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Digital trends in Africa 2021

Information and communication technology trends and developments in the Africa region 2017-2020

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Information and communication technology trends and developments in the Africa region, 2017-2020

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Abstract

This report provides an overview of trends and developments in ICT infrastructure, access and use in Africa, which includes 44 Member States and is home to a population of 1.04 billion people. The report highlights changes in ICT adoption since the last World Telecommunication Development Conference in 2017 (WTDC-17) and during the COVID-19 pandemic, tracks the evolution of regulation, and reviews progress and challenges in implementing the ITU regional initiatives for Africa. Its objective is to serve as a reference for the ITU membership in reviewing progress and identifying ICT development priorities in Africa.

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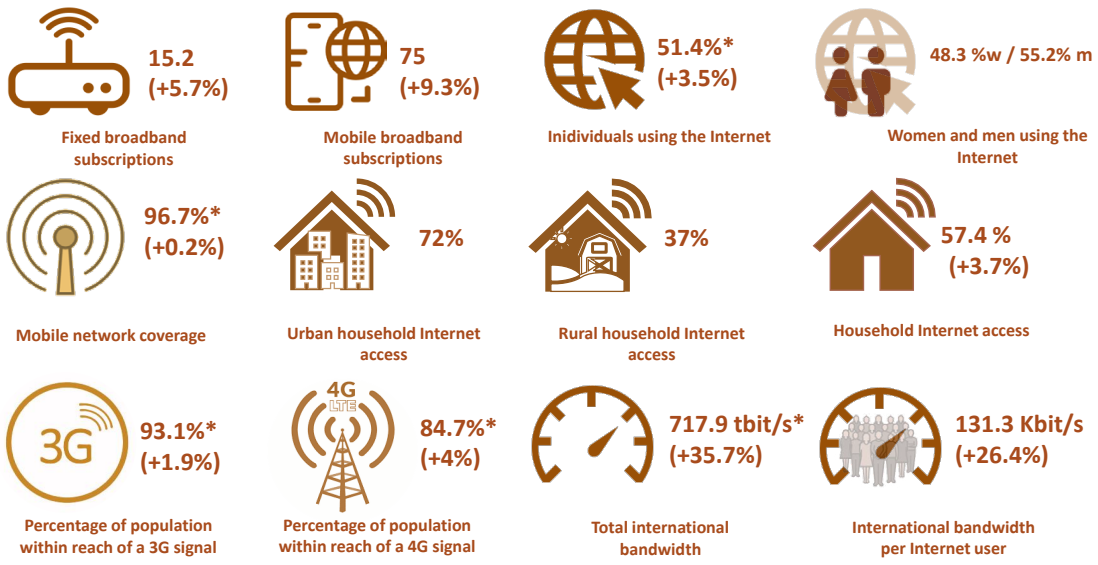
1. Overview

While COVID-19 has dominated the headlines throughout 2020, the consistent development and deployment of information and communication technology (ICT) infrastructure and its concomitant services has meant a continued trend towards digital transformation for societies, businesses and governments alike. Since the last World Telecommunication Development Conference in 2017 (WTDC-17), ICTs have continued to spread. ITU data show that, in 2019, Internet use surpassed the 50 per cent mark (51.4 per cent globally by the end of 2019), 75 per cent of the total world population had an active mobile broadband subscription, and fixed broadband subscription had grown to just over 15 per cent. Over 57 per cent of households today have Internet access at home. Moreover, given the increase in demand for data due to increasingly bandwidth-intensive services, international bandwidth has, on average, grown at a compound annual growth rate (CAGR) of 36 per cent between 2017 and 2020, with a CAGR for international bandwidth per Internet user of 26 per cent between 2017 and 2019. Yet the digital divide persists. While almost all urban areas in the world are covered by a mobile broadband network, many gaps persist in rural areas. The gender divide remains a reality, with still fewer women than men benefiting from Internet use (Figure 1).

Figure 1: Global ICT indicators per 100 inhabitants/per cent (where available), 2019-2020, and compound annual average growth rate (CAGR) (where available), 2017-2019, 2017-2020



*2020 estimate

Source: Based on ITU WTI Database, 2017, 2019 and 2020, where available

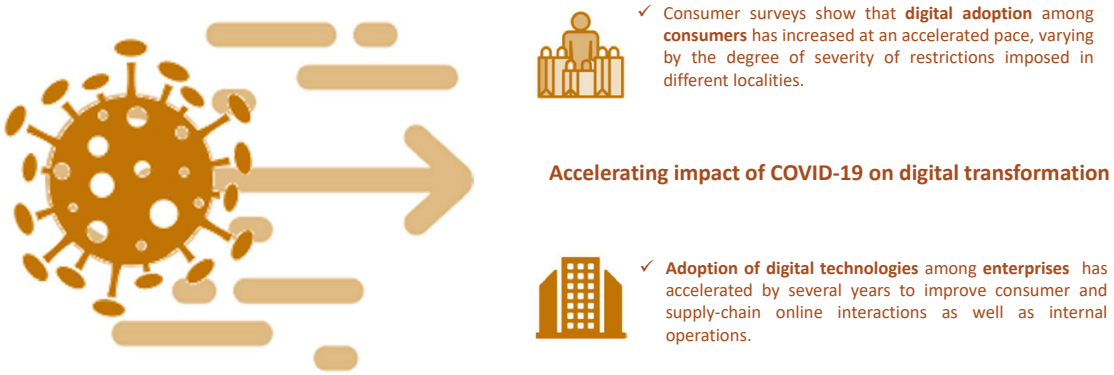
As most countries across the world grapple with the effects of the COVID-19 pandemic, the role of ICTs and digital services and the digital infrastructure on which these depend has become central to continued economic and societal activity and to lessening the pandemic's impact. The Economic Experts Roundtable organized by ITU in June 2020[1] concluded that countries with top connectivity infrastructure could mitigate up to half of the negative economic shock of the pandemic. Overall, the impact of the pandemic has been to accelerate digital transformation, as

[1] The Economic Experts Roundtable was held on 26 June 2020 https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx

businesses move towards distributed models of employment and digital delivery of services and products. Individuals are foregoing travel and socializing and turning to digital entertainment and communication platforms, and increasingly, to e-commerce. Schools are moving to online learning and digital classrooms, and governments are increasingly relying on data on citizens, health, and economic indicators to establish policies.

While research on the contribution of digitization to softening the impact of pandemics is limited, emerging evidence is compelling about its accelerating effects across all areas of people's lives and sectors of the economy. For example, surveys show that the COVID-19 pandemic has pushed consumers and businesses alike to adopt digital services and technologies, thus accelerating digital transformation in consumer behaviour and business activity by several years (Figure 2).

Figure 2: Accelerating the impact of COVID-19 on digital transformation



Source: ITU, based on insights from 2020 McKinsey consumer and enterprise surveys at https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights

Generally, the pandemic has forced a greater demand for digital reliance across the board, and this outcome is likely to be here to stay in the "new normal", as the utility of more abundant data and the ever-lower cost of using those data influence how entrepreneurs, policy-makers and professionals make decisions. The pandemic, however, is just one driver of current trends. Climate responsibility, continued economic development, demographic shifts and social well-being are also key drivers.

In the light of these global trends, policy development that is focused on inclusion, access, security, skills and sustainability in terms of emerging technologies and their benefits is poised to become one of the defining characteristics of the 2020s. This is mirrored in the ITU regional initiatives for Africa and the related ITU-D thematic priorities, which remain highly relevant going forward.[2] Above all, the development of meaningful and affordable connectivity is a key priority for the region to accelerate digital transformation as a means of achieving better, more inclusive and human condition enhancing outcomes. This can be achieved through predictable and sustainable investments and partnerships, fit-for-purpose collaborative policy and regulation, and targeted demand-side approaches. Another key priority going forward is adequate access to analogue complements such as electricity in order to reap the benefits of the digital economy.

Artificial intelligence, the Internet of Things, cloud computing, distributed ledger technology, precision medicine, digital trade, autonomous mobility and many more evolving technological

[2] https://www.itu.int/en/ITU-D/Regional-Presence/Africa/Pages/default.aspx

arenas will shape the future of the world, including Africa. Africa has the opportunity to set an example for the world in how to use emerging technologies within targeted local contexts including in the area of digital payments, precision farming[3], predictive health[4], and many more, to address some of its most pressing challenges such as harnessing Africa's youth dividend effectively[5] towards sustainable development and inclusive growth.

Ultimately, at the heart of this historical transformation, ICT infrastructure is the predominant enabler – along with fit-for-purpose policy – of the future competitiveness and prosperity of Africa. Robust infrastructure on which emerging technologies ride can help meet some of the continent's most pressing challenges. It is important not to lose sight of the fact that improving ICT infrastructure is more than a goal for operators and consumers; far more than simply facilitating mobile and broadband connections. Improving ICT infrastructure allows for global and local supply chain integration, the innovative use of critical health information, the opportunity for citizens to improve their options in the workforce, enables students to gain skill sets previously unavailable to them, among many more positive externalities that are changing the course of history. Indeed, it will be history that looks back at this early era of technological development to see how policies and governance approaches reinforced the resilience and responsiveness of societies, while assessing risks, protecting consumers and enabling positive outcomes for citizens.

2. Digital trends in Africa[6]

The Africa[7] region has a population of 1.04 billion and 44 Member States, including 28 classified as least developed countries (LDCs), five as small island developing States (SIDS) and fifteen as landlocked developing countries (LLDCs). It is one of the world's most challenged regions in terms of its economic development and socio-economic structure, compounded by ongoing conflicts and natural disasters and severe structural impediments to sustainable development. Characteristics of structural impediments differ significantly, including factors such as population size and density, level of urbanization, access to resources and geography. LLDCs lack direct access to the sea, which often makes international connectivity more expensive. Many LDCs are very rural, and others have large, sparsely populated land areas, which makes the roll-out of terrestrial communication infrastructure more difficult.[8] ICT uptake therefore also differs considerably among economies in the region, and Internet usage rates range from more than 60 per cent in the more developed economies to less than 10 per cent in the region's least developed economies.

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3 The AI app UjuziKilimo, for instance, is a precision farming app that uses machine learning and data analytics to help Kenyan farmers optimize their irrigation practices, see: http://www.ujuzikilimo.com/sms.

4 Ubenwa, a Nigerian startup working to detect birth asphyxia, uses inbuilt smartphone microphones and speech recognition algorithms to identify the condition based on the amplitude and frequency of an infant's cry, see http://ubenwa.com/index.html#ove

5 "Harnessing Africa's Youth Dividend: A new approach for large-scale job creation", Brookings Institution

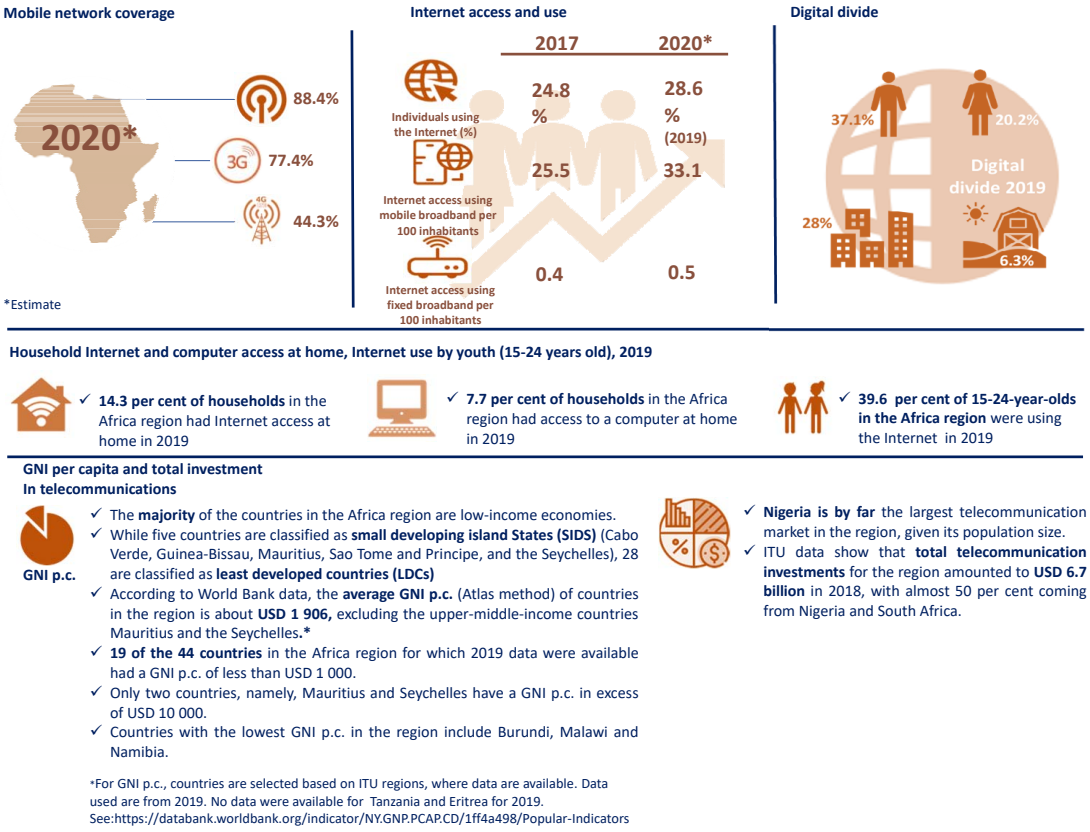
6 Mostly 2019 data with some 2020 preliminary data/estimates. Disaggregated data will be reported when available and relevant (gender, age, rural/urban). Africa averages vs global will be reported when relevant.

7 This document uses the ITU Africa region as defined under ITU country classifications, see: https://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx . Where data were only available for a subset of countries, this is indicated.

8 For a detailed discussion on key opportunities and challenges for the adoption of ICTs in LDCs, see https://www.itu.int/en/ITU-D/LDCs/Pages/Publications/LDCs/D-LDC-ICTLDC-2018-PDF-E.pdf

Over the last four years, the region has seen continued, albeit slow growth in most areas of ICT infrastructure, access and use. Mobile cellular coverage in Africa, referring to the percentage of the population that lives within reach of a mobile cellular signal, is estimated by ITU to be at 88.4 per cent. Just over 77 per cent of the population is now within reach of a 3G signal, and 44.3 per cent is within reach of a long-term evolution (LTE) mobile broadband signal. The percentage of individuals using the Internet increased from 24.8 per cent in 2017 to 28.6 per cent by the end of 2019, with households that have Internet access at home increasing by 0.1 percentage points from 14.2 per cent in 2017 to 14.3 per cent by the end of 2019. Both fixed and mobile broadband markets have shown some growth over the last four years, with active mobile broadband subscriptions outpacing fixed broadband subscriptions. Nevertheless, a very significant gender gap and a rural/urban divide persist. In 2019, only 20.2 per cent of women used the Internet, compared with 37.1 per cent of men. Moreover, only 6.3 per cent of rural households had access to the Internet in 2019, compared with 28 per cent of urban households (Figure 3). In the 15 to 24-year-old age group, 39.6 per cent used the Internet in 2019, which is higher than the regional average, yet significantly lower than the world average of 69 per cent (Figure 3).[9]

Figure 3: Key ICT statistics, Africa region, 2017-2020



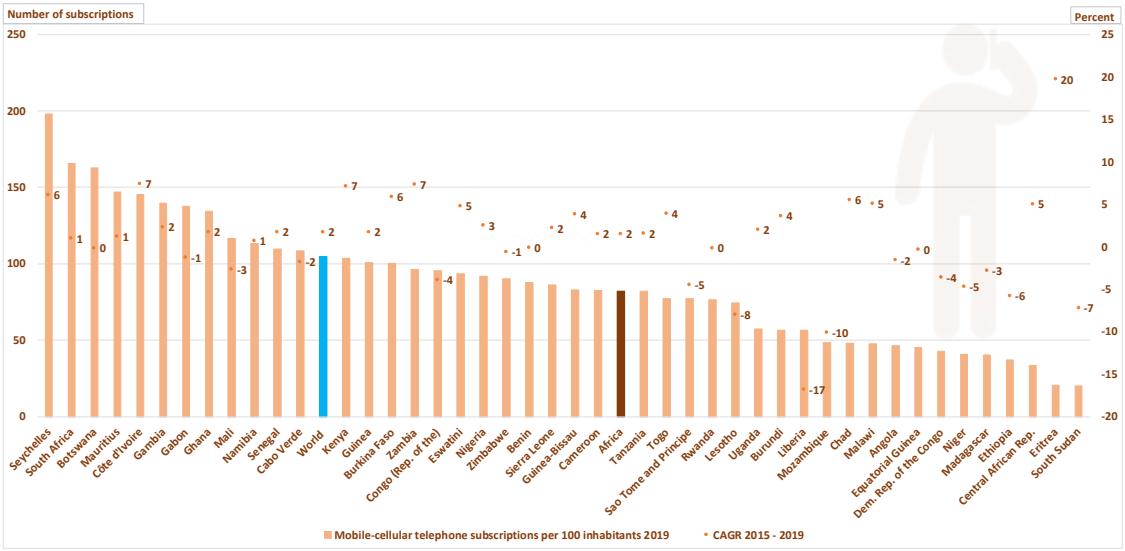
Source: ITU WTI Database and World Bank data (for gross national income (GNI) data)

[9] Measuring digital development: Facts and Figures 2020, https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

2.1 Mobile market developments

The African mobile market is very diverse, with mobile cellular subscriptions far in excess of 100 per 100 inhabitants in 12 out of 44 countries, namely Seychelles, South Africa, Botswana, Mauritius, Côte d'Ivoire, Gambia, Gabon, Ghana, Mali, Namibia, Senegal, Cabo Verde and Kenya. Twenty countries have subscription rates per 100 inhabitants below the African average of 82.3, while 12 other countries have less than 50 subscriptions per 100 inhabitants (Figure 4). In most countries, mobile cellular subscription rates have increased over the time-period 2015-2019 (see CAGR in Figure 4).

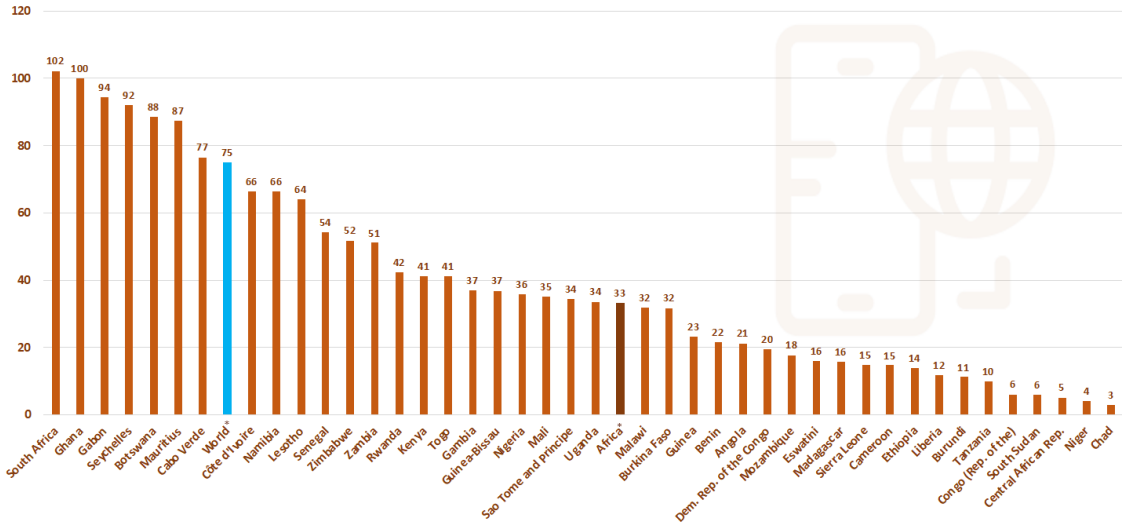
Figure 4: Mobile cellular subscriptions, African countries, 2019 and CAGR (%), 2015-2019



Source: Based on the ITU WTI Database, December 2020 edition

African active mobile broadband subscriptions per 100 inhabitants reached 33.1 in 2019, trailing far behind the world average of 75 per 100 inhabitants. While just over one sixth of countries in the Africa region, including South Africa, Ghana, Gabon, Seychelles, Botswana, Mauritius and Cabo Verde, had active mobile broadband subscription rates per 100 inhabitants above the world average, almost half of all countries for which data were available had subscription rates below the African average of 33.1 per 100 inhabitants (Figure 5).

Figure 5: Active mobile broadband subscriptions per 100 inhabitants, 42 African countries, 2019



Source: Based on ITU WTI Database, *2020 estimates

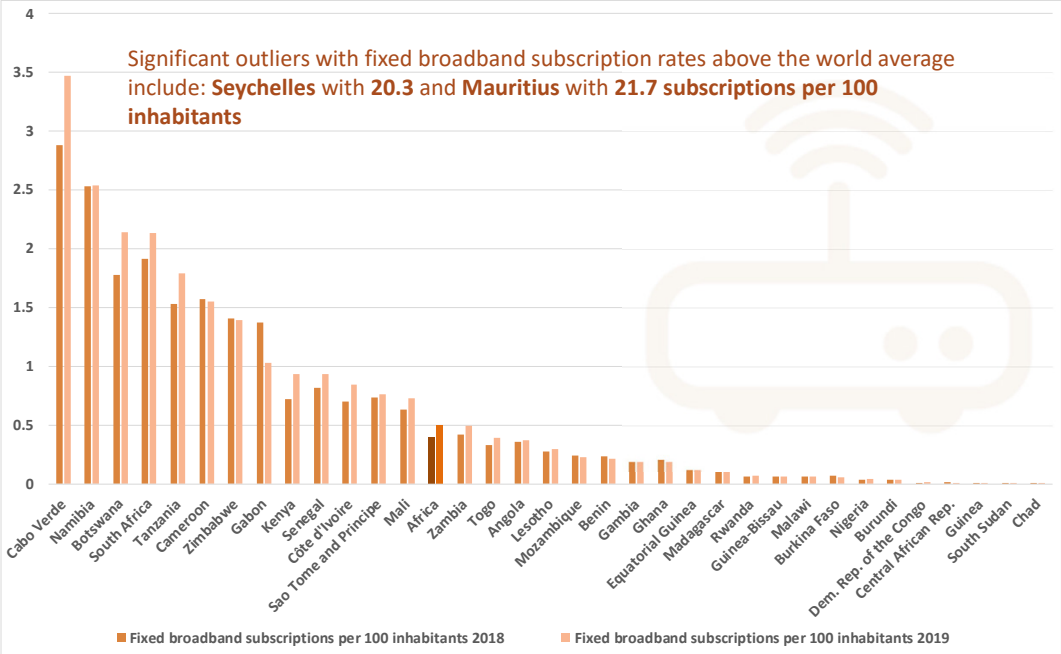
2.2 Fixed broadband market

Compared with other regions, Africa has one of the lowest fixed broadband subscription rates, given the absence of legacy infrastructure and the relatively lower costs of deploying wireless broadband infrastructure. ITU estimated a fixed broadband subscription rate of 0.5 per 100 inhabitants for Africa in 2020, a figure that is well below the global average of 15.2 subscriptions per 100 inhabitants. Yet fixed broadband subscriptions per 100 inhabitants have increased across most countries for which data were available. Within the region, two-thirds of the countries slightly increased their fixed broadband subscription rates in the period 2018-2019. Just under one-third of countries show declining subscription rates for the same period. Seychelles and Mauritius are two significant outliers, with fixed broadband subscription rates per 100 inhabitants well above the world average, recording sizable increases for the period 2018-2019 (Figure 6).

The availability of international bandwidth continues to be an important area for policy and investment, especially given the rising amount of data-intensive applications, cloud-based services and the increasing numbers of Internet users desiring better international connectivity. The Africa region is lagging far behind other regions with regard to international bandwidth at the aggregate and individual levels. Although the total international bandwidth across the region has more than doubled over the last four years from 5 Tbit/s in 2017 to 11 Tbit/s in 2020, it represents only 1.5 per cent of the total world international bandwidth. At the individual user level, there were 30.8 kbit/s per Internet user in the Africa region in 2019, compared with 131.3 kbit/s per Internet user globally (see Box 1 for an overview of international capacity in the Africa region).

At the country level, international bandwidth per Internet user has increased across almost all the countries in the region, where data were available. Kenya had the highest international bandwidth per Internet user, with 566.41 kbit/s and a CAGR of 52 per cent for the period 2015-2019. Just over one-third of the countries shown in Figure 7 had CAGRs in excess of 40 per cent, including Sao Tome and Principe, Benin, Botswana, Burundi, Ghana, Togo, Zambia, Namibia, Nigeria, Zimbabwe, Angola, Mozambique, Mali, the Central African Republic and Liberia. Over

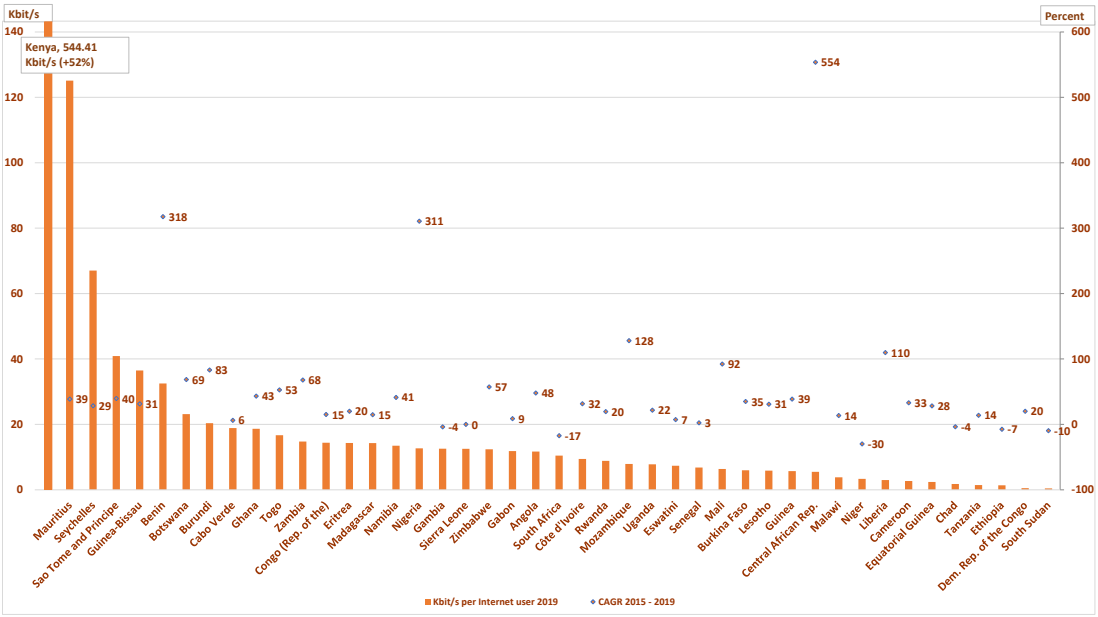
Figure 6: Fixed broadband subscriptions per 100 inhabitants, Africa region, 2019



Source: ITU, based on ITU WTI Database

the same period, just under one-third of countries grew their international bandwidth per Internet user between 20 and 40 per cent. Few countries, including South Sudan, Ethiopia, Niger, Senegal, Eswatini, South Africa, Gabon, Sierra Leone, Gambia and Cabo Verde (Figure 7) experienced small or no growth (CAGR below 10 per cent or negative).

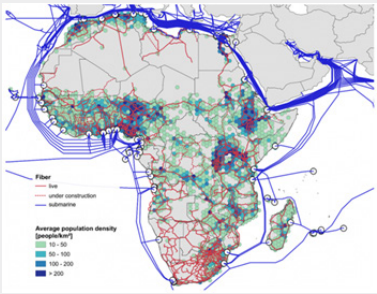
Figure 7: International bandwidth in selected African countries in kbit/s per Internet user, 2019 and CAGR (%) for the period 2015-2019



Source: ITU, based on the ITU WTI Database

Box 1: International capacity in the Africa region

To ensure that the Africa region, as one of the most important future global growth markets, is embracing digital transformation and that it has adequate connectivity, expanding international connectivity via submarine cables, international fibre and satellite is key. The figure below shows that by the end of 2019, 28 African ITU Member States had, at least, one submarine cable landing[1]. Fifteen ITU Member States in the region are landlocked and have to rely on either satellite or international fibre link capacity. The figure also shows that approximately 45 per cent of Africa's population is more than 10 km away from fibre network infrastructure.[2]



1 submarine cable	2 submarine cables	3 submarine cables	4 submarine cables	5 submarine cables	6 submarine cables	11 submarine cables
Republic of Congo	Benin	Cape Verde	Angola	Ghana	Nigeria	South Africa
Togo	Equatorial Guinea	Libya	Senegal		Kenya	
Liberia	Gabon	Tanzania	Côte d'Ivoire		Cameroon	
Sierra Leone	Dem. Rep. of the Congo		Mauritius			
Guinea	Namibia		Madagascar			
Guinea-Bissau	Mozambique					
Gambia	Seychelles					
Sao Tome and Principe	Comoros					

Source: https://www.submarinenetworks.com/en/africa; https://blogs.worldbank.org/digital-development/africas-connectivity-gap-can-map-tell-story

Satellite broadband connectivity offers a good alternative, with the possibility to provide coverage everywhere, including the remote parts of the region. It therefore may offer an effective means to close the digital divide and address remaining connectivity gaps. While progress has been made, challenges persist with regard to the cost of infrastructure.[3] ITU data for satellite broadband subscriptions[4] were only available for 19 countries, with the biggest markets including Tanzania, Zimbabwe, Nigeria, South Africa and Kenya.

Source: ITU WTI Database 2020, https://www.submarinenetworks.com/en/africa; https://blogs.worldbank.org/digital-development/africas-connectivity-gap-can-map-tell-story; https://africanews.space/oneweb-and-sky-space-failure-the-effect-on-satellite-broadband-connectivity-in-africa/

1 https://www.submarinenetworks.com/en/africa

2 https://blogs.worldbank.org/digital-development/africas-connectivity-gap-can-map-tell-story - the map visualizes fibre infrastructure in Africa and population density, showing unserved regions. Total population is estimated for each 10 000 km2 hexagon; those with populations below 100 000 are excluded. Source: Network Startup Resource Center, TeleGeography and European Commission.

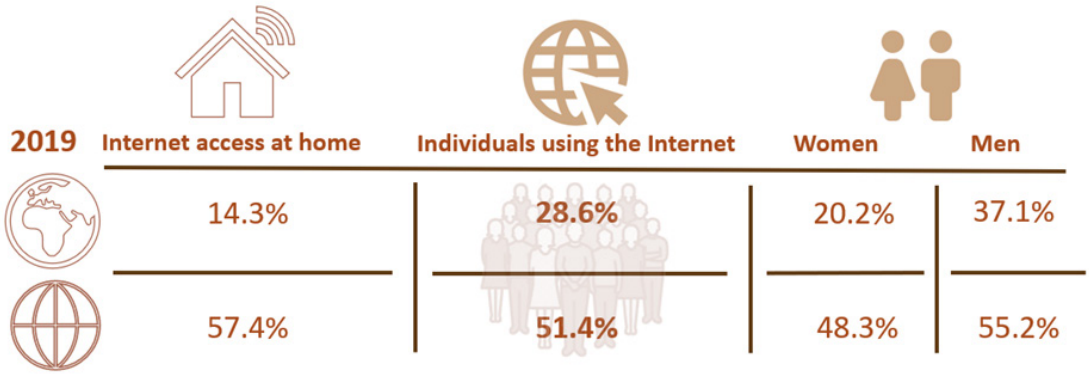
3 https://africanews.space/oneweb-and-sky-space-failure-the-effect-on-satellite-broadband-connectivity-in-africa/

4 Satellite broadband subscriptions refers to the number of satellite Internet subscriptions with an advertised download speed of at least 256 kbit/s. It refers to the retail subscription technology and not the backbone.

2.3 Internet access, use, skills and gender

ITU estimated that 14.3 per cent of households in the Africa region had Internet access in 2019, compared with 57.4 per cent globally. The proportion of individuals using the Internet in 2019 totalled 28.6 per cent in Africa[10] and 51.4 per cent globally (Figure 8), highlighting the need to bring more people in Africa online.

Figure 8: Household access, individuals using the Internet, total and by gender, Africa region and the world



Source: Based on ITU WTI Database.

ITU data show that the percentage of individuals using the Internet greatly varies across the Africa region (Figure 9). In four countries, namely Mauritius, Cabo Verde, Seychelles and South Africa, the proportion of individual Internet users (for the most recent year) was above the world average of 51.4 per cent. In most countries, individual Internet use is below 30 per cent (Figure 9).

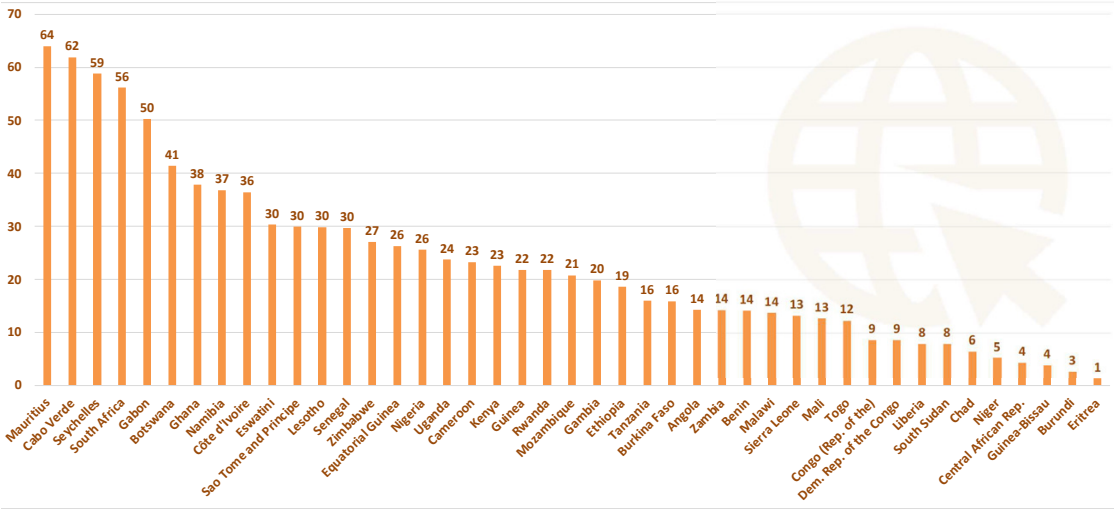
According to GSMA, lack of infrastructure is not the main reason for the relatively low numbers of individuals using the Internet. The much bigger gap is associated with individuals living in areas covered by a mobile network, but not using the Internet. At the end of 2019, 272 million people were connected to the mobile Internet across sub-Saharan Africa, while 800 million were still offline, mainly because of the high cost of smartphones, relative to average income levels, and limited digital skills among rural and less literate populations.[11] In addition, the Alliance of Affordable Internet (A4AI) has identified lack of quality of access, which it has termed "meaningful connectivity"[12], as one key reason why people are not using the Internet. While the GSMA Mobile Connectivity Index shows that infrastructure has seen the biggest improvement in sub-Saharan Africa, alongside modest increases across all other categories over the period 2016-2019 (Figure 10), more needs to be done to ensure that access to meaningful connectivity can be achieved to close the usage gap.

[10] The figure for Internet use in 2020 and 2021 is likely higher than ITU's estimation, firstly, because many countries do not conduct regular surveys, and secondly, because more people are accessing the Internet during the COVID-19 crisis, as they are forced to stay at home during lockdowns.

[11] https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/09/GSMA_MobileEconomy2020_SSA_Eng.pdf

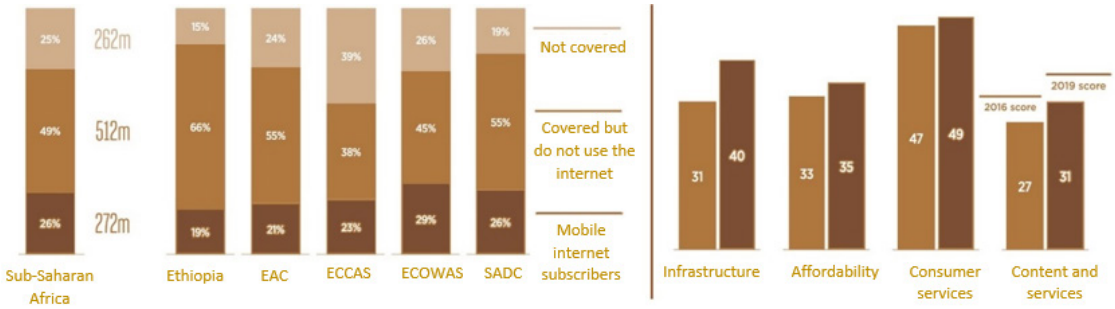
[12] https://a4ai.org/meaningful-connectivity/

Figure 9: Percentage of individuals using the Internet, Africa region, most recent year (2017, 2018 or 2019)



Source: ITU, based on the ITU WTI Database. Data for 2019 were available for Mauritius, Cabo Verde, Côte d'Ivoire and Kenya; and data for 2018 were available for Guinea, Zambia and Niger. For all other countries, the latest available data were for 2017 (except for Nigeria, where the most recent year was 2016).

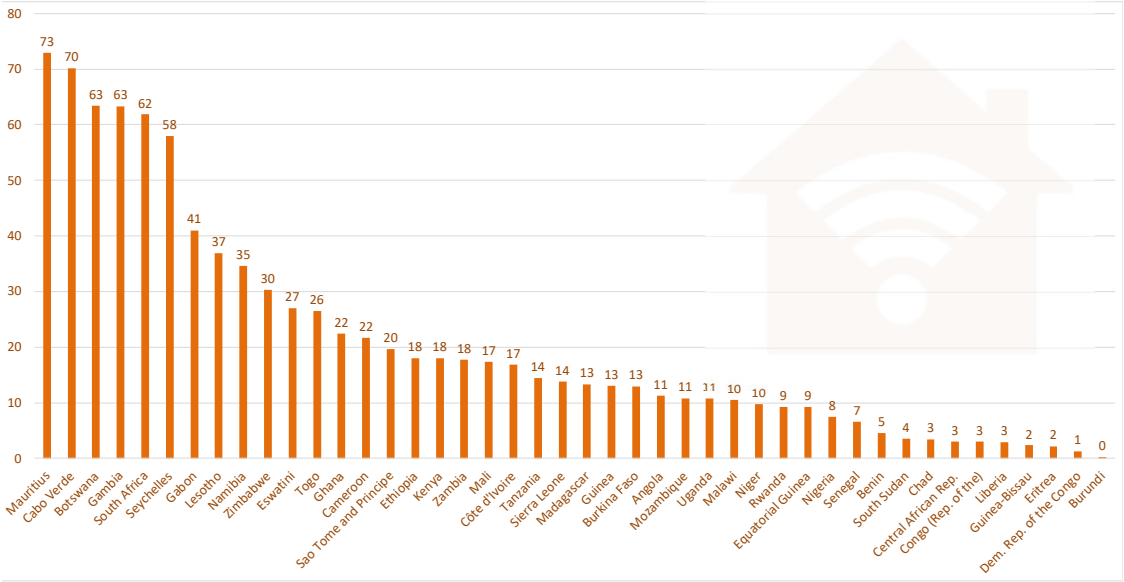
Figure 10: Percentage of population in sub-Saharan Africa with a mobile Internet subscription, covered by a mobile network but not using the Internet, and not covered, 2019; and 2016 and 2019 GSMA Mobile Connectivity Index scores



Source: GSMA The Mobile Economy 2020, sub-Saharan Africa

In terms of households with Internet access, the Africa region shows significant variation: while six countries, namely Mauritius, Cabo Verde, Botswana Gambia, South Africa and the Seychelles lead the region at estimated rates of home access above the world average of 57.4 per cent, most countries have very low home access rates of less than 20 per cent, with 14 countries having a rate of below 10 per cent (Figure 11).

Figure 11: Proportion of households with Internet access, 2019 and CAGR 2017-2019

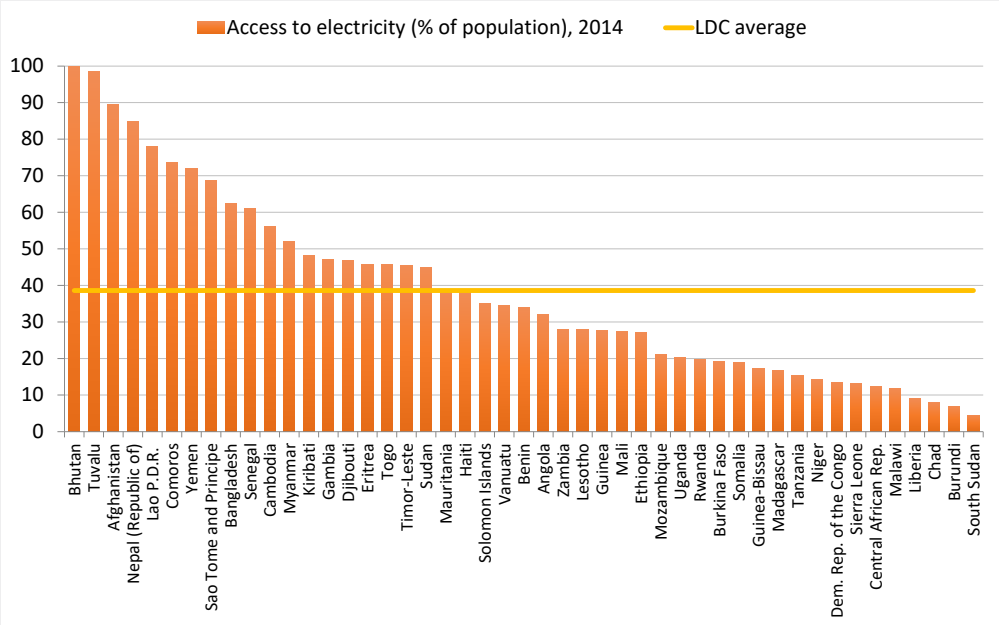


Source: ITU

Box 2: Impediments to meaningful connectivity expansion in the Africa region

To ensure that access to meaningful and affordable connectivity can be achieved across the Africa region, a number of impediments have to be overcome. These include improvements to international connectivity (see Box 1), domestic connectivity / access to backbone networks, as well as the last mile. This requires developing Internet exchange points (IXPs) to ensure that connectivity is efficient, and content is routed domestically. It also requires the building of data centres to ensure that content can be stored locally, and ensuring access to ancillary or analogue complements such as affordable electricity.

Access to reliable and affordable electricity is a major constraint, especially in the 28 LDCs in the Africa region. The ITU Report "ICTs, LDCs and the SDGs - Achieving universal and affordable Internet in the least developed countries" describes how lack of electricity results in higher costs of Internet access through, for example, having to use diesel generators to power mobile base stations, or requiring users in rural areas to travel to recharge their devices. The figure below shows that almost all the African LDCs are below the LDC average in terms of the percentage of the population with access to electricity.



Source: ITU Report "ICTs, LDCs and the SDGs - Achieving universal and affordable Internet in the least developed countries"

Access to national and regional backbones

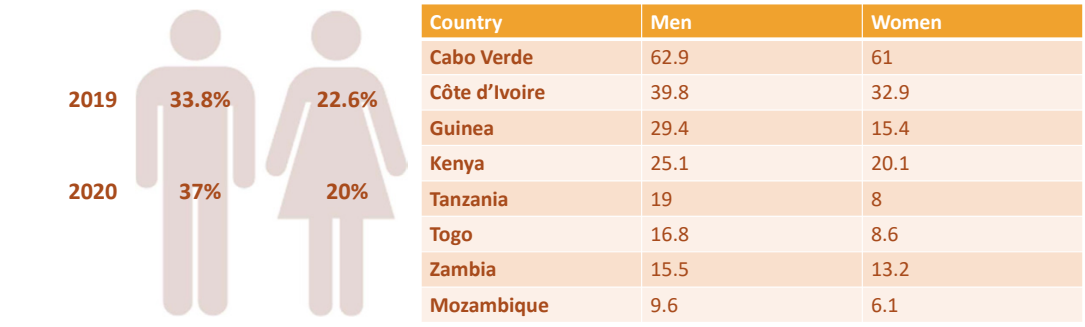
Backbone infrastructure is crucial for broadband infrastructure. LDCs are facing significant challenges, particularly underserved areas. The ITU Report "ICTs, LDCs and the SDGs - Achieving universal and affordable Internet in the least developed countries" found that while wireless backbones based on microwave or satellite offer faster roll-out at lower cost and sometimes are the only option where the cost of extending fibre is too high, optical fibre backbones provide future-proof capacity that can handle large volumes of traffic. This is particularly relevant in the context of the COVID-19 pandemic, where increased traffic has led to network congestion and degradation of quality of experience. It is also relevant in the context of the growing number of data-intensive applications, cloud-based services and the increasing numbers of Internet users desiring better international connectivity. Three successful examples of middle-mile advancements include (1) the national backbone development in Senegal, (2) Tanzania's ICT Broadband Backbone for National and Regional Connectivity and (3) the Burundi Backbone System.

Source: ITU Report "ICTs, LDCs and the SDGs - Achieving universal and affordable Internet in the least developed countries"

In terms of the digital divide, there is still a significant gender gap in the Africa region, one of the largest globally. While, on average, 20 per cent of women and 37 per cent of men used the Internet in the region in 2019, globally 48.3 per cent of women and 55.2 per cent of men used the Internet that year. Based on the limited data available for selected countries (Figure 12), the

gender divide is significant, with percentage differences of up to 14 per cent in Guinea. This divide is least pronounced in Cabo Verde and Zambia.

Figure 12: Percentage of individuals using the Internet by gender, Africa region, 2019; and for selected African countries, most recent year



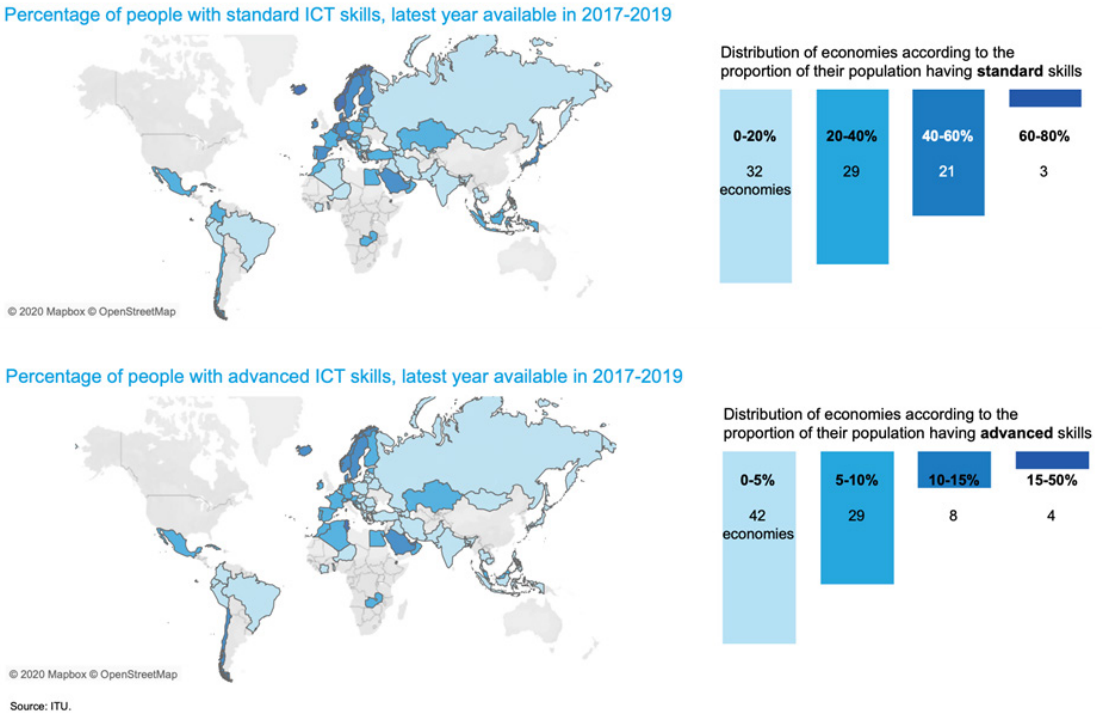
Country	Men	Women
Cabo Verde	62.9	61
Côte d'Ivoire	39.8	32.9
Guinea	29.4	15.4
Kenya	25.1	20.1
Tanzania	19	8
Togo	16.8	8.6
Zambia	15.5	13.2
Mozambique	9.6	6.1

Source: Based on ITU Facts and Figure 2019 and 2020[13]; and on the ITU WTI Database, December 2020. Data for 2019 were used for Cabo Verde and Côte d'Ivoire; 2018 data were used for Guinea and Zambia; 2017 data were used for Mozambique, Niger and Togo; and 2016 data were used for Tanzania.

The data available on the levels reached in basic, standard and advanced ICT skills for the Africa region are very limited. However, it is clear that a significant skills gap exists (Figure 13). To enable a better understanding and targeting of future initiatives to address the skills gap effectively, more data need to be collected.

Figure 13: Basic, standard and advanced ICT skills, world, most recent year (2017, 2018, or 2019)

[13] https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx



Source: ITU Facts and Figures, 2020

For the five countries for which data were available, skills levels differ, with Cabo Verde, Côte d'Ivoire and Zambia showing basic skills levels above 10 per cent. Zambia is the most advanced, with a basic skills level of 43.6 per cent, a standard skills level of 25.2 per cent and an advanced skills level of 6.6 per cent (Figure 14). Box 3 provides an overview of the ITU definition of different ICT skills levels. Box 4 showcases an example of the ITU Digital Transformation Centre (DTC) in Zambia, the main purpose of which is to develop digital skills at basic and intermediate levels for citizens.

Figure 14: Basic, standard and advanced ICT skills, selected African countries, most recent year (2017, 2018 or 2019)

Country	Basic	Standard	Advanced
Cabo Verde	14.4	5.6	...
Côte d'Ivoire	12.3	4.0	0.7
Niger	6.4	2.6	0.9
Togo	3.1	1.6	0.5
Zambia	43.6	25.2	6.6

Source: Based on ITU WTI Database

Box 3: ITU definition of different ICT skills levels

For each economy, the value for **basic skills** is the average value of the available recent data for the following four computer-based activities: copying or moving a file or folder; using copy and paste tools to duplicate or move information within a document; sending e-mails with attached files; and transferring files between a computer and other devices.

The value for **standard skills** is the average value of the available recent data for the following four computer-based activities: using basic arithmetic formula in a spreadsheet; connecting and installing new devices; creating electronic presentations with presentation software; and finding, downloading, installing and configuring software.

The value for **advanced skills** is the value for writing a computer program using a specialized programming language.

Source: ITU

Box 4: Building massive digital skills in Africa: Example of the Digital Transformation Centre (DTC) in Zambia

The ITU Digital Transformation Centres (DTC) initiative seeks to create a global network of centres to help develop digital skills mainly at basic and intermediate levels for citizens. The initiative contributes to the broader goal of building an inclusive digital society and ensuring that lack of knowledge and skills is not a barrier to participation in the digital economy.

In Zambia, The Smart Zambia Institute (SZI), selected as one of four ITU Digital Transformation Centres in Africa to participate in the initiative, celebrated the completion of equipping 72 master trainers with digital skills at basic and intermediate levels. The training was delivered by Cisco under the auspices of the ITU DTC Initiative and conducted online due to the COVID-19 pandemic. Master trainers will transfer the skills and knowledge to the citizenry, school teachers and public service employees. The results will foster and ensure progression towards the transformation of Zambia into a digitally literate society, thus meeting the expectations of the 2030 vision.

Source: ITU Academy

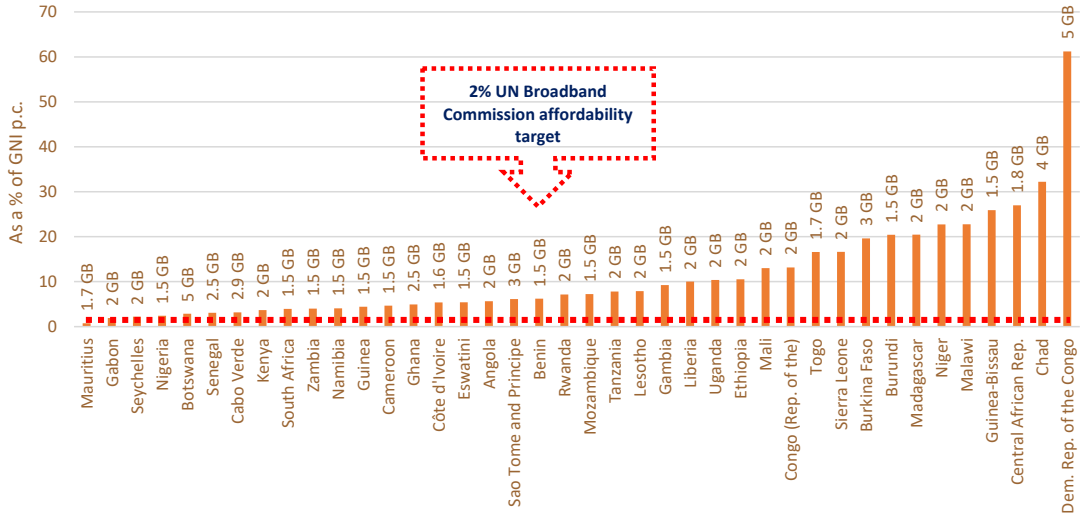
2.4 ICT prices

ITU data show that telecommunication and ICT services are becoming more affordable and prices have generally followed a downward trend over the last four years across the world, including for mobile-voice, mobile-data and fixed-broadband services. At the regional level, Africa has the least affordable prices, closely followed by the Arab States region. The ITU report

"Measuring Digital Development: ICT Price Trends 2019"[14] provides a detailed examination and discussion of ICT price trends.

In Africa, the most affordable mobile broadband baskets are available in Mauritius and Gabon, the only two countries with a basket below the Broadband Commission target of 2 per cent. In the next three countries, Seychelles, Nigeria and Botswana, prices accounted for between 2 and 3 per cent of gross national income per capita (GNI p.c.), suggesting that there is a good chance that the Broadband Commission target may be reached in these countries by 2023. In many African countries however, mobile-data baskets are still out of reach for a large part of the population, costing more than 10 per cent of GNI p.c., in situations where incomes are already limited. In eight out of 10 African countries, the data allowance included in the cheapest price (with at least 1.5 GB) did not exceed 2 GB. The highest allowance for this price is observed in Botswana and the Democratic Republic of the Congo, although in the Democratic Republic of the Congo the service remains prohibitively expensive.

Figure 15: Mobile-data prices as a percentage of GNI per capita, and monthly data allowance, Africa region, 2019



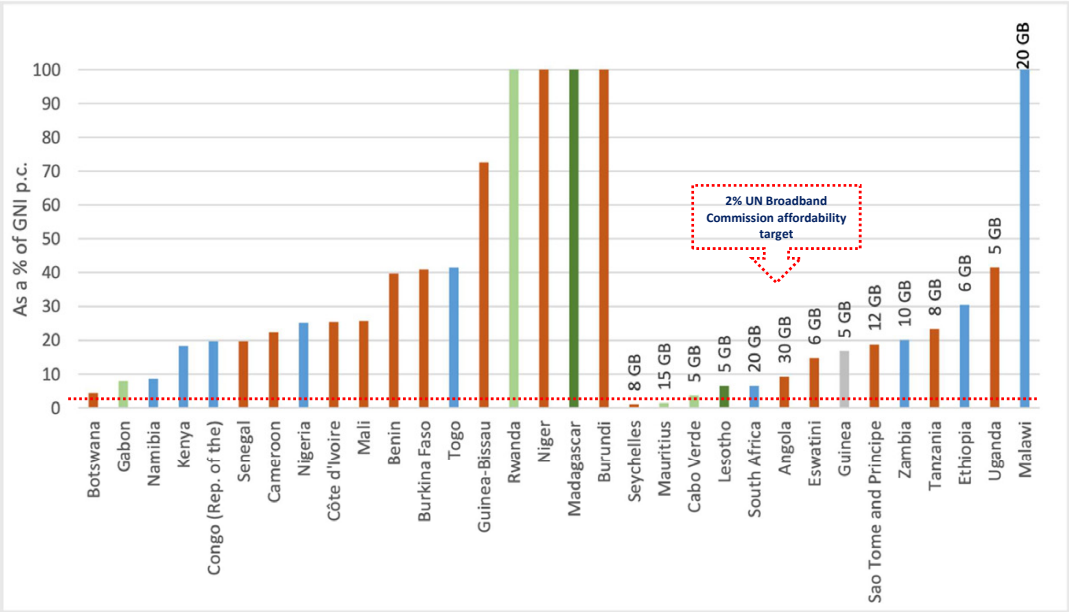
Source: ITU, adapted from "Measuring Digital Development, ICT Price Trends 2019"

In terms of affordability of fixed services, Africa is the region with the highest fixed-broadband basket prices as a percentage of GNI p.c., compared with other regions. Fixed-broadband prices in Africa range from a cost representing less than 2 per cent of GNI p.c. in the Seychelles and Mauritius, to over 100 per cent in Malawi, Rwanda, Niger, Madagascar and Burundi. As such, those first two countries are the only African countries to have achieved the Broadband Commission target for 2025. Almost half of the countries in the region offer entry-level fixed-broadband plans with capped monthly data allowances. This allows operators to offer plans at a reduced cost, but the implication for users is that they are limited in their use of the Internet. In addition, in about half of the countries, entry-level fixed-broadband speeds are only provided between 256 kbit/s and 2 Mbit/s, reducing significantly the usefulness of Internet access. Low bandwidth will prevent meaningful use of many applications, which in turn will have a negative impact on the development of a digital economy. In six of the countries for which data are

[14] https://www.itu.int/en/mediacentre/Pages/pr08-2020-Measuring-Digital-Development-ICT-Price-Trends-2019.aspx

available, speeds are 10 Mbit/s or above, although in two of those countries that package is unaffordable for most of the population.

Figure 16: Fixed-broadband prices as a percentage of GNI p.c., speeds and caps, Africa, 2019



Source: ITU, adapted from "Measuring Digital Development, ICT Price Trends 2019"

Box 5 provides an overview of how ITU measures ICT prices. Box 6 provides possible considerations for the Africa region to address affordability and meaningful connectivity.

Box 5: Measuring ICT prices at ITU

ITU and its partners and stakeholders devote considerable time and effort to developing and refining price methodologies, in particular through the Expert Group on Telecommunication/ICT Indicators (EGTI). ITU maintains a set of different price baskets to reflect different usage patterns and behaviours. In 2017, ITU updated and adjusted its price baskets to reflect current developments in the fixed and mobile broadband markets. The price baskets cover three different technologies: mobile voice, mobile data and fixed broadband.

In addition, the 2017 revision introduced combined data-and-voice baskets, as a first attempt to monitor the prices of bundled services, which is now a very common commercial practice.

The ITU mobile-data-and-voice baskets include voice, text messages and data for two different consumption levels. The low-consumption mobile-data-and-voice basket includes 70 voice minutes, 20 SMSs and 500 MB of broadband data, while the high consumption mobile-data-and-voice basket includes 140 voice minutes, 70 SMSs and 1.5 GB of broadband data.

Source: From ITU, "Measuring Digital Development, ICT Price Trends, 2019"

Box 6: Possible consideration for the Africa region to address affordability and meaningful connectivity

A number of means to address challenges in affordability and meaningful connectivity could be considered:

- Adopt long-term investment friendly strategies that ensure the predictability and regulatory certainty needed to promote business and encourage sustainable investment models for broadband connectivity.
- Explore new business models and strengthen partnerships for massive digital infrastructure and digital skills development, giving priority to content and meaningful applications development in key sectors (education, health, agriculture, etc.).
- Review universal service fund (USF) models and approaches, including exploring new community network access models and public community access points (Wi-Fi hubs) for underserved and rural communities.
- Strengthen competition along the entire ICT value chain, especially for last-mile connectivity.
- Operationalize regional Internet exchange points (RIXPs) and invest in network-based content delivery platforms to drive down costs and ensure that Internet traffic stays national and, at most, regional.
- Invest in regional and national data centres.
- Review and harmonize licensing regulation including spectrum allocation and pricing approaches and set up incentives and or obligations for infrastructure sharing.
- Support local digital innovation and enable new emerging technologies (IoT, platforms, AI, cloud computing) and satellite solution for wide scale rural connectivity.

Source: ITU Regional Economic Dialogue for Africa 2020 takeaways. https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Events2020/RED-AFR/RED-AFR_takeaways_Final-cpw.pdf

2.5 Developments in cybersecurity

Cybersecurity is key to trusted and sustainable digital transformation. This is particularly evident during situations of crisis such as the COVID-19 pandemic, where many of an organization's activities and communication move online and where cyberdefences might be lowered due to the shift of focus to the health crisis. According to an assessment of the global landscape on COVID-19 cyberthreats[15]conducted by the International Criminal Police Organization (INTERPOL), cyberthreats have increased significantly across all cybercrime domains, including online scams and phishing, data-harvesting malware, disruptive malware/ransomware, and attacks aimed at exploiting the vulnerabilities of systems, networks and applications used by businesses, governments and schools to support staff who are now working remotely.

ITU estimates that at the end of 2019, the cost of cybercrime totalled USD 2 trillion globally.[16] Therefore, fit-for-purpose cybercrime legislation, strategies and frameworks, as well as computer

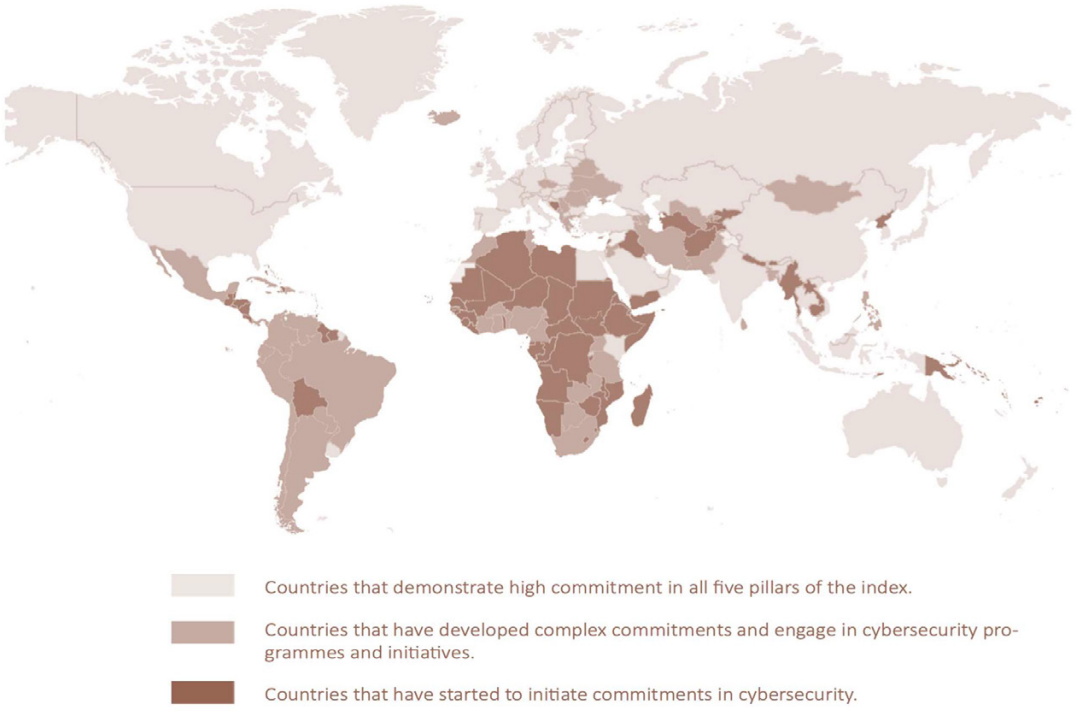
[15] https://www.interpol.int/en/content/download/15217/file/Global%20landscape%20on%20COVID-19%20cyberthreat.pdf

[16] https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx

emergency response teams, capabilities, awareness and capacities are key to sustainable economic and socio-economic development.

Since 2015, ITU publishes the Global Cybersecurity Index (GCI) to measure the commitment of each ITU Member State to cybersecurity across five pillars (see Box 6 for a description of these pillars). The GCI is an ITU initiative that involves experts from different backgrounds and organizations. The Africa region is on its way to ensuring that the use of ICTs is safe and secure, with most countries having initiated commitments in cybersecurity as shown in Figure 18. In this regard, the GCI 2018 shows that most African countries have cybercriminal legislation (38) and cybersecurity regulation (37) in place (see Box 7). Moreover, 11 countries, namely South Africa, Botswana, Uganda, Zambia, Burkina Faso, Tanzania, Cameroon, Nigeria, Benin, Ghana and Côte d'Ivoire have developed complex commitments and engage in cybersecurity programmes and initiatives. Mauritius, Kenya and Rwanda have obtained the top three scores in the Africa region across all five GCI pillars (Figure 17).[17]

Figure 17: Heatmap of national cybersecurity commitment, based on the ITU GCI 2018

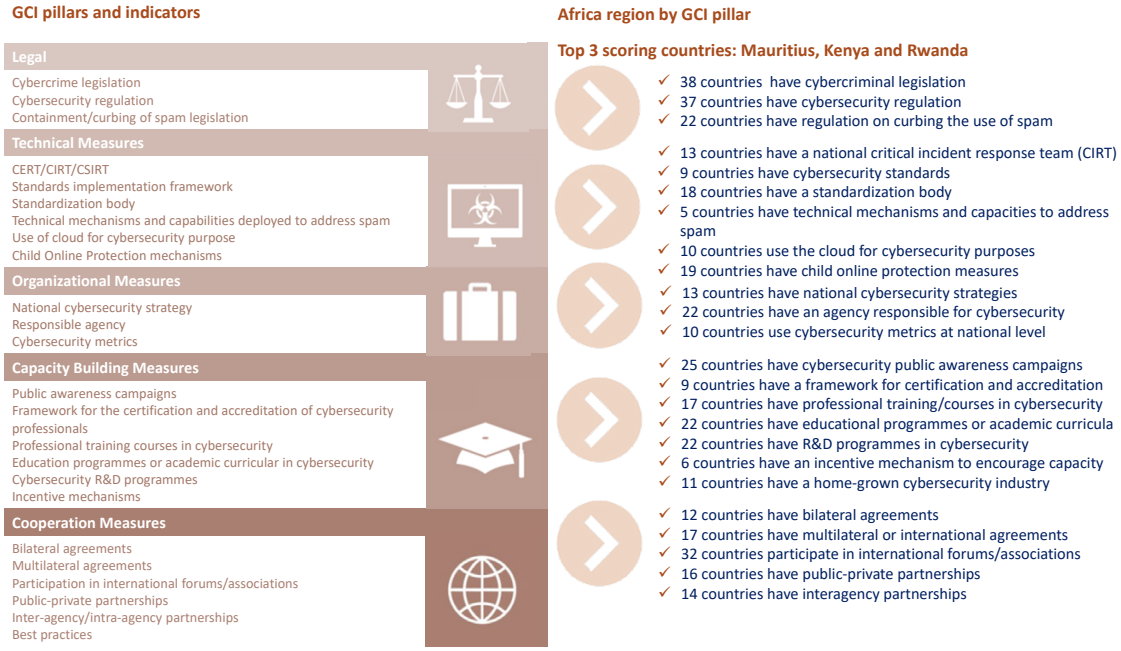


[17] https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx, see GCI Report 2018 p. 30

Box 7: ITU Global Cybersecurity Index: Africa region – A closer look

The **objective of the GCI** is to measure the level of cybersecurity commitment of each ITU Member State in five main areas: **legal, technical, organizational, capacity building and cooperation**. The GCI can help countries identify areas for improvement, motivate action to improve relative GCI rankings, raise the level of cybersecurity worldwide, help identify and promote best practice and foster a global culture of cybersecurity.

Africa shows mixed GCI scores across all five pillars, as highlighted below.



Selected country case studies by GCI pillar:

Legal Measures Pillar: Mauritius – The cabinet has approved the accession of Mauritius to the African Union Convention on Cybersecurity and Personal Data Protection and the instrument for ratification will be sent to the African Union Office in Addis Ababa, Ethiopia. In addition, the Computer Misuse and Cybercrime Act (CMCA) of 2003 has been reviewed in order to align it with the Budapest Convention on Cybercrime and the African Union Convention on Cybersecurity and Personal Data Protection. The alignment of the CMCA has been approved by the cabinet and the Ministry of Technology Communication and Innovation and the State Law Office are working on the amendments.

Technical Measures Pillar: Kenya – In order to mitigate cyberthreats and foster a safer Kenyan cyberspace, the Government of Kenya established the National Kenya Computer Incident Response Team – Coordination Centre (National KE-CIRT/CC) with the support of ITU. The National KE-CIRT/CC coordinates response to cybersecurity matters at the national level in collaboration with relevant actors locally and internationally. The National KE-CIRT/CC is based at the CA Centre and comprises staff from the Communications Authority and law-enforcement agencies. The National KE-CIRT/CC acts as the interface between local and international ICT service providers whose platforms are used to perpetrate cybercrimes, and the Judicial Law and Order Sector, which investigates and prosecutes cybercrimes. In 2019 and 2020, the continuous and successful collaboration between ITU and KE-CIRT/CC enhanced the maturity of CIRT by building more expertise to improve cyberthreat intelligence capabilities to secure the cybersecurity ecosystem in Kenya more effectively.

Organizational Measures Pillar: Rwanda – The National Cyber Security Policy (NCSP) addresses national risks, priorities and objectives and describes measures that address issues relating to public-awareness raising, mitigation of cybercrime, incident response capability and critical national infrastructure protection. The National Cyber Security Agency (NCSA) is tasked with implementing the National Cybersecurity Strategic Plan (NCSSP) 2015-2020. This plan provides implementation guidance for National Cyber Security Policy (NCSP) 92.

NCSP and NCSSP also facilitate capacity building and investments in cybersecurity. In this regard, cybersecurity-related metrics and measurement processes have been established and are being implemented and used to inform decision-making.

(continued)

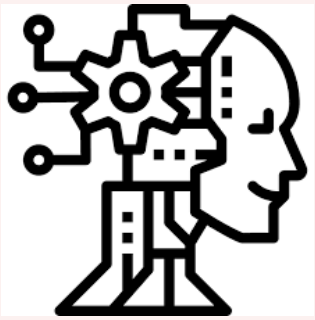
Selected country case studies by GCI pillar:	
	Capacity Building Measures Pillar: Côte d'Ivoire – In August 2019, ITU in close collaboration with Deloitte Consulting undertook a mission in Côte d'Ivoire to support work to increase the country's national cybersecurity level. The proposals drawn up are based on the information obtained during the field mission and are crafted in the light of the experience of the teams from ITU and Deloitte. The suggestions highlight actions that have proven to be effective in similar contexts and may support Côte d'Ivoire in implementing quick-wins that will pave the way to a more structured remediation plan to enhance the development of the country's capacity to: (1) respond to cyberincidents; (2) strengthen the skills and capabilities of national cybersecurity personnel; (3) establish the framework to create an adequate cybersecurity workforce; (4) conduct campaigns to increase the level of cyberawareness of the population; (5) increase the capability to detect, respond and reduce cyberincidents; (6) strengthen the digital transformation of the country; (7) harmonize the national cybersecurity legislative framework.
	Cooperation Pillar: Malawi – Malawi has been fully involved in the process of preparing the African Union Convention on the establishment of a credible legal framework for cybersecurity in Africa. Article II of the Convention provides that each Member State shall adopt the measures required to establish and maintain cross-border collaboration with other CERT/CSIRT at regional and global levels. Member States may join existing early warning and surveillance networks (WSN) such as FIRST (Forum for Incident Response and Security Team) and the European Government CERTs (EGC) group. Malawi will implement this Article; the MW-CERT has already been initiated and is in progress. In March 2018, MACRA signed a cooperation agreement with ITU to assist Malawi to establish its national CERT (MW-CERT) to serve as a trusted, central coordination point of contact for cybersecurity. Further, MACRA organized a workshop in March 2018, facilitated by ITU to assist Malawi in the assessment of its readiness to implement a national CERT.
Source: ITU, based on data from ITU GCI 2018	

2.6 ICT infrastructure developments and integrated technologies

While ITU does not, at present, collect data for indicators on emerging technologies such as the application of artificial intelligence (AI), the status of the Internet of Things (IoT) – except for machine-to-machine (M2M) SIM cards – or on developments in relation to cloud technologies, it is an increasingly important area of ICT development that thrives through the work of all the three ITU Bureaux. As infrastructure around the world evolves, it is likely to do so in a way that accommodates co-dependent hardware and software. Figure 18 provides an overview of the landscape for AI, IoT and cloud technologies in the Africa region.

Figure 18: Landscape for AI, IoT and cloud technologies, Africa region

AI landscape



- The AI landscape in Africa region is very mixed, with successful deployments at scale in the areas of **financial services, agriculture and health care** in some African countries such as **Kenya, Nigeria, Ghana, Ethiopia and South Africa**; and a complete lack of the necessary foundations for AI ecosystems to blossom in other parts across the region.
- African-led AI research and collaboration has produced a **homegrown AI community** that attracts global attention and financial support. The Indaba AI conference has drawn in Google, Microsoft, Apple, Amazon and Netflix as sponsors. With 75 per cent of the continent lacking Internet access, the opportunity for international firms is high, and creating relationships and supporting AI-driven applications is the first step to accessing data profitably across the continent.
- **South Africa** leads the continent in AI adoption with a robust ecosystem that includes numerous technology hubs, research groups and forums such as the AI Summit and Singularity University's South Africa Summit. There are an estimated one-hundred-plus companies in South Africa that are either integrating AI solutions into their existing operations or developing new solutions using AI.
- Companies such as IBM and Google have set up AI research labs in **Kenya and Ghana**. The recognition of Africa's unique challenges, and the need to build skills and capacity in local population is driving this investment. Smaller, somewhat less coordinated efforts are also surfacing, such as iCog Labs, a privately operated AI research lab in **Addis Ababa, Ethiopia**.
- South Africa and Nigeria alone accounted for 2.4 billion in investment in AI between 2008 and 2018.
- The **critical success factors** necessary for the technology to take hold require **reforms in the areas of data collection and data privacy, infrastructure, education and governance**. Without those reforms, most African nations will have little chance to exploit AI technologies to advance sustainable development and inclusive growth. The spectre of automation threatens to leave these countries behind.

Source: https://www.reportlinker.com/p05993774/Middle-East-Africa-MEA-AI-Cyber-Security-Big-Data-Analytics-Market-Growth-Trends-Forecasts.html?utm_source=GNW; https://onezero.medium.com/africa-is-building-an-a-i-industry-that-doesnt-look-like-silicon-valley-72198eba706d; https://info.microsoft.com/rs/157-GQE-382/images/report-SRGCM1065.pdf; https://www.technologyreview.com/2019/06/21/134820/ai-africa-machine-learning-ibm-google/; https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/coming-to-life-artificial-intelligence-in-africa/

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IOT landscape

- In terms of the **status of IoT** in the Africa region, there is still significant room for development. Local conditions, needs and economic structure, demographics, evolving digital infrastructure and technologies in place that locally relevant IoT use cases and devices scale on will determine Africa's IoT potential.
- According to a market research study on **South Africa**, the IoT market is expected to reach **USD 30 billion by 2027**, up from USD 2 billion in 2019. That represents a CAGR of 40 per cent between 2020 and 2027. The market is being driven by industries such as **manufacturing, automotive, and health care**.
- Africa is beginning to see more use cases for the Internet of Things, in particular **for solving local problems**. As more telecommunication companies upgrade their networks to handle 4G and 5G, the prospects of having a robust IoT sector holds more promise now than ever before.
- Examples of locally tailored approaches include the **WAZIUP project**, which uses IoT and big data technology to enhance the working conditions in rural sub-Saharan Africa. The cost of hardware and services; the dependency on proprietary infrastructure; and the need to provide local interaction models are among the key issues to be addressed in order to implement IoT solutions in rural locations.
- In **Kenya and Tanzania**, people have been able to use mobile payments for access to cooking gas. A smart meter on gas cylinders means people can pay when needed. Such accessibility and tailoring to local needs have an enormous impact on the quality of life. When infrastructure is upgraded to handle more data, the opportunity for the IoT sector will only increase, as Africa is expected to have 600 million mobile subscribers by 2025.

Source: https://www.idgconnect.com/article/3583362/africa-s-iot-network-are-we-building-it-the-wrong-way.html ; https://www.comparethecloud.net/articles/challenges-surrounding-iot-deployment-in-africa/ ; https://www.theinsightpartners.com/pr/south-africa-iot-market ; https://www.comparethecloud.net/articles/challenges-surrounding-iot-deployment-in-africa/

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Cloud computing technologies

- As the adoption of smartphones increases and software is needed by growing businesses, there is a **large push for data centres across Africa**. Africa has **less than 1 per cent of global data centre capacity** despite being home to over 1 billion people. Data centre growth has doubled in the last three years.
- **Security** is one of the largest challenges to cloud computing development across Africa. Major African companies and international companies in Africa have been affected by **data breaches and cyberattacks**, exposing the data of millions of accounts and threatening a major hospital in the middle of the pandemic.
- As of 2020, there **were 62 data centres across 26 of Africa's 53 countries**. Major cloud service providers are now providing offers in the market, from Microsoft to AWS to Huawei. Forecasts predict that with the growth of data centre capacity, African cloud revenues could grow by 80 per cent by 2025.
- **Lack of infrastructure** has been identified as an obstacle to cloud computing roll-out and success. With **broadband infrastructure widely unavailable, affordability issues and unreliable energy supply** to data centres, the risks and costs to users and vendors are high. Add to this mix the **complexity of variation in data regulation** across the continent and the challenges to IoT growth opportunities are still considerable.
- Based on a Worldwideworx survey, since the onset of COVID-19, **cloud services have been used primarily for three categories of productivity**: 1) disaster recovery (91 per cent), 2) remote working (82 per cent), and 3) customer service activities (52 per cent).

Source: https://www.ft.com/content/402a18c8-5a32-11ea-abe5-8e03987b7b20; https://www.itweb.co.za/content/KjlyrvW1P3DMk6am; https://www.globenewswire.com/news-release/2020/08/10/2075387/0/en/Africa-is-Undergoing-a-Revolution-in-New-Cloud-and-Data-Centre-Capacity-with-Growth-Forecast-of-80-and-50-Respectively-Over-the-Coming-4-Year-Period.html; https://charlesphillips.me/a-look-at-the-african-cloud-computing-market/ ; http://www.worldwideworx.com/cloud2020/

Box 8: 5G deployment in Africa

Before COVID-19 struck, the assessment was that 5G roll-out and uptake were far from becoming a reality in the sub-Saharan region. The assumption was that investment in 5G infrastructure would precede customer demand for 5G services. This view was based on the low uptake of 4G services, relative to network coverage and ongoing network modernization efforts by mobile operators. However, the COVID-19 pandemic has brought a surge in demand and network congestion as people shifted to work from home and access more entertainment and education resources online. For instance, Vodacom experienced 40 per cent traffic increase on mobile networks and 250 per cent traffic increase on fixed networks during the lockdown period. The notion that 5G is not yet a reality in Africa is slowly changing.

5G networks were launched by Vodacom and MTN in South Africa in 2020 ahead of schedule, with the South African government assigning temporary spectrum in the wake of the coronavirus pandemic, ostensibly to boost broadband connectivity and respond to the surge in traffic during the lockdown. More deployments, although in infancy, are beginning to pop up elsewhere on the continent with trials conducted in Gabon, Kenya, Nigeria and Uganda. Lesotho, prior to the COVID-19 pandemic, was the only country with limited commercial 5G services.

The lessons learned in the 3G and 4G eras underscore the need for governments and other stakeholders to address key policy imperatives for the 5G era, both in the wider context of next-generation connectivity and advancement of the digital economy. A lack of affordability for 4G-capable smartphones, for instance, has held back 4G adoption. This could also be the case in the early years of 5G.

Key policy consideration to maximize the benefits of 5G in Africa include:

- Streamlining and harmonizing regulatory conditions to facilitate 5G deployment.
- Providing regulatory flexibility for innovative 5G propositions.
- Ensuring efficient and sufficient allocation of spectrum that is harmonized and affordable.
- Easing the cost burden of deployment and addressing the consumer barriers to adoption.

What will be required to facilitate the transition to 5G in Africa? From a market readiness perspective, what will be needed is ecosystem collaboration on key supply and demand initiatives, ranging from supporting content creation and development of use cases to solutions and models for cost-effective network deployment. Other considerations are set out in the table below.

Summary	For consideration…
Harmonize spectrum	National regulatory authorities (NRAs) may consider allocating/assigning globally harmonized 5G spectrum bands.
Spectrum roadmap	NRAs may consider adopting a spectrum roadmap and a predictable renewal Process.
Spectrum sharing	NRAs may consider allowing sharing to maximize efficient use of available spectrum, particularly to benefit rural areas.
Spectrum pricing	NRAs may consider selecting spectrum award procedures that encourage investment.
700 MHz spectrum	Policy-makers may consider supporting the use of affordable wireless coverage (e.g. through the 700 MHz band) to reduce the risk of a growing digital divide.
Taxation	Policy-makers may consider removing any tax burdens associated with deploying infrastructure to reduce the associated costs.
Wireless backhaul	Operators may consider a portfolio of wireless technologies for 5G backhaul in addition to fibre, including point-to-multipoint (PMP), microwave and millimetre wave (mmWave) radio relays, high altitude platform systems (HAPS) and satellites.
Access/ sharing of passive infrastructure	Policy-makers may consider allowing access to government-owned infrastructure, such as utility poles, traffic lights and lampposts to give wireless operators the appropriate rights to deploy electronic small-cell apparatus to street furniture. NRAs may consider continuing to elaborate existing duct access regimes to encompass 5G networks, allowing affordable fibre deployments.
Access costs	Policy-makers/NRAs may consider ensuring reasonable fees are charged to operators to deploy small-cell radio equipment onto street furniture.
5G test beds	Policy-makers may consider encouraging 5G pilots and test beds to test 5G technologies, and use cases, and to stimulate market engagement.

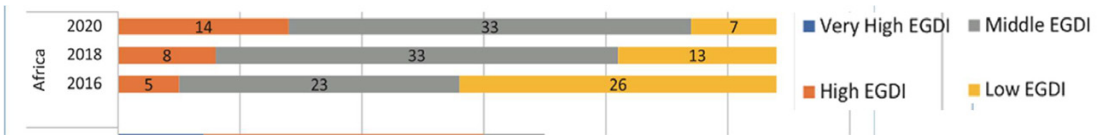
Source: ITU Report on setting the stage for 5G: Opportunities and challenges (2018) https://www.itu.int/en/ITU-D/Documents/ITU_5G_REPORT-2018.pdf;; https://www.itu.int/en/ITU-D/Regulatory-Market/Pages/Events2019/Togo/5G_workshop.aspx

2.7 Digital services trends

Digital economy services have been on the rise as governments and enterprises adopt digital strategies, policies and plans across the Africa region. The 2020 UN E-Government Development Index (EGDI)[18] survey shows positive signs of rapid growth. Africa has the largest share of countries that have moved to a higher EGDI group (15 countries, or 28 per cent) (Figure 19). Mauritius, the Seychelles, and South Africa are leading the e-government ranking in Africa. However, persistent gaps in infrastructure and human capital development have prevented many countries in this region from moving to the higher EGDI levels.

[18] https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020

Figure 19: Regional distribution of countries by EGDI level, 2016, 2018 and 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

Boxes 9 and 10 showcase examples of digital financial inclusion in Ethiopia and within the context of the African Continental Free Trade Agreement. Box 11 explores how to scale up the Smart Villages initiative in Niger across the African continent, outlining a whole-of-government, holistic approach to leveraging ICT tools for sustainable development. The initiative offers a framework that is conducive to collaborative practices and leverages partnerships.

Box 9: Enabling digital financial inclusion (DFI): A case of Ethiopia

According to the National Financial Inclusion Strategy for **Ethiopia**, the financial sector has expanded considerably to develop an inclusive and modern financial sector. However, there is room for improvement to allow full financial inclusion and basic public services. For example, utility service providers are not adequately linked to the financial sector. While cross-sectoral synergies play an essential role in driving financial inclusion and economic development, this still remains largely unexplored in Ethiopia as the provision of mobile money services has been limited to financial institutions such as banks and microfinance companies. Telecommunication firms were allowed to engage in mobile money services only recently. Enabling cross-sector partnerships to include other sectors for example, utility service providers, schools and health centres to support the development of the financial sector would not only facilitate flexibility and foster effective service delivery, but would also establish a strong digital financial ecosystem to accelerate financial inclusion and socio-economic development.

The preliminary findings of an ITU study undertaken to facilitate digital financial inclusion in Ethiopia highlight the low usage of digital financial services and limited number of digital finance platforms. The need for enhanced digital connectivity and capacity development are also emphasized as a foundational element to digital transformation and, consequently, to digital financial inclusion. Reliable and robust digital connectivity is crucial, as other digital products and services are dependent on seamless and equitable access to the Internet for their operation.

At the same time, the National Financial Inclusion Strategy and the Proclamations on Mobile and Agency banking put in place by the National Bank of Ethiopia support an enabling environment for digital financial services. In addition, the present national Digital Transformation Strategy comprises the recent positive developments and the liberalization of Ethio Telecom, accompanied by the reform measures taken by the Government.

Despite the progress, restrictive finance sector policy and lack of an up-to-date digital financial inclusion strategy that targets disadvantaged segments of the population are still a challenge. Restrictions on transaction values in the existing laws, the silos style of coordination, and the lack of appropriate frameworks for e-governance, consumer protection and cybersecurity are among the gaps in the policy, regulatory and institutional arena.

From the demand side, the unbanked in general are largely constrained by different factors which include the lack of targeted interventions to promote DFI among women and disadvantaged segments of the population, including youth. The informal norms and weak enforcement of the formal laws exacerbate the problem.

Some of the preliminary findings from the study highlight the need to:

- Build on achievements made so far on digital financial inclusion while redressing the gaps in the DFI landscape or ecosystem at all levels.
- Adopt international policy frameworks that advocate the prioritization of women. This should be reflected in policy and programmatic responses, including efforts to support women's financial resilience as they recover from the impact of COVID-19 and the associated economic challenges.
- Strengthen policy, laws and institutions for DFI to support efforts to overcome barriers embedded in laws, regulations and institutional norms.
- Enhance access to digital financial services (DFS) and mobile money accounts.
- Enable inclusive, interoperable digital financial payment services to help build a trustworthy, robust digital financial system.
- Promote cross-cutting capacity development for inclusive DFI through a holistic approach to building the capacity of DFI actors at all levels.

Source: Preliminary results of ITU Baseline Assessment on Enabling Digital Financial Inclusion in Ethiopia, 2020

Box 10: Digital opportunities around the African Continental Free Trade Agreement (AfCFTA) that came into force on 1 January 2021

The African Continental Free Trade Area (AfCFTA) commenced operation on 1 January 2021, presenting unique opportunities for informal cross border traders, including access to new markets and customers for their products and presents an opportunity to improve cross border digital payments and ease transactions across countries. The findings of a preliminary study undertaken by ITU to explore cross border digital payments within the framework of the AfCFTA took into consideration the enablers and barriers of cross border digital payments in Africa and reviewed three countries: Ethiopia, Kenya and South Africa as case studies. They indicated that despite the potential presented by the AfCFTA, challenges still exist for example lack of robust platforms that allow interoperability which can enable the ease of movement of funds between countries using basic devices such as mobile phones. The preliminary findings suggest that several key interventions are required to facilitate cross-border digital payments and include (1) creating a harmonized payments policy framework across the continent; (2) increasing investment in physical and digital infrastructure; (3) enhancing cybersecurity measures; and (4) enhancing regulation and supervision.

There is also need for continental collaboration in the form of standardized payment and reporting protocols, expansion and refinement of the necessary platforms, enhancement of regional regulation on digital finance to optimize flexibility and security, and domestic and regional security measures. The successful expansion of digital over traditional payments depends on the development of efficient platforms and conducive regulations, both built with a vision of regional cooperation, industrialization and sustainable development in mind.

Source: ITU study on cross-border digital payments within the framework of African Continental Free Trade Area, 2020

Box 11: Scaling up the Smart Villages initiative in Niger and exploring potential for the African continent

Digital technologies can serve as a powerful tool to deliver the much-needed social and economic transformation to disadvantaged rural communities, many of which remain unconnected and do not have the opportunity to harness the empowering potential of ICTs. The ITU Smart Villages approach involves a design and implementation framework that is demand-driven, user-centric, flexible, and focused on sustainability, scalability and multi-sector collaboration. In particular, it emphasizes reusability of the same solutions for simultaneous contribution to different user needs through the establishment of a single integrated platform that can provide a range of services in different sectors through the use of interoperable infrastructure elements.

The Smart Villages initiative promotes a whole-of-government, holistic approach to leveraging ICT tools for sustainable development and offers a framework that is conductive to collaborative practices and leverages partnerships. It requires government to coordinate across and between ministries and government organizational structures to work together on policy development, citizen engagement, and service delivery. This approach is cost efficient, particularly with infrastructure, or investment, shared by all government departments, projects, and initiatives.

It has been tested during a proof of concept that was carried out in two villages in rural Niger. The proof of concept involved deployment of a range of ICT building blocks aimed at providing services in the areas of health care, education and agriculture. The communities in the two villages were equipped with connectivity and solar power solutions, local servers, tablets to be used by local health professionals and educators, talking boxes with information and advice on various topics, and an SMS messaging platform.

In collaboration with Niger National Agency for the Information Society (ANSI), ITU developed a blueprint on Building Smart Villages that was published based on the experience from Niger and contributions from different stakeholders to provide fundamental guidance on how to transform remote rural settlements into smart villages. Niger is now extending the Smart Villages initiative to an additional 2 000 villages supported by a USD 100 million World Bank loan/grant aimed at accelerate digital transformation in the country.

Source: ITU Smart Villages initiative and Blueprint on Building Smart Villages in Niger: https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-SMART_VILLAGE.NIGER-2020-PDF-E.pdf

2.8 COVID-19 impact on digital development in Africa

The COVID-19 pandemic has accelerated digital development across all regions. While research on the contribution of digitization to mitigate the impact of pandemics is limited, emerging evidence is compelling about its positive effects. For example, the "Africa's Pulse, No. 22, October 2020" report[19] states that during lockdown, 25 per cent of the firms in sub-Saharan Africa accelerated the use of digital technologies and increased investments in digital solutions in response to COVID-19.

While digital transformation has also accelerated in parts of Africa, the crisis has highlighted the urgent need for universal digital access to ensure that people can be reached, that they can stay informed, and that they are able to work and communicate. A study by the European Investment Bank[20] has examined digital solutions that have since been implemented across the Africa region and those that can help Africa in managing the current and future crises. These include **collaborative tools**, **contact tracing apps** (e.g. a **Kenyan** app called **Msafari**[21]), **large communication tools**, **health-related tools**, such as self-assessment apps (e.g. **Wellvis app**[22] for self-diagnosis and contact to medical emergency workers in 15 African countries), self-assessment solutions based on USSD technology (e.g. **Sierra Leone** extended a USSD government platform in partnership with local start-ups to enable citizens to conduct a self-assessment of their symptoms[23]), **drones and robots** (in **Ghana, Zipline**[24] started using drones to collect test samples from health facilities in rural areas, and deliver them to medical laboratories in the country's two largest cities, Accra and Kumasi), **healthcare software** (e.g. **mHero**[25]), **e-commerce purchase and delivery platforms** (e.g. UNDP, in partnership with **Jumia Uganda**[26], has launched an online platform to enable small- and medium-sized businesses to connect with consumers), **education technologies** (e.g. **Shule Direct** online learning platform in **Tanzania**[27]), government monitoring dashboards, and solutions that target the protection of vulnerable populations and tools to anticipate the impact on society and the economy. Moreover, Africa is well known as a leader in digital payments and the pandemic has had an important impact on the necessity and growth of digital payments. Before COVID-19, Bain & Company had predicted that digital payments would account for 57 per cent of all transactions by 2025, but the pandemic has accelerated this trend and estimates are now 10 per cent higher.[28] Other examples that rely on digital payments include Togo's social welfare programme Novissi, which was launched on 8 April 2020 using digital cash transfers to help informal workers during lockdown. During the first week, 1 million citizens signed up. Up to 65 per cent of the eligible beneficiaries were women.[29] Box 12 outlines the implications of the COVID-19 pandemic for the future of young people in Africa and Box 13 presents collaboration efforts between UN organizations to build back better to ensure continuity of learning for the most vulnerable children and youth in Senegal.

19 https://openknowledge.worldbank.org/handle/10986/34587
20 https://www.eib.org/attachments/country/africa_s_digital_solutions_to_tackle_covid_19_en.pdf
21 https://www.france24.com/en/20200519-we-can-get-it-done-here-african-tech-tackles-coronavirus-locally
22 https://innov.afro.who.int/global-innovation/covid-19-self-screening-app-2747
23 https://www.dsti.gov.sl/sierra-leone-goes-live-with-sms-and-ussd-covid-19-self-assessment-mobile-services/
24 https://www.cnbc.com/2020/04/20/zipline-begins-drone-delivery-of-covid-19-test-samples-in-ghana.html
25 https://digitalsquare.org/blog/2020/12/2/more-countries-now-using-mhero-to-boost-covid-19-response
26 https://www.ug.undp.org/content/uganda/en/home/presscenter/pressreleases/2020/covid-19--undp--jumia-uganda-partner-to-link-market-vendors-with.html
27 https://www.shuledirect.co.tz/
28 https://www.institutmontaigne.org/en/blog/new-voices-africa-covid-19-catalyst-digital-transformation
29 https://www.weforum.org/agenda/2020/09/digital-platforms-africa-technology-change-development/

While positive effects for digital development emerged, the COVID-19 pandemic also brought a surge in demand and network congestion on both mobile and fixed networks, as people shifted to work from home and access more entertainment and education resources online, highlighting areas that require increased attention. A study by Facebook on "How the Internet reacted to Covid-19 – A perspective from Facebook's Edge Network"[30] assessed the impact of the COVID-related traffic surge on network stress and performance. While North America and Europe did not show any signs of stress in their networks, India and parts of sub-Saharan Africa and South America did witness signs of network stress translating into degraded video experience, higher amount of traffic overflowing to indirect links and secondary content delivery network (CDN) locations, and higher network round trip times. While the study could not pinpoint the exact causes of network stress, it identified a variety of factors including congestion of direct CDN peering links, overutilization of CDN servers and congestion of the access networks of ISPs, particularly mobile carriers in emerging markets. The study concluded that despite these issues, measures taken by operators (such as capacity additions, rate limiting, or capping video bitrates) and the eventual stabilization of network traffic did allow networks to recover to their pre-COVID-19 performance levels relatively quickly.

ITU finds in its GSR-20 Discussion Paper "Economic Impact of COVID-19 on Digital Infrastructure"[31] that in the medium term (e.g. 2021), countries with top connectivity infrastructure could mitigate up to half of the negative economic impact of the COVID-19 pandemic. However, there are also factors that limit the capacity of digitization to improve social and economic resilience. These include the digital divide where it still persists, and demand-side barriers, such as limited affordability and digital illiteracy. Furthermore, the paper emphasizes that the benefits of digital infrastructure for dealing with the pandemic are limited to those industries that are well on their way to digital transformation, such as logistics. To address these barriers and increase the mitigation value of digitization, the paper makes a number of recommendations, stressing that the digital infrastructure sector needs to re-examine some of the basic fundamental premises of the digital sector held before the COVID-19 pandemic struck. These premises include:

- **concrete actionable measures** in the telecommunication sector to enable private operators to provide universal access to quality digital infrastructure networks for all and support the development of a digital economy;
- **adoption of a much broader, holistic view by governments** of investment in high-speed broadband networks, considering the economic, social and environment/climate benefits and costs of investment;
- **possible adjustment of regulatory frameworks** to stimulate investment whilst maintaining a sensible level of competition, shifting from a purist to a pragmatic viewpoint on State-aid regulations;
- **harnessing the opportunity to use COVID-19 as a catalyst** for the adoption of digitization in sectors where it had not occurred before, especially in more business-oriented applications.

ITU has called into life various COVID-19 initiatives, activities and partnerships to help understand the impact of the crisis better and develop guidance for countries, including "Connect2Recover", the Global Network Resiliency Platform "REG4COVID", the World Summit on the Information Society (WSIS) ICT Case Repository and CYB4COVID. Partnerships include the Ad hoc Group on digital technologies for COVID health emergency "AI for Health" and the Agenda for Action

[30] https://research.fb.com/publications/how-the-internet-reacted-to-covid-19-a-perspective-from-facebooks-edge-network/
[31] https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx

developed by the United Nations Broadband Commission for Sustainable Development. For more information, see https://www.itu.int/en/Pages/covid-19.aspx.

Box 12: Addressing the implications of COVID-19 for the future of young people in Africa

Beyond its immediate health impacts, the COVID-19 pandemic is having severe socioeconomic consequences for Africa. The International Labour Organization (ILO) estimates that the equivalent of over 50 million full-time jobs were lost on the continent in the first half of 2020. The impacts of the pandemic on young people are systematic, deep and disproportionate. They face disruptions to learning and training, employment and income losses, and greater difficulty in finding good quality jobs. The pandemic has, however, demonstrated how important digital technology is in responding to crises and how it can help to build back better.

With enhanced digital skills, access to markets, networks, finance, information, voice and representation, young Africans can benefit from, and contribute to, the digital transformation and long-term development of their countries.

Under the aegis of the **Global Initiative on Decent Jobs for Youth**, ILO and ITU, with the support of the African Union (AU), have initiated a programme with continental reach **to create decent employment and enhance skills for youth in Africa's digital economy**. Launched in 2020, the programme aims to ensure that Africa's youth are empowered and able to benefit from new opportunities in the digital economy, and in turn, that their energy and creativity can be harnessed by expanding digitally enabled industries. The overarching goal of the programme is to increase the number of young Africans in target countries, who are able to access decent work in the digital economy. Work is already under way in **Kenya, Côte d'Ivoire, Nigeria, Rwanda, Senegal and South Africa** to achieve this goal – and the programme is actively seeking partners.

Source: ITU-ILO-AU Programme on Boosting decent jobs and enhancing digital skill for youth in Africa's digital economy at https://www.itu.int/en/ITU-D/Regional-Presence/Africa/Pages/projects/2020/jobs-skills.aspx

Box 13: Collaboration between UN organizations to build back better: Ensuring continuity of learning for the most vulnerable children and youth in Senegal

To address the impact of school closures and educational institutions and ensure that the right to education for all children in Senegal is upheld, the United Nations COVID-19 Response and Recovery Multi-Partner Trust Fund (UN COVID-19 MPTF) supported a joint-project proposal prepared and submitted by four UN agencies: United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations International Children's Emergency Fund (UNICEF), United Nations High Commissioner for Refugees (UNHCR) and ITU. The activities being undertaken by ITU within the project, which is being deployed in early 2021, focus on the provision of Internet access to vulnerable and disadvantaged girls in secondary education and technical and vocational education and training (TVET) learners in hard-to-reach areas.

ITU committed to providing Internet access to 1000 vulnerable learners (750 in technical and vocational training, and 250 marginalized girls in general secondary education) from underserved and remote areas, who will receive tablets from the project. The terminals (tablets and laptops) to be used by these school children would be bought and provided by UNESCO, according to the project agreement.

ITU has the following roles and responsibilities:

- Provision of relevant and trustworthy information and expertise on how to leverage the existing Internet technologies and broadband infrastructure in the targeted rural and remote school/TVET geographical locations.
- Provision of Internet access to most marginalized girls in general secondary education and vulnerable learners in technical and vocational training from hard-to-reach areas.

Source: ITU project on Ensuring continuity of learning for the most vulnerable children and youth in Senegal

3. Regulatory trends in Africa

The right regulatory framework is key to successful digital transformation that is inclusive and sustainable, and that minimizes the emergence and manifestation of unwanted consequences for market structures and consumers. As the COVID-19 crisis has laid bare, inequalities are increasing within and between countries, not least because current governance and regulatory frameworks and their implementing mechanisms are failing to deliver more equitable outcomes. As the pace of digital transformation accelerates, formulating an effective regulatory approach therefore becomes a defining moment. Through complementary ITU regulatory metrics, the now established ICT Regulatory Tracker and the new Benchmark of Fifth Generation Collaborative Regulation (G5 Benchmark (ITU, 2019))[32], ITU has identified the broad tracks for regulatory

[32] Note that the term "G5" used in relation to the Benchmark should not be confused with "5G" which refers to wireless technology.

reform and has pinpointed how countries can accelerate progress towards the next regulatory generation.

3.1 New collaborative regulatory paradigm

A new regulatory paradigm has emerged – the "gold standard" for collaboration among regulators and policy-makers [33] – that seeks to fast forward digital transformation for all. This new paradigm is embodied in collaborative regulation (see Box 14 for a definition of the general concept), which must engage a broad and diverse range of stakeholders in informed, evidence-based rulemaking and decision-making, with both social and economic impact in mind – and with priority granted to the latter. Collaborative regulation applies readily to multiple areas of regulatory work; infrastructure sharing, and co-deployment are no exception and can substantially benefit from the introduction and effective use of collaborative governance and data-driven regulatory instruments.

ITU forged the concept of "collaborative regulation" in 2016 and has since tested it annually at every Global Symposium for Regulators (GSR). While the concept continues to evolve, since 2020 it can best be cast as a framework to discuss the evolution of regulatory patterns and policies, while charting the way ahead for industry and regulators as one constituency, towards digital transformation.

Box 14: Collaborative regulation - A forward-looking concept

What is collaborative regulation?

Collaborative regulation, or 5th generation regulation (G5), is a broad notion that ITU has defined based on the concept of generations of ICT regulation. It marks a fundamental shift in the way regulation is executed, its holistic policy ground and the stakeholders that it brings together – from policy-makers, single-sector and cross-sector regulators to market players of any size. It also shifts regulatory focus on behaviours and impact on markets and development. Collaborative regulation puts a new emphasis on consumer benefits and protection and leverages the resources of government institutions and industry to deliver them through organic consultation, collaboration and conciliation. Collaborative regulation is driven by leadership, incentive and evidence rather than by command-and-control schemes. The concept also refers to the set of new tools used by regulators to tackle the issues related to digital transformation and the data economy.

[33] https://www.itu.int/en/mediacentre/Pages/PR06-2020-Global-ICT-Regulatory-Outlook-G5-Benchmark.aspx

Why do we need collaborative regulation?

All roads now point to more collaboration, better channels and more bandwidth. But while the case for collaboration is irrefutable, progress has been stalled by power battles, lack of resources and misconceptions. Good progress towards inclusive, collaborative regulation is needed for the good of all users of digital services, now and into the future – a need borne out by four fundamentals:

- **Digital transformation is a game changer – especially in "the new normal" amid the current global pandemic**

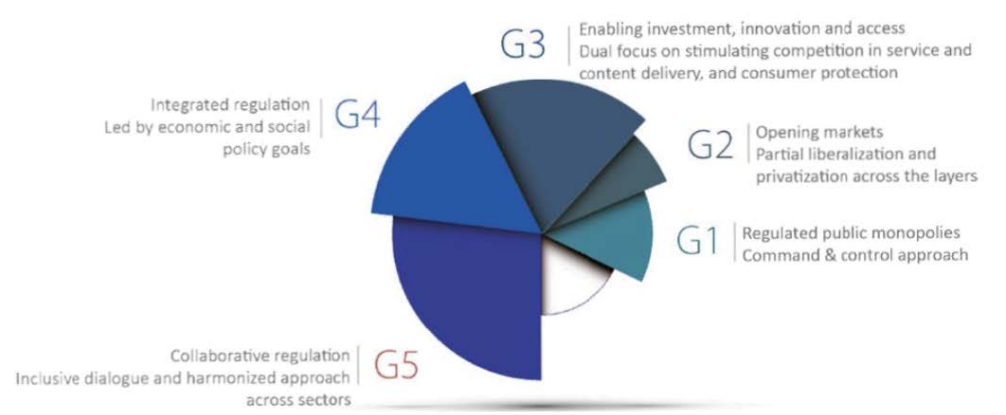
  ICTs have become the foundation for every economic sector and a *sine qua non* of business performance, national growth and – more recently – resilience. Regulators need to ensure that regulation achieves its objectives in the most effective and efficient manner, in particular ensuring network resilience and enhancing both the capacity and coverage of networks without imposing disproportionate, redundant or overlapping burden on the market.
- **The new digital world needs a new take on regulation**

  ICTs can dramatically transform education, health care, environmental management, agriculture, trade and entrepreneurship, the provision of government services – and so much more. For this to happen, enabling policies and regulatory frameworks need to be put in place.
- **Holistic and harmonized approach can deliver greater impact**

  Silo-style regulation of the ICT sector is not viable in the digital world. Collaborative regulation mirrors the interplay between digital infrastructure, services and content across industries and national borders. It also allows for the harmonization of rules and ensures consistent implementation of policy and regulatory frameworks that have evolved independently in many sectors over the years.
- **Development and inclusion have become a primary focus of regulation**

  Collaborative regulation is people-centred regulation – it looks at sustainability and long-term gains as opposed to industry profit maximization and exclusive economic growth. Collaborative regulation champions are also engaged in connecting marginalized individuals, persons with disabilities, low-income communities, communities challenged by educational impoverishment, and remote or isolated populations which may also lack basic infrastructure such as electricity – so there is a need to be much more innovative and collaborative in the approach to policy-making.

The 5 Generations of ICT Regulation – conceptual framework



Source: ITU, 2020

3.2 The G5 Benchmark for regulatory excellence

To afford perspectives on the regulatory road already travelled and on future pathways, ITU developed the G5 Benchmark for regulatory excellence based on GSR Best Practice Guidelines[34] and ITU research and analysis. First conceptualized in 2019 to set out new goals for regulatory excellence, the benchmark is built around an extensive and varied set of indicators and will soon cover all of the ITU Member States[35]. The indicators are clustered into three tracks: collaborative governance, policy design principles and the G5 toolbox. The cross-sector regulatory frameworks captured through the various indicators are pivotal in creating a digital marketplace that is inclusive, sustainable and pro-development and that forms a cornerstone of digital transformation. Box 7 sets out the G5 Benchmark in a nutshell. More in-depth information on the G5 Benchmark can be found in the "Global ICT Regulatory Outlook 2020" report (GIRO 2020).[36]

[34] See in particular GSR Best Practice Guidelines 2019 "Fast forward digital connectivity for all", and 2020 "The gold standard for digital regulation", which set out key principles and recommendations regarding regulatory thought leadership for digital transformation.

[35] The G5 Benchmark will be expanded to cover all ITU Member States leveraging the new refined methodological framework and a new edition will be released ahead of the World Telecommunication Development Conference 2021 (WTDC-21).

[36] https://itu.foleon.com/itu/global-ict-regulatory-outlook-2020/home/

Box 15: ITU G5 Benchmark in a nutshell

What is it?

The G5 Benchmark is a new tool for policy-makers and regulators. It fast tracks collaborative, cross-sector regulation – the best and quickest means to leverage digital transformation for the benefit of everyone. It uses a brand-new three-lens approach, which focuses on collaborative regulation and offers insights that are both surprising and of high value. The G5 Benchmark is the new gold standard for collaboration among regulators.

What does the G5 Benchmark do?

It is a powerful, straightforward tool that makes sense of shifts in regulatory frameworks as policy- makers and regulators navigate a complex digital landscape. It delivers on additional aspects of high value for policy-makers and regulators by:

- setting new goals for regulatory excellence;
- highlighting shortcomings in the pursuit of SDGs and proposing solutions;
- diving deep into policy trends;
- enriching global policy debate.

Why is the G5 Benchmark different?

First, it uses a brand-new three-lens approach, which has a laser-sharp focus on collaborative regulation. Second, three features combined make it especially powerful:

1. *Scope:* Most ITU Member States; all regions; 2018-2019 data.
2. *Ease-of-use:* Straightforward methodology; three regulatory tracks and easy-to-measure indicators; policy-makers can check and update country data, compare with others and run "what-if" projections; easy interplay with the ICT Regulatory Tracker; easy assessment of cross- sector regulatory frameworks and quick identification of "win" opportunities.
3. *Objectivity*: Built on latest data; factual evidence.

What is the three-track approach and why is that important?

The G5 Benchmark is built with simplicity to cut through complexity. It uses three regulatory tracks, or lenses, which together focus in on the DNA of G5 collaborative regulation:

1. *Collaboration*: The very watermark of G5 regulation, this lens focuses on the breadth and depth of cross-sector collaboration between the ICT regulators and their peers.
2. *High-level principles*: This lens focuses on the use of policy principles (which are increasingly replacing rules in policy design).
3. *G5 regulatory toolbox*: This lens focuses on the use of reimagined, innovative policy instruments that "switch on" the digital economy.

Why is the G5 Benchmark especially important at this time?

1. *Regulation is changing as digital markets mature.* Economies undergoing digital transformation in this decade follow a very different path from the paths followed previously.
2. *Existing metrics do not tell the whole story.* The Benchmark's three clear regulatory tracks present new perspectives and new insights that were previously not apparent.
3. *High-level policy design principles are fully taken on board.* Regulation is multi-layered and complex in the digital age – and rules are increasingly giving way to principles.
4. *Collaboration among sector/multi-sector regulators.* Collaboration, the very watermark of G5 regulation, is essential for relevance, coherence and impact.
5. *A benchmark is worth a thousand words.* Policy-makers need a tool that simply and quickly evaluates and models regulatory set-up and tools – comparing apples with apples.

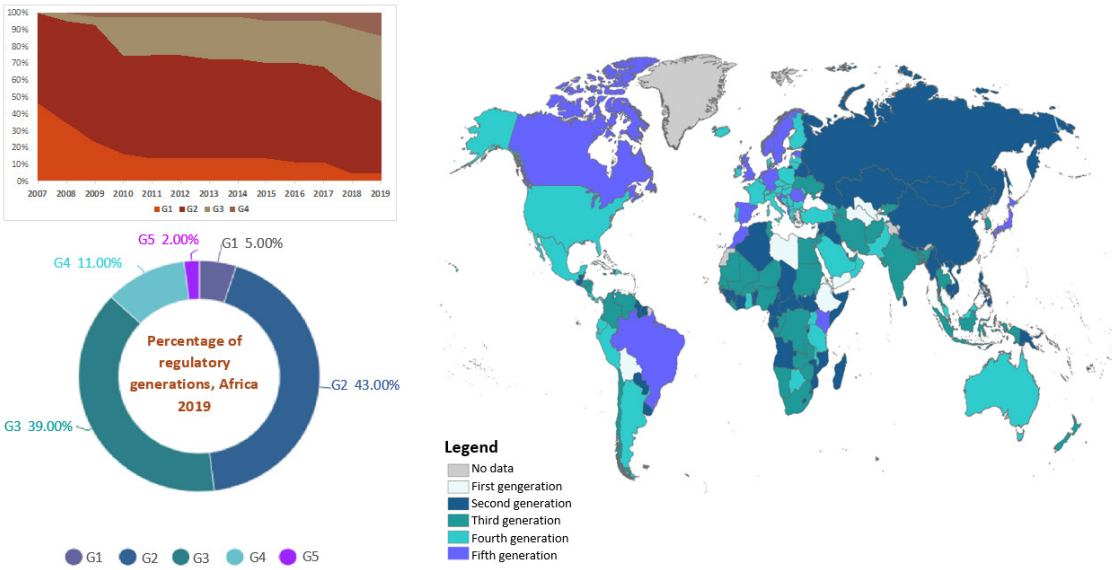
Source: ITU 2020

3.3 Maturity of ICT regulatory frameworks in the Africa region

Africa is the region where regulatory frameworks have evolved the most over the past 10 years. G3 countries have increased steadily in number from 5 per cent to 52 per cent of African countries in slightly over a decade. In 2007, some 47 per cent of African countries were in the G1 category – in 2018, only two LDCs remained in this lowest tier. The evolution of Africa's scores tracks world averages, and tracks above the averages of the Arab States, Asia-Pacific and the Commonwealth of Independent States (CIS).

Much remains to be done, however, to advance G1 and G2 countries to the higher tier: considerable support will be required to ensure these countries move ahead on their journey towards meaningful regulatory reform. In terms of regulatory leaders, Kenya was the only African country in the lead group of G5 regulators in 2019, entering the global top 10 for the first time in eighth position. For the first time in 2019, Africa boasted five top countries in the G4 category: Senegal, Rwanda, Nigeria, Malawi and Uganda form the African group of G4 regulators, with Senegal and Rwanda moving close to reaching G5. Uganda was also the first African country to reach G4, in 2009 (Figure 20). Eight in ten African countries are now in either category G2 or G3, compared with half of the countries in G2 in 2007 and no G3 countries back then.

Figure 20: Evolution of the generations of ICT regulation, Africa, 2007-2019



Source: Based on ITU data, 2020

At the global level, ITU analysis shows that while digital has been gaining ground and shaping regulatory responses, too few countries have to date achieved the maturity needed to trigger its multiplier effect on development and digital transformation – with 9 out of every 10 countries still regulating ICTs as a separate economic sector. However, a vanguard of 8 per cent of countries now have holistic, forward-looking regulatory frameworks in place, enabling digital transformation across their economies. More information and a deep dive into country analysis can be found in the ICT Regulatory Tracker and the Global ICT Regulatory Outlook Report 2020.

Further insights into regional markets, regulatory and tariff policy trends are available on the ITU data portal, the ICT Eye. Regional data are based on official national statistics provided by administrations of ITU Member States through ITU regular surveys, and include ICT statistics, institutional frameworks and governance, market structure, universal access and service policies and price regulation.

In 2021, ITU is launching a series of country case studies on regulatory and institutional frameworks and collaborative governance in selected countries. The case studies will highlight diverse experiences and different policy and regulatory patterns in order to explore the challenges, new ideas and lessons learnt by regulators on the path towards collaborative regulation. The case studies will also focus on developing a better understanding of the role and impact of collaboration and collaborative governance, and the use of new tools for regulating ICT markets. The library of collaborative regulation case studies will be launched at GSR-21 and featured on the ITU website. The findings and insights generated during the process will be integrated into a global project on the transition to collaborative regulation, to be released at WTDC-21. The individual case studies will also be leveraged in other ITU and partner initiatives in the Africa region. Sample case studies are set out in Box 16.

Box 16: Voices from the region - Kenya and Uganda on the journey towards collaborative regulation

In an effort to better understand how regulators are mastering the journey towards collaborative regulation, ITU undertook primary research based on five questions that were sent to regulators. This box highlights how the **Communications Authority of Kenya** and the **Uganda Communications Commission** experienced the journey:

Kenya

- **What is the single most difficult challenge in moving towards collaborative regulation?**

  Lack of awareness of existing regulatory frameworks by key actors and sector regulators.
- **Who are your key counterparts/interlocutors?**

  Government ministries, legislature, the judiciary and law-enforcement agencies, cross-sector regulators, the Central Bank.
- **What are the top three most important actions a regulator can undertake?**

  1. Analyse regulatory gaps
  2. Identify areas for collaboration
  3. Elaborate a strategic plan for collaboration, with concrete outcomes.
- **What is the single most important lesson learned moving forward with a collaborative regulatory approach?**

  Overcoming jurisdictional issues is the first step towards true collaboration.
- **What piece of advice can you give to regulators engaging on a journey towards digital regulation?**

  Maintain transparency and disclosure in corporate governance affairs.

Uganda

- **Single most difficult challenge in moving towards collaborative regulation**

  The slow pace of policy review/development and the capacity of the regulator to handle competition and quality of service issues in rapidly evolving markets and evolving business models.

- **Key counterparts/interlocutors**

  Telecommunication service providers/operators; cross-sector regulators such as the financial and energy regulators; consumer associations; academia/researchers; government ministries, departments and agencies.

- **Top three most important actions a regulator can undertake**

  1. Embark on the review of regulatory frameworks to ensure that they are responsive to technology and business developments.
  2. Identify and address barriers to competition in national ICT markets and carry out periodic industry and market assessments.
  3. Strengthen engagement with key stakeholders and build a common understanding of the roles and responsibilities of each of them.

- **Single most important lesson learned moving forward with a collaborative regulatory approach**

  Stakeholders and partners have a key role to play in the advancement of regulation and its successful implementation. Assessing the economic and social impact of regulatory interventions provides important evidence in the discussions with stakeholders.

- **Piece of advice to regulators engaging on a journey towards digital regulation**

  1. Identify clearly the areas of collaboration and the expectations of all entities involved.
  2. Carry out periodic evaluation of the operational environment so as to ensure that regulations are relevant and supportive of the interests of regulated entities.

Source: Communications Authority of Kenya and Uganda Communications Commission

Box 17: Digital Regulation Handbook and Platform

ITU collects significant information across various domains, including regulatory governance, competition, access for all, consumer affairs, spectrum management, trust and safety, emerging technologies, emergency communications and technical regulation. To provide an easy-to-access gateway to this wealth of information, ITU and the World Bank launched the Digital Regulation Handbook and Platform in 2020, which provides a repository of practical guidance and best practice for policy-makers and regulators across the globe who are concerned with harnessing the benefits of the digital economy and society for their citizens and businesses The content provides an update on the basics of ICT regulation in the light of the digital transformation sweeping across sectors and also includes new regulatory aspects and tools for ICT regulators to consider when making regulatory decisions.

Source: ITU-World Bank Digital Regulation Platform, www.digitalregulation.org

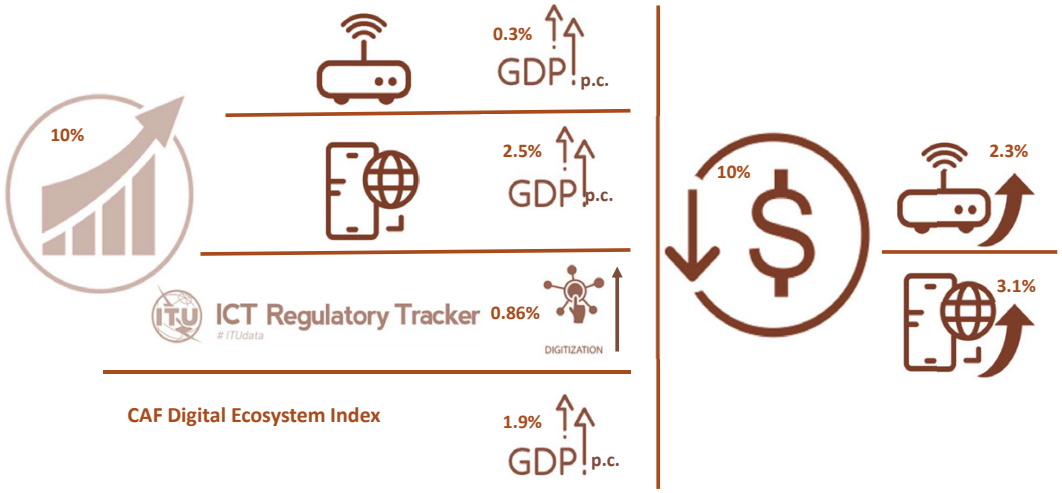
3.4 Economic contribution of broadband, digitization and ICT regulation in Africa

It is without doubt that broadband, digitization and ICT regulation contribute to economic and socio-economic development across the Africa region. The ITU study on "The economic contribution of broadband, digitization and ICT regulation: Econometric modelling for the ITU Africa region" measures the impact of fixed and mobile broadband and digital transformation on the economy as a whole in the region, as well as in how far institutional and regulatory variables contribute to the development of the digital ecosystem.

The results of the study, as summarized in Figure 21, reveal that a 10 per cent increase in mobile and fixed broadband penetration in the Africa region would yield an increase of 2.5 per cent and 0.3 per cent in gross domestic product (GDP) per capita, respectively. Moreover, the report also validated the positive impact of the policy and regulatory component in the region, suggesting that an increase of 10 per cent in the ITU ICT Regulatory Tracker yields a positive increase in the CAF[37] Digital Ecosystem Development Index of 0.68 per cent.

[37] CAF stands for Corporación Andina de Fomento(Andean Development Corporation)/Development Bank for Latin America.

Figure 21: Economic impact of fixed and mobile broadband and digitization, 2019

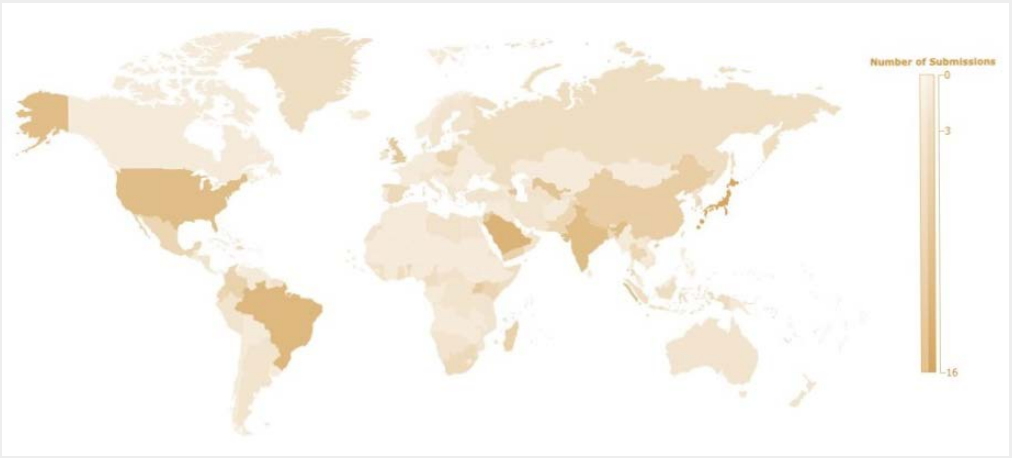


Source: Adapted from the ITU study: "The economic contribution of broadband, digitization and ICT regulation: Econometric modelling for the ITU Africa region", 2019

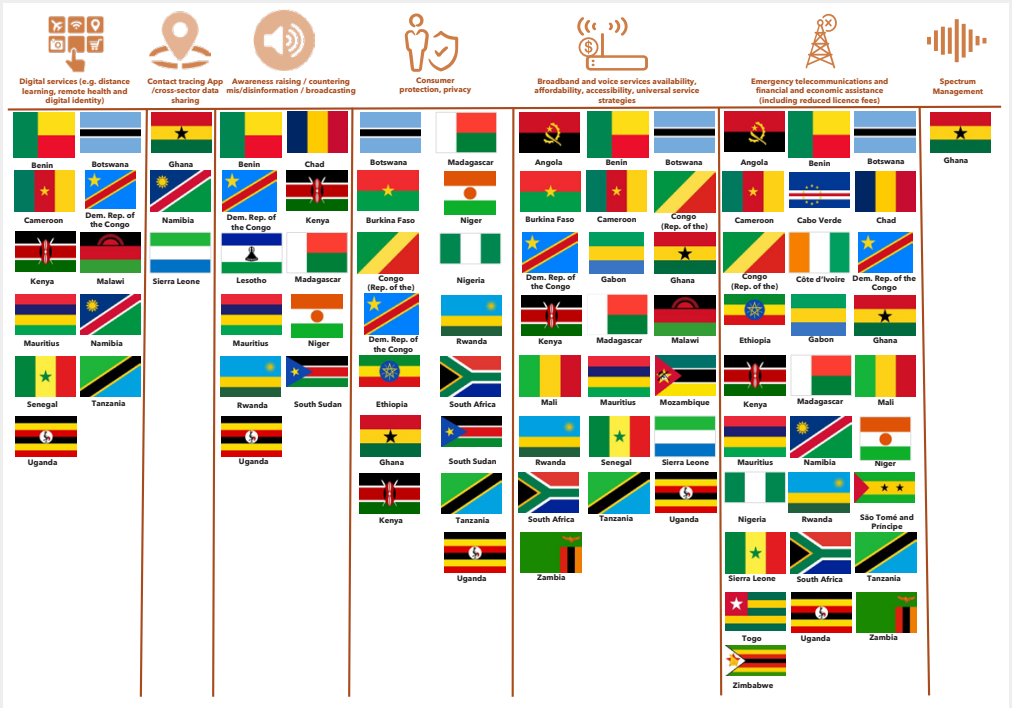
Box 18: COVID-19 Regulatory framework initiatives for the Africa region

The COVID-19 outbreak has led to significant disruptions in economic activity, which has had an impact on all industries, albeit at differing levels. To mitigate the impact of the pandemic, different ICT stakeholders have undertaken a number of emergency steps and initiatives with regard to consumer protection; traffic management and prioritization;, broadband availability, affordability and accessibility; emergency telecommunications; universal service strategies; and quality of service (QoS) and quality of experience (QoE). These responses include increasing broadband capacity and speeds, providing free services to customers, providing information services on COVID-19, network management, allowing more flexible IMT spectrum use, free access to online learning sources, generally easing regulatory requirements on licensees, new fixed wireless access (FWA) networks, addressing misinformation in relation to COVID-19, contact tracing development and government subsidized broadband services.

To provide easy access to this information, ITU has created the Global Network Resiliency Platform (#REG4COVID), where ICT regulators, policy-makers and other interested stakeholders can share information and view the initiatives and measures introduced around the world to help ensure that communities remain connected during the COVID-19 crisis. The map below provides an overview of the number of submissions made to the platform by different countries.



In the Africa region, most countries have made submissions to the platform, with Kenya, Uganda, South Africa, and Madagascar having submitted more than three initiatives across two or more different areas. This is shown in the figure below.



Source: Based on data from ITU https://reg4covid.itu.int/

Industry has been very active in implementing emergency responses to mitigate the impact of the COVID-19 pandemic. A recent GSR Discussion Paper "Pandemic in the Internet Age: communications industry responses," published by ITU in June 2020, explores and summarizes the types of responses by industry stakeholders.[1] The tables below, taken from that report, show selected responses by operators and content and online service providers.

Common short-term Initiatives by operators

Initiative	Description
Additional data allowances	Many fixed operators, MNOs and wholesale providers have offered to provide their customers with additional data allowances as businesses and schools across the world transition to working remotely, due to the spread of the COVID-19 virus.
Increasing broadband speeds	Operators have upgraded Internet speeds – including transmission and backhaul capacity - to better accommodate the unprecedented number of people working and learning from home.
Relaxing of payment terms	Operators have relaxed payment terms including downgrade plans/vouchers, payment of monthly invoices, and prepaid voucher validity dates.
Providing free services	MNOs have also commenced a variety of other initiatives for their customers, many at no extra cost. These include free access to networks and waiving overcharge fees.
Free access to online learning/education resources	In order to support distance learning and home-schooling during school closures, access to remote learning opportunities and educational platforms has been made available at no cost by a number of operators.
Free access to health/government information	Operators are providing free access to information available on government and social welfare websites, as well as to websites containing health information relevant to the coronavirus crisis.
Facilitating mobile money transactions	Telecommunication companies (and banks) are encouraging consumers to avoid cash payment in favour of digital transactions to prevent the spread of COVID-19.
Going digital in terms of recharges etc.	MNOs have facilitated prepaid mobile recharges being made online rather than through physical scratch cards etc. to improve connectivity during any lockdowns.

Source: ITU REG4COVID database and selected industry sources, 2020

Selected COVID-19 related initiatives by content and online service providers

Initiative	Description
Lifting time limits in video calls	**Zoom** has lifted time limits on its video calls for the free versions in China, as well as for schools in Japan, Italy, and the United States, by request.
Reducing network demands	**Netflix** and **Youtube (Google)** reduced the resolution of their video content to assist in reducing the peak network demands on fixed and mobile networks experiencing additional COVID-19 demand.
Developing new technology	**Apple** and **Google** announced their partnership to develop a contact tracing technology to reduce the spread of COVID-19. The two companies have launched a comprehensive solution that includes application programming interfaces (APIs) and operating system-level technology to assist in enabling contact tracing. Given the urgent need, this solution is being implemented in two steps while maintaining strong protections around user privacy.
Range of free services including but not limited to:	**Microsoft** is offering anyone its premium version of Teams for free for six months and has lifted existing user limits on its free version. The premium Teams product was already available for no extra cost to those who pay for the Office Suite, and Teams had already been free for many schools.
	Google announced that it would offer its enterprise videoconferencing features – for example, larger meetings of up to 250 people and the ability to record – for free to G Suite and G Suite for Education customers until 1 July 2020.
	LogMeIn is making "Emergency Remote Work Kits" available for free for three months. Those kits are designed for non-profit organizations, schools, and health care organizations that are not already customers. The kits include GoToMeeting, GoToWebinar - where users can host presentations for up to 3 000 users- and LogMeIn, which provides remote desktop access from numerous devices.
	Cisco is offering the free version of its Webex service with no time restrictions. In addition, it will allow up to 100 meeting participants and has added toll-free dial-in features with a 90-day licence for businesses that are not already customers.
	Slack already offers a free tier, but the company is offering live Q&A and webinars to get the influx of new users up to speed.

Source: ITU REG4COVID database and selected industry sources, 2020

[1] https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Pages/default.aspx

4 Opportunities and challenges of digital transformation

To harness opportunities and meet the challenges of digital transformation, the Telecommunication Development Bureau (BDT) fosters international cooperation and solidarity in the delivery of technical assistance and in the creation, development and improvement of telecommunication and ICT equipment and networks in developing countries. The ten areas of action (also referred to as "thematic priorities") of the ITU Telecommunication Development Sector (ITU-D) guide and shape the work of BDT and contribute to achieving its objectives. The areas of action cover capacity development, cybersecurity, digital inclusion, digital innovation ecosystems, digital services and applications, emergency telecommunications, environment, network and digital infrastructure, policy and regulation, and statistics. Across these areas, many initiatives, projects and programmes are conducted that take the shape of direct technical assistance to Member States or capacity building initiatives such as events or workshops, often in collaboration with other stakeholders including Sector Members, Academia or other international organizations.

The ITU Regional Office for Africa represents the Union in Africa as well as within the UN Development System, the UN Economic Commission for Africa, the African Union and

international organizations and other stakeholders in the region. The Regional Office serves to bring ITU services closer to the membership in Africa. With a presence in Addis Ababa, Dakar, Harare and Yaoundé, the Regional Office provides assistance to the 44 Member States in the region. Enabling and accelerating digital transformation is at the heart of the work on the continent. Working in partnership is critical to advancing digital development and to bringing emerging technologies and digital solutions in areas such as government, education, health and finance, which can only be achieved as a collective effort. Through its work on the continent, ITU supports the implementation of the African Union's Digital Transformation Strategy for Africa (2020-2030) as a blueprint and master plan for transforming Africa's economy and societies. The work in the region further responds to the UN Secretary-General's Roadmap for Digital Cooperation, where emphasis is placed on the need to (a) build an inclusive digital economy and society; (b) develop human and institutional capacity; (c) protect human rights and human agency; (d) promote digital trust, security and stability; and (e) foster global digital cooperation.

Emerging technologies are transforming sustainable development across all sectors and industries. However, these constantly evolving technologies also carry the risk of widening the societal and economic gaps between those who are connected and those who are not. With the COVID-19 pandemic, it has become increasingly clear that when one needs connectivity for education, for work and for health services, the importance of connectivity is further elevated.

4.1 Developments under the regional initiatives for Africa

A number of initiatives have been undertaken across the Africa region within the scope of the ITU-D thematic priorities. These initiatives are fully aligned with, and implemented under, the ITU regional initiatives for Africa. As illustrated in Box 19, there are five regional initiatives for Africa: building digital economies and fostering innovation in Africa; promotion of emerging broadband technologies; building trust and security in the use of ICTs; strengthening human and institutional capacity building; and management and monitoring of the radio-frequency spectrum and transition to digital broadcasting. The box also provides an overview of the key initiatives and projects carried out in the period 2018-2020, some of which are discussed in more detail in the sections below.

A detailed description of all initiatives undertaken by the ITU Regional Office for Africa can be found on the ITU Projects website.

Box 19: Africa regional initiatives, 2018-2021 – Definition, objectives and ongoing projects

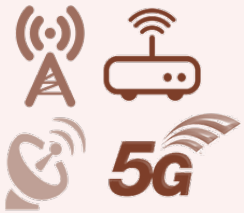
The **five Africa regional initiatives** contained in the Buenos Aires Action Plan issued at WTDC-17 set the roadmap which the ITU Regional Office for Africa follows. These initiatives provide all stakeholders with a path for ICT development, in agreement with governments.

AFR RI 1: Building digital economies and fostering innovation in Africa

Objective: To build digital economies and foster innovation in Africa. Countries in the Africa region are in need of interventions that would help them transform into digital economies. It is necessary that ITU assist Member States in the Africa region to reap the full benefits of the digital economy by addressing the emerging policy and regulatory challenges. In line with growing digital economies, information and communication technology (ICT)-based innovations, which have demonstrated their potential to contribute to the socio-economic development of countries, are also growing. ITU is called upon to support Member States in the Africa region to build more effective ICT-based innovation ecosystems.

Ongoing projects under RI 1:

- Be Healthy Be Mobile mDiabetes project and other projects around digital health services to accelerate achievement of related SDGs.
- ITU-WHO Digital Health for Africa project.
- African smart villages initiative with country projects.
- ITU Digital Innovation Ecosystems initiative.
- ITU-EIF Tech as a Driver of Women's Economic Opportunity project.



AFR RI 2: Promotion of emerging broadband technologies

Objective: To promote emerging technologies to assist the Africa region in securing the full benefits of high-speed, high-quality broadband.

Ongoing projects under RI 2:

- ITU-UNICEF Giga Africa - Connecting every school to the Internet.
- ITU Global Network Resiliency Platform (#REG4COVID) with updates from Africa.
- Connect2Recover national implementation.
- ITU project on ensuring continuity of learning for the most vulnerable children and youth in Senegal.

AFR RI 3: Building trust and security in the use of telecommunications/information and communication technology

Objective: To assist Member States in developing and implementing policies and strategies, standards and mechanisms to enhance the security of information systems and networks, ensure interoperability of digital technologies, protect data and people and guarantee digital trust. To protect information and communication technology (ICT) and its applications.

Ongoing projects under RI 3:

- ITU Child Online Protection Guidelines in Africa and related national implementation.
- ITU CIRT implementation support (Kenya, Botswana, Malawi, Burundi, Gambia).

AFR RI 4: Strengthening human and institutional capacity building

Objective: To strengthen human and institutional capacity building in the Africa region. Countries in the Africa region are in dire need of human and institutional capacity-building interventions that would help them transform society as a whole in preparation for the emerging digital socio-economic environment. The Africa region therefore seeks ITU's assistance in enhancing the region's capacity to effect this transformation. Although some training institutions in Africa that provide information and communication technology (ICT)-related training and capacity building to the membership already exist, there may be a need to enhance their capacities.

Ongoing projects under RI 4:

- ITU Centres of Excellence (CoEs) in Africa.
- ITU Digital Transformation Centres initiative in Africa.
- ITU-ILO-AU programme on boosting decent jobs and enhancing digital skill for youth in Africa's digital economy.
- ITU African Girls Can Code initiative (AGCCI) with partners (UN WOMEN, UNECA and others).

AFR RI 5: Management and monitoring of the radio-frequency spectrum and transition to digital broadcasting

Objective: To assist Member States in ensuring the transition to digital broadcasting and efficient and economical management of the radio spectrum and orbital resources.

Ongoing projects under RI 5:

- ITU-AU-EU joint Policy and Regulation Initiative for Digital Africa (PRIDA) project provides technical assistance, capacity building, events and workshops on spectrum and broadband.

Source: ITU Office for Africa

In order to implement regional initiatives successfully, an approach that matches seed funding from the ITU operational budget with funds mobilized for projects was adopted to help develop more comprehensive approaches that would have national, subregional and regional impact.

The ten ITU-D thematic priorities also serve to guide implementation of the regional initiatives. Increasingly, members in the region are basing their requests for assistance on the thematic priorities they deem more relevant, depending on the challenges of the moment. This has resulted in targeted interventions and the provision of appropriate products and services for several regional initiatives and thematic priorities.

Across the regional initiatives, resource mobilization remains a major challenge for project implementation in the Africa region. Diverse modes of partnerships have been considered to explore and scale with a view to reaching more people with affordable and safe access to the Internet and the associated digital skills.

4.1.1 Building digital economies and fostering innovation towards digital transformation in Africa - AFR Regional Initiative 1

Expectations and approach

The activities and projects under Regional Initiative 1 have been undertaken with the aim of enabling the use of digital solutions across various sectors to unleash the full potential of ICTs and foster innovation, while capitalizing on existing solutions to develop sustainable cross-cutting solutions in Africa. This has involved engagement with different stakeholders in various areas such as education, health and agriculture in order to understand the needs from the grassroots level using a bottom-up approach and identify innovative approaches that can create an enabling environment to accelerate the use of digital technologies to facilitate the transition process towards a digital economy in the Africa region.

Some of the innovative approaches have involved developing common digital platforms, building a capable workforce to use ICTs effectively, and addressing the need for multi-stakeholder partnership models that can facilitate innovation and adoption of digital services and strengthen digital economies in the region to achieve sustainable development.

Results and impact

The activities undertaken have helped to boost the implementation and scaling up of digital solutions at national level, with emphasis on country priorities. They have also supported the development of appropriate digital strategies, roadmaps and blueprints. Thanks to the development of common digital platforms, it has been possible to deploy and scale up integrated digital services and improve their delivery to citizens using a whole-of-government approach. Strengthening the capacity of local stakeholders for efficient use of digital resources and facilitating the development of best practices have also contributed significantly to building digital economies in the region. Examples of the actions undertaken include the development of a blue print for smart villages; the development of a digital health training curriculum; the development of digital innovation profiles; country baseline assessments to facilitate digital government and digital financial inclusion for Ethiopia; and capacity building workshops in Lesotho and Benin to support the development of e-health strategies.

4.1.2 Leveraging emerging broadband technologies towards digital transformation in Africa - AFR Regional Initiative 2

Expectations and approach

In implementing the programmes under Regional Initiative 2, emphasis is placed on strengthening the capacity of Member States to create the enabling policies and strategies required to attract investment in broadband networks, including the harmonization of broadband plans at regional level. A number of tools have been developed at the global level and range from an ICT infrastructure business planning toolkit, a report on Connecting Humanity to a report on Connecting Africa Through Broadband: A strategy for doubling connectivity by 2021 and reaching universal access by 2030. These tools have been localized through capacity development and knowledge sharing platforms such as the ITU Centres of Excellence network and the ITU Academy, coupled with strengthening of partnerships to connect critical sectors such as health and education.

Connect2Recover is an example of enhanced partnerships and collaboration in the region. As a global initiative, Connect2Recover aims to reinforce the digital infrastructure and ecosystems of beneficiary countries, initially focusing on Africa, which has the least connected countries. Its objective is to provide means of utilizing digital technologies for teleworking, e-commerce, remote learning and telemedicine in the wake of the COVID-19 pandemic.

Results and impact

Today, more countries (64 per cent) in the Africa region have either a national overarching policy or an ICT master plan, compared to less than 40 per cent five years ago and more countries (57 per cent) have specific broadband plans[38]. Through a wide range of partnerships with governments, the private sector and the development community, a number of programmes and projects that promote emerging technologies in information and service delivery in health, education, agriculture, among other sectors, have been undertaken to stimulate growth and help to close the access gap. These advances have, to some degree, enabled business continuity and enhanced service delivery during the COVID-19 pandemic.

4.1.3 Fostering security and trust for a safer cyberspace in Africa - AFR Regional Initiative 3

Expectations and approach

As technology continues to spread and evolve rapidly, cybersecurity is a critical component to ensuring the proper functioning of essential services, security of individual devices, shared networks, individuals, and entire global systems. Overall, ITU fosters a holistic approach to cybersecurity that contributes to achieving the mandate of building confidence and safety in cyberspace for the Africa region, in accordance with WSIS Action Line C5 and Regional Initiative 3.

In policy and regulation, ITU assists countries in tackling issues such as data protection, privacy, and electronic transactions so that clear guidelines can be implemented. ITU also assists

[38] ITU regulatory survey 2019

countries in harmonizing policies and regulation at subregional and regional levels, which are essential for the digital economy to flourish in Africa.

Results and impact

Different actions under Regional Initiative 3 implemented during the past few years have aimed at creating a trusted cyberspace for all. With a focus on fostering safety online for children, the child online protection initiative and its regional approach aim to provide tools and guidelines for developing measures to protect children, as they are among the most vulnerable people in cyberspace. The ITU Global Cybersecurity Index (GCI) highlights areas for improvement in cybersecurity culture at national and regional levels. ITU has provided support to countries in accelerating the development and adoption of sound national cybersecurity strategies and comprehensive action plans to promote cybersecurity awareness, coordination and collaboration to enable digital transformation.

The support to countries in establishing their national computer incident response teams (CIRTs) has ensured that a country can establish a national trusted body that contributes to cybersecurity awareness and supports the implementation of measures to enhance security of critical information infrastructures networks, data centres and others. Annual cyberdrills, with participation from across African countries, contribute to strengthening collaboration and communication between national CIRTs, and enhance the regional CIRT network. As a result, more countries in Africa have national cybersecurity strategies, national plans or policies, response teams and specific legislation to counter threats.

4.1.4 Capacity development as a key enabler for digital transformation in Africa - AFR Regional Initiative 4

Expectations and approach

When implementing activities under Regional Initiative 4, the focus has been on two things:

1) First: **understanding the specific capacity development needs** and tracking their evolution since WTDC-17 in the light of emerging new technologies and the increased use of specific platforms and services to get a sense of how these factors are changing user behaviour.
2) Second: **developing appropriate interventions** (events, activities and tools) and **formulating projects** and **exploring partnerships** to address those evolving needs.

Some of the tools that have been developed at the global level, for example the Digital Skills Assessment Guidebook, the Last-Mile Connectivity Guide and the Child Online Protection Guidelines, have also been launched at the Africa regional level and put into practice through capacity development activities within the scope of new and ongoing projects and initiatives.

In early 2020, the launch of the first phase of the ITU Digital Transformation Centres initiative, with four initial centres in Africa and their national networks (Ghana, Côte d'Ivoire, Zambia and Rwanda) marked an important milestone **in establishing and enhancing regional institutional capacity that is inclusive.**

To strengthen digital capacity building, skills development and training interventions have been delivered in French and English across the continent through face-to-face interventions and virtual training opportunities with development partners, private-sector partners and academia.

Results and impact

The Digital Transformation Centre networks were only launched in early 2020, and are therefore yet to realize their full potential in terms of advancing national development goals and providing support across all areas that are considered under the SDGs. These networks are still ramping up their work to deliver basic digital skills training to enhance digital literacy and foster the uptake of digital tools among those at the bottom of the social pyramid; offer intermediate digital skills training to provide users with job-ready skills, improve workplace efficiency and enhance chances of employability; improve the capacity of policy-makers to design and implement digital skills programmes; provide train-the-trainer programmes on digital skills to ensure scalability and self-sustainability in digital skills capacity development; and train SMEs in digital technologies, innovation and entrepreneurship.

The ITU Centres of Excellence network, with six centres in Africa following a relaunch for the 2018-2022 cycle, aim at providing training on specific thematic areas of focus. Under the umbrella of the ITU Academy platform, the regional networks are brought together into a single global network, sharing expertise, resources and capacity building know-how in telecommunications and ICT training/education. The platform is updated continuously with new resources, training partners and face-to-face and virtual courses.

Digital skills are not only critical to finding or keeping jobs, they are also critical to closing the digital divide. In addition to the platforms and initiatives mentioned here, a number of dedicated activities have been undertaken to meet specific capacity development challenges in countries with customized curricula and training modules for specific target groups: for example in a regulatory body or ministry, or judiciary, and among marginalized populations in the communities, such as girls and youth.

4.1.5 Facilitating efficient spectrum management for affordable connectivity to enable digital transformation - AFR Regional Initiative 5

Expectations and approach

Regional Initiative 5 was intended to assist Member States to ensure not only a smooth transition from analogue to digital broadcasting, but also efficient management and economical use of the radio-frequency spectrum and orbital resources in order to support the development of new services. To achieve this, the focus has been defining conditions for the allocation and use of the "digital dividend" and developing spectrum-management plans at national, regional and global levels, including for the transition to digital broadcasting. In direct response to the results expected from Regional Initiative 5, a number of tools have been developed on a global level (Setting the scene for 5G – Opportunities and challenges) to support and strengthen the capacities of Member States in spectrum management. These tools have been customized for the Africa region through the establishment of a training and knowledge exchange platform (Spectrum Management Training Programme).

The Policy and Regulation Initiative for Digital Africa (PRIDA), which falls under Regional Initiative 5, is a three-year multi-partner project of the African Union, the European Union, and ITU. PRIDA aims to foster universally accessible and affordable wireless broadband across the Africa region in order to unlock future benefits of Internet-based services.

Results and impact

Direct assistance was extended to a number of countries (Zambia, Gambia, Malawi, Côte d'Ivoire, Liberia, Namibia, Ethiopia, Ghana) on issues ranging from spectrum monitoring, allocation, and pricing to cross-border coordination and harmonization. In addition, more than 580 stakeholders from over 50 countries strengthened their capacities, following their participation in a number of training courses under the ITU Academy and the ITU Centre of Excellence platforms, as well as in regional and national forums. Thanks to these activities, Member States in Africa are increasingly making the transition to digital terrestrial television broadcasting (see ITU DTT Transition Portal), with advances at national level and improved national and regional coordination and harmonization of approaches.

4.2 Regional initiatives: Areas of challenge

Although the region has made much progress, some long-standing challenges remain, and new ones have emerged over the past three years. In the context of each regional initiative, the main challenges encountered, based on ITU experiences and research, are outlined in Figure 22.

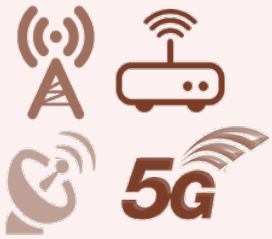
Figure 22: Regional initiatives - Areas of challenges

AFR RI 1: Building digital economies and fostering innovation in Africa

Challenges:

- While ICTs are transforming rapidly how various services are delivered, most countries in the Africa region have not fully leveraged the power of digital technologies to support their innovation and transformation into digital economies. Most of the challenges are related to a high level of fragmentation of existing services that lead to duplication of systems.
- Lack of relevant digital skills/expertise and insufficient resources limit the capability of local stakeholders to drive the adoption and scaling up of digital services with poor coordination and harmonization of the digital ecosystem.
- Limited and high cost of connectivity and devices and operational costs also impede innovation and the implementation and scaling up of digital services, which further challenges digital transformation.
- Although the ICT sector is the biggest source of big data and driver of data technologies, the region is yet to fully unlock data and the potential of data analytics. Setting strategic foundations for a data-driven digital transformation is critical for Africa.

(continued)



AFR RI 2: Promotion of emerging broadband technologies

Challenges:

- Citizens in Africa still lack access to meaningful and affordable connectivity to the Internet, even in critical sectors (health, education, trade, tourism and agriculture, among others).
- High cost of broadband connectivity due to multifaceted supply constraints such as spectrum availability and cost; policy and regulatory inertia; high tax burdens; limited coverage of reliable electricity, among other factors, impeding the scaling up and adoption of new broadband technologies.
- Demand-side impediments such as low digital skills/expertise, inadequate content, use cases; local digital innovation and platforms collectively suppress commercial viability and incentive to invest in new broadband technologies.

AFR RI 3: Building trust and security in the use of telecommunications/information and communication technology

Challenges:

- Today, more than 640 million Africans are online, meaning that nearly 640 million people benefit from the digital services offered. However, the negative ramifications of ineffective cybersecurity, especially in the Africa region where only 21 countries have established their computer incident response teams, can have a direct impact on those who are connected and an indirect impact on many more.
- Cybersecurity has become a cornerstone in today's world to guarantee confidence, safety and security in cyberspace for a viable digital economy. However, it is also recognized that the developing world often lacks resources to put in place the necessary structures to strengthen the resilience of networks and IT assets in general.
- Additional deficiencies such as the lack of resources to continue building capacity for all stakeholders of the ICT sector, failure to adopt appropriate policies and strategies at national and subregional levels constitute concerns that need to be addressed thoroughly.

AFR RI 4: Strengthening human and institutional capacity building

Challenges:

- Across all the capacity development initiatives and activities aimed at strengthening human and institutional capacity in the region, there is a sense that more needs to be done to scale up initiatives that have proven to be impactful among the constituents.
- To accelerate the much-needed impact at all levels of society – from digital skills for primary school children to the appropriate technical skills for professionals and digital literacy for everyone in the community – immediate and coordinated action is needed. There is also a need to rethink the role of partnerships in capacity development on the continent to ensure the achievement of all the SDGs.

(continued)

AFR RI 5: Management and monitoring of the radio-frequency spectrum and transition to digital broadcasting

Challenges:

- Lack of regional harmonization, weak coordination and institutional capacity in the Regional Economic Communities (RECs).
- The digital switchover is not completed in many of the countries within the region. Digital dividend spectrum, given its technical features, will be crucial in addressing current and future broadband connectivity needs and expansion to rural and underserved areas.
- Incomplete or inadequate legal and regulatory spectrum management framework and licencing to create an attractive environment that will facilitate the emergence of a modern communications system.
- Absence of/non-updated harmonized National Frequency Table of Allocation in some countries, which creates concerns of transparency and predictability. Many countries have not developed roadmaps for the release of frequency bands including for IMT-2020. Examples could be drawn from countries and regions that have completed this process.
- Adequate tools and monitoring facilities for effective planning and management of spectrum and limited mechanisms for countries to share information and experiences to support the strengthening of capacities.

Source: ITU Office for Africa, and https://www.worldbank.org/en/region/afr/overview

4.3 Regional initiatives: Areas of opportunities

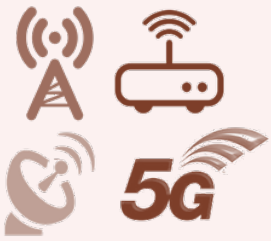
Digital transformation will make a tremendous difference for people on the African continent as it constitutes an opportunity to boost economic growth and industrialization, alleviate poverty and improve people's lives. Figure 23 describes areas of opportunities in all five regional initiatives and how digital technology can drive innovation, economic growth and job creation in key sectors of the economy, while giving a boost to the development of digital skills to ensure that no one is left behind in the digital economy.

Figure 23: Regional initiatives - Areas of opportunities

AFR RI 1: Building digital economies and fostering innovation in Africa

Opportunities around building digital economies and fostering innovation

- Build strategic partnerships with multistakeholders across various sectors to facilitate coordination and harmonization of the digital ecosystem to strengthen digital economies.
- Invest in a whole-of-government approach that fosters innovation and enables the deployment and scaling up of integrated digital services, particularly in rural communities.
- Leverage available best practices to strengthen the capacity of local stakeholders at national levels for efficient use of digital technologies to foster digital innovation and ecosystem building.
- Develop appropriate policy and regulatory frameworks to create an enabling environment for digital economy uptake.
- Scale up and promote the development of digital services through cross-cutting initiatives to facilitate the adoption of innovative and impactful solutions and accelerate the achievement of the Sustainable Development Goals.
- Collect and analyse data for informed decision-making.
- Explore new areas to create jobs and build sustainable digital economies, in e-waste management and other areas of the circular economy.



AFR RI 2: Promotion of emerging broadband technologies

Opportunities around promoting emerging broadband technologies

The increased demand for resilient digital infrastructure to support business continuity, trade and access to basic services such as education and health is enabling new partnerships, business models and technical solutions. This calls for increased:

- Harmonization of policy and regulatory regimes to create certainty and build economies of scale to attract massive infrastructure investment in Africa.
- Flexibility in regulatory regimes and adoption of ecosystem collaboration on key supply and demand initiatives ranging from supporting content creation to the development of use cases to facilitate the adoption of new technologies and platforms.
- Conformity and interoperability of networks to enable full benefits of high-speed, high-quality broadband connectivity.

(continued)

AFR RI 3: Building trust and security in the use of telecommunications/information and communication technology

Opportunities around a safe and trusted cyberspace for all

- Education and awareness are vital for a safe and secure cyberspace for all. With cyberawareness and the appropriate skills, Africa's youthful population can, in an informed manner, drive technology adoption and use across the continent.
- Child Online Protection (COP) needs specific attention by countries. This could, for instance, encompass creating synergies of actions among COP stakeholders, while putting emphasis on a regional approach and coordination, and partnerships at technical and financial levels to not only acquire the required expertise, but also mobilize funding to implement COP-related strategies.

AFR RI 4: Strengthening human and institutional capacity building

Opportunities in capacity development for digital transformation

Ensuring inclusion and wide adoption across nations requires that some of the enablers are in place:

- Decent job and entrepreneurship opportunities have, as a prerequisite, certain basic digital capacity. By raising the level of skills across all levels in society also allows for the development of new job opportunities in nascent domains across sectors.
- There is a need to stress the importance of needs-based capacity development that is based on the skills needs in society, in government, in enterprises and in other economic and value creating domains.
- Significant value can be created by leveraging existing initiatives, deploying holistic and inclusive approaches that bring together existing initiatives and entities at the national, subregional and regional levels.
- Technologies can be used to increase existing efforts and good practices to expand digital skills and literacy to all.
- Raising investment for capacity development will be critical going forward.

(continued)

AFR RI 5: Management and monitoring of the radio-frequency spectrum and transition to digital broadcasting

Opportunities to facilitate efficient spectrum management for affordable connectivity

- Complete the switchover both in 700 MHz and 800 MHz frequency bands to free radio frequencies for mobile broadband services, drawing on lessons from countries that have moved on to digital broadcasting and establish a harmonized regional or African table of frequency allocation under the aegis of ATU.
- Develop and harmonize roadmaps for the release of frequency bands for cellular and wireless broadband, within the region with specific timelines, including for IMT-2020.
- Strengthen regional organizations in order to develop and promote the coordinated regulatory frameworks mentioned earlier.
- Adopt transparent and non-discriminatory spectrum management policies in order to ensure adequate availability of spectrum, provide regulatory certainty to promote investment, and improve national regulatory instruments and tools.
- Embrace technology neutrality to maximize innovation, create conditions for the development of broadband services, reduce investment risks and stimulate competition among different technologies.
- Adopt spectrum price efficiency models to foster the provision of innovative broadband services at affordable prices and minimize unreasonable costs which are barriers to entry.
- Provide effective and timely spectrum use and equipment authorizations to facilitate the deployment and interoperability of infrastructure for wireless broadband networks.

Source: ITU Office for Africa

5. Conclusion

The Africa region has seen continued (albeit slow) growth in most areas of ICT infrastructure, access and use. Yet many challenges persist that have been magnified by the COVID-19 pandemic. Lack of meaningful and affordable connectivity is the key impediment to rapid progress.

Mobile network coverage stands at 88.4 per cent, with 3G network coverage at 77.4 per cent and 4G network coverage at only 44.3 per cent. Internet use by individuals is still below 30 per cent, Internet access at home stands at 14.3 per cent and only 7.7 per cent of households had access to a computer at home. This shows that there is a significant use gap, where individuals who live within the footprint of a network are not using the Internet because of lack of affordability, skills or meaningful/quality access. Internet access using mobile broadband totalled 33.1 per cent and use of fixed broadband remains very low. The highest percentage of Internet use was among the 15- to 24-year-olds at 39.6 per cent. One of the key issues to be addressed is affordability. Only one country, namely Mauritius, meets the UN Broadband Commission target of 2 per cent of GNI per capita for both mobile and fixed broadband, with Gabon and the Seychelles each meeting the target for either, mobile or fixed broadband.

The digital divide persists, with rural Internet access by household at 6.3 per cent at the end of 2019 compared with 28 per cent of urban households and a widening gender gap compared to the previous year, with a 16.9 percentage-point difference between women's and men's Internet use. This highlights the need for more targeted initiatives to bring women online. Data on achieved levels of basic, standard and advanced ICT skills are very limited. Data from selected countries show that a significant skills gap exists in the Africa region across all skills categories, with great variation among the selected countries. However, many countries do not collect data on ICT skills. Increased efforts in data collection are key to addressing the skills gap going forward.

In the area of cybersecurity, some progress has been made in the legal pillar, with most African countries having put in place cybercriminal legislation and cybersecurity regulation.

In terms of ICT infrastructure development and integrated technologies such as AI, IoT and cloud computing, there is still ample room for development, which hinges on progress with regard to Internet adoption through infrastructure, demand-driven expansion and key reforms in the areas of data collection and data privacy, infrastructure, education and governance. A home-grown AI community is on the rise and has attracted international attention and investment. Some successful AI deployments at scale are taking place in the areas of financial services, agriculture and health care.

The COVID-19 pandemic has had a profound impact on Africa and has pushed consumers and businesses alike, as well as governments to adopt digital services and technologies (where digital access was available), accelerating digital transformation and changing the mindset on advanced network technologies such as 5G. The COVID-19 pandemic has brought a surge in demand and network congestion on both mobile and fixed networks, as people have shifted to work from home and access more entertainment and education resources online, highlighting areas that require increased attention.

Where positive ICT developments have emerged, they have been underpinned and accompanied by steady improvements in regulatory frameworks that are increasingly based on a new regulatory paradigm of collaborative regulation.

Many projects, programmes and initiatives have been undertaken jointly by ITU-D and Member States across all five ITU regional initiatives for Africa, which cover building digital economies and fostering innovation in Africa; promoting emerging broadband technologies; building trust and security in the use of ICTs; strengthening human and institutional capacity building; and managing and monitoring of the radio-frequency spectrum and transition to digital broadcasting. The outlook for the African ICT market appears positive, if systemic weaknesses laid bare by the COVID-19 pandemic, in particular, and the region's priorities are addressed urgently. The Africa region together with the ITU Office for Africa stand ready to build on the progress achieved and to address challenges where these persist.

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