal and Aliexpress.com further open up global marketplaces to Kenyan consumers and entrepreneurs.

Leading e-commerce platforms in the region include:

- **Jumia** – the largest e-commerce retailer in Nigeria with operations spread across 14 countries. Jumia's post-IPO results showed that gross merchandise value<sup>17</sup> for the first quarter of 2019 grew by 58% year-on-year to €240 million.
- **Mall for Africa** – enables local buyers to directly purchase goods from global retailers online. It is present in 15 countries across the region.
- **Takealot** – the largest e-commerce retailer in South Africa. Takealot is majority owned by Naspers and Tiger Global following significant investments in 2017 and 2014, respectively.



### Safaricom's Masoko

In November 2017, Safaricom became the first mobile operator in Africa to launch an independent e-commerce platform, as part of plans to grow revenues outside its core connectivity business. The e-commerce platform, Masoko, builds on the reputation and trust of Safaricom's successful mobile money proposition, M-Pesa, which can be used to complete transactions on the platform. Safaricom also offers other payment methods (such as VISA and MasterCard) but does not provide the option of cash-on-delivery. As a payment service provider itself, Safaricom can guarantee payment for an order the moment it is placed – a core added value.

Masoko follows the marketplace model used by Amazon and Alibaba. While it screens merchants and provides e-commerce enablement services (such as payment processing and customer support channels), it operates on an asset-light basis and does not own the inventory on offer. With regards to logistics, Safaricom leverages its sizeable mobile money agent network (160,000+) as delivery and collection points, as well as multiple delivery partners. This approach enables Masoko to deliver products to 45 of 47 counties in Kenya. By November 2018, Masoko had 120 (pre-approved) active vendors and more than 30,000 stock keeping units (SKUs) on the website.

15. Statista

16. "Communication Authority report says e-commerce picks up in Kenya at Sh1 trillion mark", Standard Digital, October 2018

17. Total amount of goods sold over the period

## Transport

Increasing urbanisation across Sub-Saharan Africa means more people will rely on public transportation. However, conventional public transport services in many parts of the region are notoriously inefficient and fraught with poor quality and safety standards. The arrival of global taxi-hailing service Uber in 2013 and Taxify (now Bolt) a few years later has started to change that narrative. Today, both services are well established in major cities across the region, with an estimated 4 million active passengers between them.<sup>18</sup> In recent years, a number of homegrown platforms have emerged

to challenge the established platforms, and create solutions that aim to address uniquely local transport challenges.

The disruption of the transport sector using digital technologies has significant implications for society. The solutions offered by transport platforms are often designed to provide greater safety, convenience and predictability for users. There is also the potential for increased transparency in revenue collection and usage to support governments' fiscal and planning objectives.



### Côte d'Ivoire

mTick enables passengers to pay for bus tickets via mobile money, eliminating the risks and inconvenience of making cash payments in person, while also enabling transport companies to receive and monitor sales updates in real-time, reducing losses due to fraud.



### Uganda

SafeBoda is one of several ride-hailing apps for motor cycle transportation – one of the most popular forms of urban transit – in the region. Kampala-headquartered SafeBoda offers on-demand ride-hailing services in Uganda and Kenya.



### South Africa

Lifti is a lift-club app that matches car owners with passengers from the same neighbourhoods. For riders, the service can be up to 90% cheaper than a typical taxi.



### Kenya

In early 2019, ride-hailing firm Little launched a bus sharing service in Nairobi to disrupt the widely used but often chaotic Matatu buses. Little Shuttle owns and operates its own buses, with free WiFi and vehicle tracking among the comfort and safety propositions for users. Buupass.com also launched a platform to reserve, book and pay for long-distance bus travel in Kenya, paying remotely by mobile phone.

18. "Uber and Taxify in Africa: Good Work or a Race to the Bottom?", Center for Global Development, November 2018

## Logistics

As consumers turn to e-commerce, enabled by increasing connectivity and online payments, there is a growing expectation for safe and speedy delivery of their online purchase. This is a key factor behind the emerging disruption of the hitherto inefficient, expensive and in some cases non-existent last-mile logistics in several countries

across the region. While the physical infrastructure challenges still exist (for example, poor road and rail networks and a lack of addressing system), tech start-ups are leveraging digital platforms, such as mapping, tracking and even basic SMS, to optimise deliveries and drive cost efficiencies.



### Zambia

In 2016, Musanga Logistics launched an on-demand, mobile-based delivery solution that connects independent cyclists, motorbike riders and truck drivers to those in need of last-mile logistics support. The platform offers a fast, low-cost delivery service within one to three hours in the capital, Lusaka. Users can also track their packages via smartphone until they are delivered. Meanwhile, cyclists and drivers with smartphones and underutilised assets (bicycles, motorbikes or trucks) can earn additional income on the Musanga Logistics online marketplace. Musanga Logistics had more than 1,500 trucks registered on its platform as of early 2019.

In October 2018, Musanga Logistics signed a mobile money integration partnership with MTN Zambia. The partnership simplifies Musanga's payment collection and reduces reliance on cash. It also allows users and drivers to access other mobile financial services on the MTN mobile money platform, such as microloans.

Musanga Logistics has reduced the average customer delivery time in Lusaka from seven to three hours. By making use of underutilised assets, Musanga Logistics has reduced inefficiencies in the supply chain (half-empty trucks doing most deliveries) and the negative per capita environmental impact, thereby contributing to a more sustainable city. Musanga Logistics received a grant from the GSMA Ecosystem Accelerator Innovation Fund in February 2018 to expand its operations and platform in three cities across Zambia.<sup>19</sup>



### Nigeria

Kobo360 launched in Nigeria in 2016, enabling individuals and businesses to schedule pickup of packages, and track the driver to the final destination. Through an integrated system that leverages mobile technology, IoT solutions and data analytics, the platform aims to match a user's request with a selection of trucks, delivery options and transparent pricing within six hours.

The company has partnered with global brands, including Dangote Group, DHL, Unilever and Lafarge, serviced over 1,450 businesses and aggregated a fleet of more than 10,000 drivers and trucks. In the last year, Kobo360 has raised \$7.2 million from investors, including the IFC, YCombinator, WTI, Cardinal Stone Partners, Chandaria Capital and TLcom, to fund its expansion into other countries in the region. Kobo360 is now present in Ghana, Kenya and Togo, with plans to expand into other countries in the coming years.

19. Start-ups and mobile in emerging markets: insights from the GSMA Ecosystem Accelerator, GSMA, 2018

### 3.3 Transformative technologies

Artificial intelligence (AI) and blockchain – two of the most widely discussed transformative technologies over the last three to five years – are beginning to attract considerable interest in Sub-Saharan Africa. In April 2019, Google opened its first AI Lab centre in Africa, located in Accra, Ghana, in addition to supporting machine intelligence programmes at the African Institute for Mathematical Sciences centre in Rwanda. In May 2019, Microsoft launched its Africa Development Centre (ADC) with two initial sites in Nairobi, Kenya and Lagos, Nigeria, with local developers expected to focus on transformative technologies, such as AI and machine learning. AI and blockchain have the potential to help address a variety of social and economic challenges in the region, as evidenced by some of the use cases and applications being implemented.

Table 2

## Examples of AI and blockchain use cases in Sub-Saharan Africa

AI	Blockchain
<p><b>Agriculture</b></p> <p>Google’s AI Lab provides a solution that can be installed on a smartphone, to help farmers diagnose plant diseases and boost production.</p>	<p><b>Agriculture</b></p> <p>Twiga Foods, a Kenyan agri-tech company, has partnered with IBM Research to trial a blockchain-based financing system to provide microloans to food stall retailers in the country. The technology manages the entire lending process, from applications and offers to accepting the terms and repayment.</p>
<p><b>Humanitarian response</b></p> <p>Pulse Lab Kampala, the first UN Global Pulse Lab in Africa, uses AI to take recordings of radio conversations around set themes, such as healthcare, refugees or local disasters, and translate the discussions into English. This provides valuable insights for local governments and humanitarian agencies to help inform life-saving policy decisions, such as where aid is needed.</p>	<p><b>Land titling</b></p> <p>Ghana-based start-up Bitland uses blockchain to help register land, settle land disputes, and reduce illegal displacement and corruption in the sale of properties.</p>
<p><b>Healthcare</b></p> <p>Nigerian tech start-up Ubenwa (meaning “cry of a baby” in Igbo language) has developed a machine learning system to detect child birth asphyxia. The AI solution has achieved over 95% accuracy in trials with pre-recorded baby cries and has the potential to help save lives through early detection and treatment.</p>	<p><b>Logistics</b></p> <p>The United Nations World Food Programme (WFP) plans to test blockchain for tracking the movement of food from Djibouti, where the WFP receives shipments, to Ethiopia, where much of its food operations are located.</p>
<p><b>Customer engagement</b></p> <p>In 2018, MTN adopted Flyxt’s AI-driven solution for automation of inbound and outbound marketing across its entire network of subscribers. Similarly, Safaricom introduced Zuri, an AI chatbot assistant to enable mobile data users to perform a range of tasks, such as managing subscriptions and buying airtime.</p>	<p><b>Remittances</b></p> <p>Digital forex platform BitPesa uses blockchain to facilitate remittances to Africa. In 2018, BitPesa signed agreements with Japanese firms SBI Remit and Sompo Holdings to bring distributed ledger to transactions between Japan and African countries.</p>



<p><b>Fintech</b></p>	<p>Awamo in Uganda uses AI to reduce fraud when signing up customers and businesses to its platform, which operates as a digital banking platform and credit bureau. Its platform helps digitise business procedures, credit information sharing, and many other services using mobile devices.</p>	<p><b>Identity</b></p>	<p>Aid:Tech has teamed up with PharmAccess Foundation in Tanzania to use blockchain to create a more transparent way for governments, enterprises and NGOs to provide formal identity to pregnant women, provide them with the care they need, and create a digital identity for their babies by adding them to a distributed ledger.</p>
<p><b>Education</b></p>	<p>Tuteria, a Nigerian educational start-up, uses AI to match tutors with students according to location and budget.</p>	<p><b>Healthcare</b></p>	<p>Kenyan startup Nurse in Hand collects and delivers information to a network of paramedics to improve emergency response times. In March 2018, it partnered with Apla Tech Company to build a blockchain-based accident response platform, to reduce the distance between first responders in Emergency Care Centres and accident victims.</p>
<p><b>Business processes</b></p>	<p>South Africa-based Clevva has developed a system that uses virtual advisors on AI platforms to advise sales and technical consultants within large organisations to help them better manage business processes and ensure consistency in task management across departments.</p>	<p><b>Media piracy</b></p>	<p>South Africa-based Custos, a copyright infringement protection service, uses blockchain to encode videos submitted on its platform. Using its patented core technology, Custos allows users to embed a Bitcoin monetary reward inside a media file. This acts as an incentive for third-party ‘bounty hunters’ to report leaked and re-uploaded content to the original rights holder. Custos is able to notify rights holders of these leaks and infringements in real time, and reveals the identity of the person responsible.</p>

Transformative technologies can have a profound impact on a variety of sectors and services in Sub-Saharan Africa. However, there are significant challenges to widespread application and adoption. These include a lack of enabling policy frameworks and data legislation to support long-term investment into new solutions and applications; acute shortage of technical skills to develop locally relevant use cases; and poor infrastructure,

especially outside urban areas, to support the deployment of these technologies in the locations needed. There are also ethical concerns around the use of these technologies and the long-term impact on jobs, given the region’s demographic composition. Stakeholders in the region will need to work together to address issues around these technologies and maximise their potential in the region.

# 04 Policies for sustainable digital progress



Digital transformation is already happening across Sub-Saharan Africa. Increasingly, governments, public institutions, private sector players and development organisations are using digital platforms to increase engagement and improve service delivery to citizens, as well as drive social development and economic growth. With mobile technology at the heart of Sub-Saharan Africa's digital journey, it is essential for policymakers in the region to implement policies and best practices that enable sustainable growth for the mobile industry.

Arguably the most significant enabler is radio spectrum. Efficient and effective management of this vital but finite resource is key to maximising the opportunities that mobile connectivity can bring to society. This is especially important as the region transitions from 2G to next-generation mobile broadband networks. While high mobile broadband speeds and increased mobile data consumption

have been proven to generate economic benefits, they also require adequate and sufficient spectrum to function effectively and attract the necessary investment for network infrastructure development. Here, we highlight best practices for two key areas: technology-neutral spectrum licensing and spectrum auctions.

## 4.1

### The need for technology-neutral spectrum licensing

For governments that want consumers and businesses to benefit from the best possible mobile broadband experience, support for technology-neutral spectrum licensing is a must. It is widely recognised as best practice when assigning spectrum to mobile operators. It enables 2G or 3G spectrum to be refarmed for 4G as well as 5G, at a pace driven by market demand. Beyond mobile broadband, the rapidly growing IoT market is also making the need to adopt neutral licences more urgent.

To get technology neutrality right, key considerations include the following:

- Attempts to extract additional revenue have misfired and held back the introduction of new mobile technologies.

- While a renewal process provides an opportunity to re-issue spectrum licences as neutral, regulators should not delay the introduction by waiting for the expiry dates of existing licences.
- When assigning new spectrum, regulators should do so in a technology-neutral manner or at the very least not restrict the introduction of next-generation technologies, such as 5G.

Some countries in the region have not yet moved to technology-neutral spectrum licences and are still issuing technology-specific licences or have not decoupled spectrum licences from operating licences.<sup>20</sup> This means consumers and businesses do not benefit from the best possible mobile broadband experience and can end up paying more for inferior services.

20. It is best practice to issue spectrum licences separately from operating licences. The operating licence, which may be a unified licence, authorises the operation of a public telecommunications network. A spectrum licence confers the right to use the licensed spectrum.



Senegal provides an example of where a technology-specific 4G licence has been issued. The 800 MHz licence issued to Sonatel in 2016 has a duration of 17 years and is technology specific to 4G. It is highly likely that prior to the expiration of the 4G licence the operator will want to refarm at least one 2x5 MHz block of the 800 MHz to 5G. With 5G on the horizon, mobile operators elsewhere are taking advantage of specifications that allow 4G and 5G to operate in the same radio to deploy multi-mode radios capable of 4G and 5G with a software upgrade. Regulators that issue 4G spectrum licences are limiting the use of spectrum to what could be a legacy technology before the expiration of the licence.

If spectral efficiency is to be maximised, operators need to be free to deploy the latest technology. For example, using 4G (LTE) rather than 2G (GSM), operators can produce much higher levels of

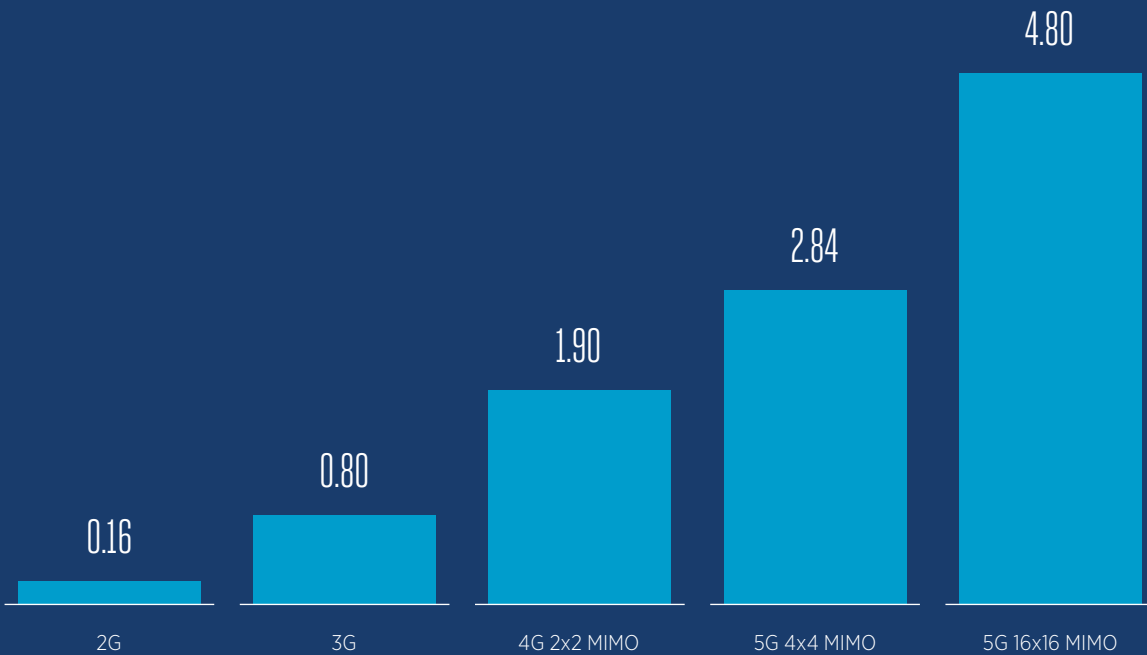
throughput for the same cost (a lower cost per bit). This enables mobile operators to offer their customers large data bundles at the same cost.

Figure 17

Source: GSMA, Coleago Consulting

### Average spectral efficiencies

Bits per Hz



## 4.2

### Creating an effective framework for spectrum auctions

Over the past three decades, auctions have become the dominant mechanism for mobile spectrum assignment. They were designed to provide a transparent, impartial and legally robust means of assigning spectrum to those who will use it most efficiently to support competitive, high-quality mobile services. Alternative approaches such as administrative awards and beauty contests have generally proved less able to assign spectrum in an efficient, impartial and legally robust way. Against this backdrop, effective auction design has become vital to delivering the best possible mobile services. The GSMA public policy on spectrum auctions<sup>21</sup> outlines 10 best-practice positions:

1. **Spectrum auctions should support affordable, high-quality mobile services** – Given the limited supply of mobile spectrum, the primary goal should be to ensure spectrum is awarded to operators who will use it most efficiently to support affordable, high-quality mobile services.
2. **Auctions are a tried and tested award mechanism but can and do fail when poorly designed** – Failures are frequently due to the auction design or wider regulatory issues, such as high reserve prices, artificial spectrum scarcity and auction rules which prevent price discovery or flexible bidding.
3. **Auctions should not be the only award process as they are not always suitable** – For example, alternatives to auctions can be considered when there is evidence of lack of excess demand, or when all qualified operators and the government/regulator are able to find a mutually agreeable split of the spectrum on offer at a fair price. Auctions are almost always inappropriate for renewing expiring mobile spectrum licences. The key focus for renewals should be to provide the predictability licence holders need to invest heavily in their networks throughout the term of the licence.
4. **Auctions that are designed to maximise state revenues risk impacting consumers** – Policy measures that inflate the price of spectrum can result in spectrum remaining unsold, or sold at such a high price that the affordability and quality of services are adversely affected, thus impacting the broader digital economy.
5. **Assign a sufficiently large amount of spectrum and publish future spectrum roadmaps to support high-quality mobile services** – Regulators should publish, and regularly update, a spectrum roadmap for at least the following five years, detailing how much is planned to be made available in which bands and when.

21. [Auction Best Practice](#), GSMA, 2019

6. **Spectrum caps and set-asides distort the level playing field** – Setting aside spectrum or stipulating spectrum caps can restrict the amount operators can access, which in turn can negatively impact mobile broadband speed and coverage, and inflate spectrum prices.
7. **Licence obligations and conditions should be designed to minimise the cost of covering non-profitable areas** – Coverage obligations should be used with caution. They should not result in inefficient duplication of networks in non-profitable areas or distort efficient assignments. As a first step, once policymakers have decided which objectives they wish to prioritise, they should consult with stakeholders on how best to achieve them.
8. **The chosen auction design should not create additional risk and uncertainty for bidders** – There is no single auction design for all types of spectrum award; factors such as individual market dynamics and the type and amount of spectrum auctioned need to be factored into the auction design.
9. **Poorly chosen lot sizes or inflexible packages of spectrum lots risk inefficient outcomes** – Auctioning frequency-specific lots can lead to distortions. Auctions should be designed to allow operators to secure the optimum spectrum to meet their needs (e.g. amount, type and location)
10. **Policymakers should work in partnership with stakeholders to enable timely, fair and effective awards** – A comprehensive consultation with all stakeholders allows sufficient time for all issues to be adequately discussed and where necessary revised.

Mobile users and the wider digital economy are best served when key spectrum management decisions support sustainable growth in the mobile industry. To this end, telecoms regulators and policymakers should take steps to make all existing spectrum licences technology neutral, ensure the spectrum will be made available in time to meet market demand, and adopt spectrum auction best practices for continued investment in next-generation mobile networks and cutting-edge mobile services.



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