The State of Broadband in Africa

September 2025

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1 Introduction

The sub-Saharan African region had a population of 1.24 billion in 2023 and comprises 44 ITU Member States – including 24 classified as least developed countries (LDCs), five as small island developing States (SIDS) and sixteen as landlocked developing countries (LLDCs).

Africa's vast geography is immensely varied, with countries differing greatly in population size and density, urbanization and access to resources. LLDCs lack direct access to the sea, which usually adds additional transit costs to international Internet connectivity, making Internet access considerably more expensive. Africa faces considerable challenges in economic development, compounded by ongoing conflicts in some countries and regions, with a number of countries in debt distress and growing vulnerability to natural disasters and climate change over time.

Many African LDCs have largely agrarian economies, with large, sparsely populated land areas, which makes the roll-out of terrestrial communication infrastructure to remote areas more challenging. Internet uptake differs considerably, between Internet usage rates over 60% in the more developed economies to around 10% in Africa's least developed economies.

Africa is also home to one-third of the global youth population (a trend sometimes referred to as the 'demographic dividend'). Although this youth surge generates pressure on governments in terms of education, job creation and housing, it also means that Africa has an energy, hope and aspirations other continents struggle to match. Africa's many promising and entrepreneurial start-ups are offering – and taking advantage of – opportunities both directly *within* the ICT sector or more remotely, *via* the Internet.

Investments in digital technologies are growing, with opportunities for technological leapfrogging. The limited availability of fixed broadband infrastructure partly explains the mobile sector's runaway growth. Going forward, the development of new integrated handsets and Direct-to-Device (D2D) satellite services may impact the mobile sector by lowering the cost of satellite services for rural populations.

2

Investment in Infrastructure

Unsurprisingly, African national governments are among the key investors in infrastructure in Africa, accounting for an estimated 35-45% of total African infrastructure financing over the period 2016-2020, according to the Infrastructure Consortium for Africa (ICA)[1].

Governments have embraced and understood the need for Information and Communication Technology (ICT) infrastructure and included it in many of their national policy agendas, from National Broadband Plans to Digital Agendas, and, more recently, AI strategies and data governance frameworks. Governments have also generally sought to make licensing and legislation more investor and user-friendly.

In terms of Foreign Direct Investment (FDI) from abroad, FDI flows into Africa accounted for a relatively small 3.5% of total global FDI, but levels declined to US$45 billion in 2022 from a record of US$80 billion set in 2021 (mainly due to a corporate restructuring in South Africa in 2021)[2]. Investment within the continent remains strong – according to UNCTAD's World Investment Report 2023, three-quarters of the value of projects invested in by only African multinational corporations remained on the continent. The UK, France and the Netherlands remained the three largest holders of African FDI stocks, prior to the pandemic.

In nominal terms, ICT infrastructure remains a relatively small proportion of Africa's total infrastructure needs, even if it accounts for a large number of deals. Prior to the pandemic, the African Development Bank (AfDB) had estimated that Africa's infrastructural needs for the continent as a whole could amount to annual outlays of between US$130-170 billion until 2025[3], of which between US$4-US$7 billion would need to be put into the ICT sector[4], a relatively small proportion. This estimate may however, fail to take into account activity by private sector start-ups, as well as ICT investments in other sectors (e.g. digital health or smart transport).

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1 https://www.icafrica.org/en/

2 UNCTAD's World Investment Report 2023, available at: https://unctad.org/news/investment-flows-africa-dropped-45-billion-2022#:~:text=UNCTAD's%20World%20Investment%20Report%202023%20published%20on%205%20July%20shows.

3 www.afdb.org/en/news-and-events/african-development-bank-pre-ticad7-seminar-on-investing-in-africa-18645

4 https://africaportal.org/wp-content/uploads/2023/05/Policy-Briefing-197-corrigan-1.pdf

Indeed, the ICT sector is relatively attractive to private sector investment[5]. Of some US$7.1 billion committed to ICT investments in 2018, over half – $4.8 billion – originated in the private sector[6]. Around US$1.1 billion was committed by African governments, US$550 million by China and US$503 million by the ICA respectively, and an additional US$66 million from other bilateral and multilateral partners.

Mobile operators in Sub-Saharan Africa have invested more than US$28 billion in mobile capex over the past five years and are expected to invest US$62 billion in capex for the period 2023-2030. In 2023, the mobile sector generated 7.3% of GDP across Sub-Saharan Africa, a contribution that amounted to US$140 billion of economic value added. In total, the mobile ecosystem contributed 3.7 million jobs in SSA in 2023 (Source: ME SSA 2024).

Private sector interest in ICT reflects the returns and perceived profitability of the sector. Largescale African investors in telecom have emerged, such as Vodacom and MTN, as well as European investors in Africa, such as Orange. These investments create greater opportunities for partnerships and cooperation between firms, and help create a broader digital ecosystem.

American tech titans are also investing in Africa. For example, in 2021, Google announced US$1 billion of investment in Africa to enhance connectivity, drive innovation and support local entrepreneurs. These investments can prove profitable, however. According to a recent report commissioned by Google, in 2023, Google's services (including Search, Maps, and YouTube) generated US$16 billion in economic activity for businesses, publishers, creators and developers across Sub-Saharan Africa to date (https://googlessa.publicfirst.co.uk/). For historical comparison, Google invested a total capex of US$47 billion between 2016-2018[7].

In September 2024, Amazon Web Services (AWS) announced an additional investment of US$1.7 billion in Africa by 2029 to expand its cloud and artificial intelligence (AI) services[8]. Amazon Web Services had already established its first data centres on the continent in 2020. In October 2024, it launched its online retail service in South Africa.

5 www.icafrica.org/en/topics-programmes/ict/ict-financing-trends/

6 https://africaportal.org/wp-content/uploads/2023/05/Policy-Briefing-197-corrigan-1.pdf

7 https://cloud.google.com/blog/products/infrastructure/introducing-equiano-a-subsea-cable-from-portugal-to-south-africa

8 www.wearetech.africa/en/fils-uk/news/amazon-to-invest-1-7-billion-in-africa-to-expand-cloud-ai-services#:~:text=Amazon%20to%20invest%20%241.7%20billion%20in%20Africa%20to%20expand%20cloud%2C%20AI%20services,-By%20%3A%20Adoni%20Conrad&text=Amazon%20has%20been%20expanding%20its,goals%20to%20achieve%20by%202029.

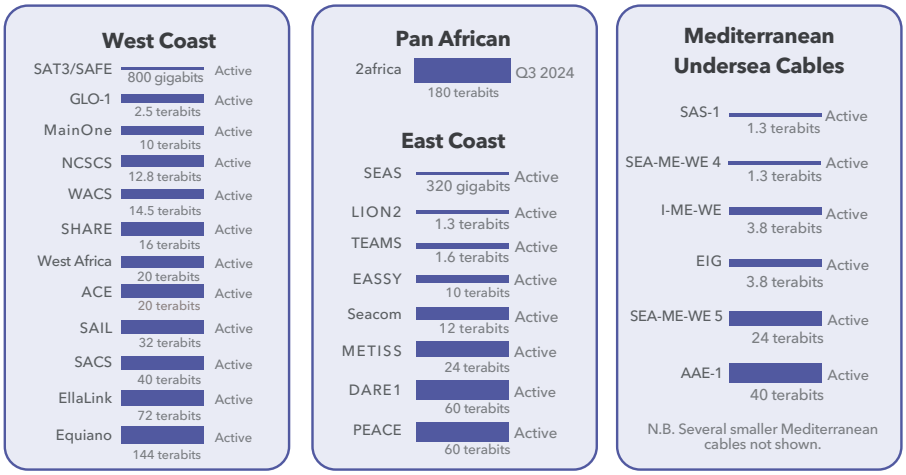
3

Submarine cables

There has been a steady progression in submarine cable connectivity over the last two decades. After the initial SAT3/SAFE cable was activated in 2001, the number of cables put into service exploded around 2009-2012, with another subsequent wave of activity from 2016-2020. Although many governments have invested in submarine cables, many submarine cables have also been funded by private consortiums to share the risks involved.

Cables driven mainly by Chinese investment include the PEACE cable on the west coast and the SAIL cable on the east coast. The South Atlantic Cable System (SACS) completed around 2018 was the first direct link between Africa and Latin America, with a 6,500km cable extending between Brazil and Angola. SACS is owned and managed by Angola Cables. Google has committed to its private cable project Equiano, which will initially link Portugal, Nigeria, Namibia, South Africa, Togo and St. Helena, but could expand to many other countries (Table 1).

Table 1: A Selection of Submarine Cables with connectivity to African Countries



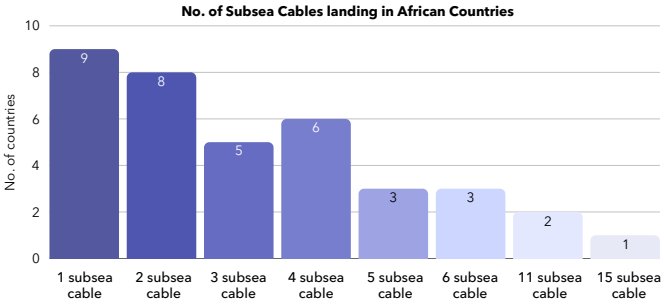
Source: African Undersea Cables, by Steve Song, Many Possibilities.

By 2021, South Africa was the only sub-Saharan African country served by eleven cables. Nigeria, Kenya and Cameroon were served by six subsea cables, and Ghana by five (Figure 1). Arab States in the north and north-east of Africa (including Djibouti and Ethiopia) benefit from additional Internet connectivity via Mediterranean and Gulf region subsea cables. The African submarine cable consortium project 2Africa is planned to extend to

45,000 kilometres and will link 33 countries in Africa, the Middle East, and Europe, with a wide range of private sector investors (including China Mobile, MTN, Meta, Orange, STC, Telecom Egypt, Vodafone and WIOCC).

Figure 1: Subsea cables in all African countries (including Arab States)

	East Africa	West Africa	North Africa
1	SEACOM	SAT3	SMW3
2	EASSy	WACS	SMW4
3	TEAMS	ACE	SMW5
4	LION	Glo1	MENA/GBI
5	LION2	MainOne	EIG
6	SAFE	NCSCS	AAE-1
7	SEAS	Atlantis-2	Aden-Djibouti
8	PEACE (2019)	Cieba-2	FALCON
9	Africa-1 (2019!)	SAIL	FEA
10	DARE (2019)	SACS	IMEWE
11	IOX (2019)	SABR (2019)	Hawk
12	METISS (2019)	SAEX-1 (2019)	Aletar
13	Gulf2Africa(2020!)	EllaLink (2020)	TE North
14	SAEX-2 (2021)		



Source: Submarine cables in Africa by 2021, by Suvesh Chattopadhyaya, quoted at: www.submarinenetworks.com/en/stations/africa

For example, **SEACOM** is a 17,000 km submarine cable connecting South Africa, Kenya, Tanzania, Mozambique, Djibouti, France and India. The SEACOM cable system entered into service on 23 July 2009, supplied by SubCom, and was upgraded to 1.5Tbps capacity in 2018.

The SEACOM cable system is described as a US$600 million investment. The initial private investment amounted to US$375 million: US$75 million from the developers, US$150 million from private South African investors, and US$75 million as a commercial loan from Nedbank (South Africa). The remaining US$75 million was provided by Industrial Promotion Services (IPS), the infrastructure arm of the Aga Khan Fund for Economic Development (funded by US$15 million in equity, and a total of US$60.4 million in debt from the Emerging Africa Infrastructure Fund and the Dutch Entrepreneurial Development Bank, the FMO).

Source: https://www.submarinenetworks.com/en/systems/asia-europe-africa/seacom

The Eastern Africa Submarine System (EASSy) is a 10,000km submarine cable system along the east coast of Africa, with 9 landing stations (in Sudan, Djibouti, Somalia, Kenya, Tanzania, Comoros, Madagascar, Mozambique and South Africa)[9]. It provides a telecommunication backhaul system for at least 12 landlocked countries, enabling wide coverage in the East African region. It was ready for service in July 2010 and has deployed a latest upgrade with Ciena's GeoMesh Extreme solutions to reach a system capacity of 36Tbps. The EASSy project cost an initial investment of approx. US$ 235 million. The EASSy Consortium consists of 18 telecom industry members. According to Many Possibilities, EASSy is 90% African-owned, with substantial investment of around US$70.7 million by financial Institutions including the World Bank/IFC, EIB, (AfDB), AFD and KfW.

Submarine cables have transformed Africa's digital landscape by reducing latency, increasing bandwidth capacities, and lowering Internet costs. For example, the landing of the SEACOM

[9] https://www.submarinenetworks.com/en/systems/asia-europe-africa/eassy

and EASSy cables in Mozambique in 2010 had significant consequences – they boosted international Internet bandwidth, while significantly reducing broadband Internet retail prices. More recently, interconnection has been facilitated by the opening of Mozambique's first Tier III data centre in early 2023, when Raxio Group completed its Tier-III carrier-neutral colocation data centre in Maputo[10].

[10] www.budde.com.au/Research/Mozambique-Telecoms-Mobile-and-Broadband-Statistics-and-Analyses

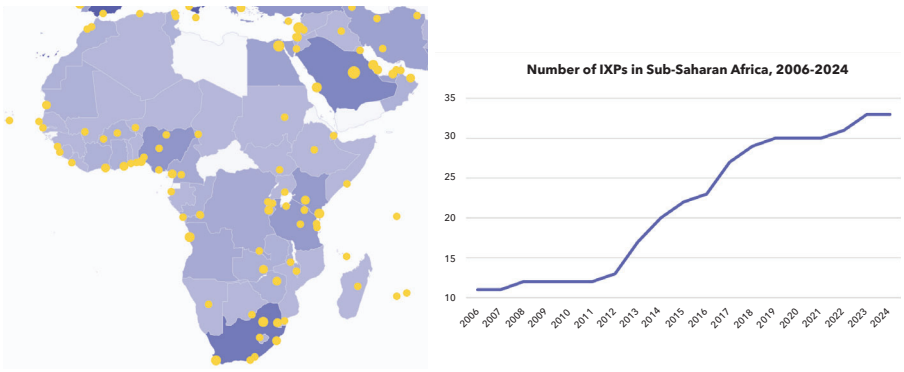
4

Internet Exchange Points (IXPs)

The number of African countries with an Internet Exchange Point (IXP) has increased steadily. The establishment of a local (or national) IXP is important for efficient, optimal domestic exchange of Internet data traffic, avoiding wasting valuable international bandwidth. Today, according to aggregated data from Packet Clearing House and the Peering Database, there are 33 African countries with an IXP (Figure 2). However, there are still eleven Sub-Saharan African countries without a national IXP, comprising: Central African Republic, Ethiopia, Equatorial Guinea, Eritrea, Eswatini, Guina-Bissau, Niger, Seychelles, Sierra Leone, South Sudan and Sao Tomé & Principe.

Countries vary in the number of IXPs, as well as the number of participants for each IXP. The first IXP to be established in sub-Saharan Africa was the Johannesburg Internet Exchange in South Africa in 1996, followed by the Kenya Internet Exchange Point in Nairobi in 2001. IXP growth in Africa accelerated after 2013 (Figure 2). Today, South Africa has a total of 7 IXPs, followed by Tanzania (5) and the Dem. Rep. of Congo, Cameroon, Kenya (all with 3 IXPs). The IXP report 2020 found that the large majority of African IXPs had between 3-10 participants, consistent with the number of new IXPs being formed over the last few years[11]. Notably, more coastal cities are connected with IXPs than inland cities, due to their proximity to landing stations.

Figure 2: Internet Exchange Points (IXPs) in Africa, 2024



Source: https://www.pch.net/ixp/dir

[11] Page 8, euro-IX Internet Exchange Points 2020 report, available at: www.euro-ix.net/media/filer_public/cf/7c/cf7c8cb1-40c9-4e37-9d79-02b61ccc081e/ixp_report_2020_.pdf

5

Internet Usage

The percentage of individuals using the Internet in Africa increased steadily from 25% in 2019 to 38% by 2024, boosted in part by the pandemic, which encouraged more affluent households to adopt Internet access to continue work, communications and/or schooling. However, this regional average mask significant disparities (Table 2) – for example, Sub-Saharan Africa (36.7%), compared to the world (67.4%) and between Eastern & Southern Africa (34.9% in 2023) and Western & Central Africa (39.4%). In 2024, ITU estimated the Internet usage rate for Sub-Saharan Africa as 38%, compared to 68% globally.

Table 2: Internet Usage in Africa and the World, 2020-23

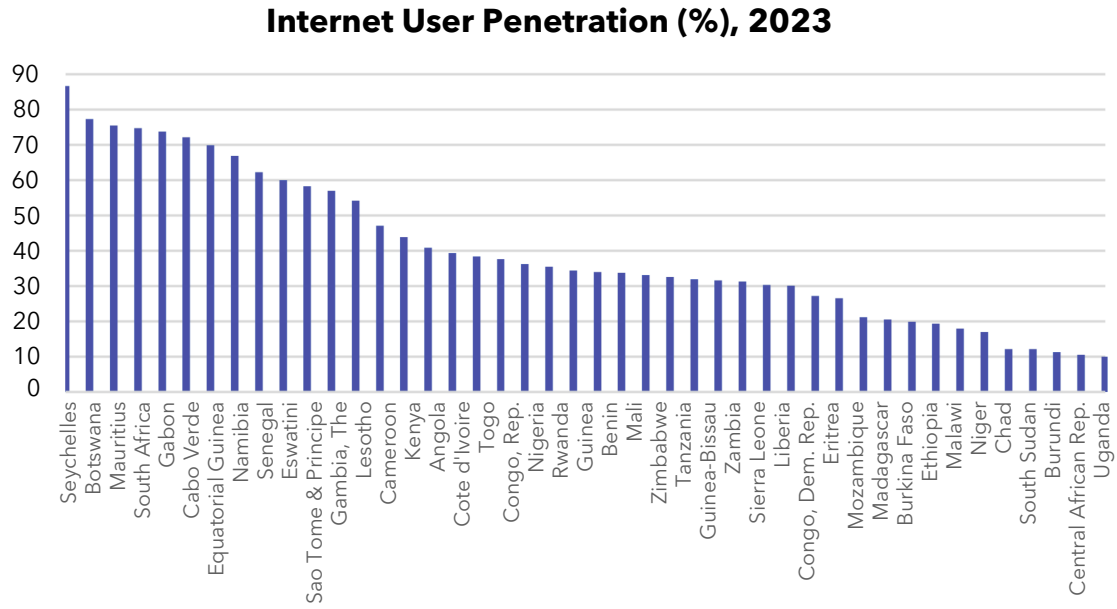
	2020	2021	2022	2023
Eastern & Southern Africa	26	29.5	31.4	34.9
Sub-Saharan Africa	28.6	31.4	33.6	36.7
Western & Central Africa	32.4	34.3	36.9	39.4
World	**59.3**	**62.2**	**64.4**	**67.4**

Source: Based on ITU.

Internet usage was highest among countries that are popular tourist destinations (e.g. Seychelles and Mauritius) and/or higher income African countries (such as Botswana and South Africa) – Figure 3. Research ICT Africa found a strong impact of the pandemic in driving 'digital substitution' in some African countries. Between 2018 and 2022, Internet use in South Africa increased from 49% to 76%. According to Research ICT Africa, the uptake of smartphones enabled a greater reach of digital products, the gender access gap reduced to almost zero and the gap between urban and rural areas is also declining in South Africa[12].

[12] https://researchictafrica.net/research/digital-inequalities-in-the-post-pandemic-recovery-the-case-of-south-africa/

Figure 3: Internet User Penetration per Capita, African Countries, 2023



Source: ITU World Telecommunication Development Indicators.

Internet access in Africa comprises several different types of access, including the runaway success of mobile telephony, alongside slower, more costly gains in household Internet. Large swathes of population are also being brought under satellite coverage, with significant efforts underway to make satellite access more affordable. In reality, most countries need and rely on a combination of technologies to connect municipalities to the Internet – for example, Box 1 describes government initiatives in Benin to provide Internet access to municipalities.

Alongside access, usage and availability of Internet, quality of experience and affordability also matter. As well as being less densely connected than many other regions, many African countries are falling behind in the quality of services available (as well as cost), relative to income.

Box 1: Using a Mix of Technologies to Connect Benin

The Government of Benin aims to transform Benin into West Africa's digital services hub, driving growth and social inclusion. It plans to connect 18 additional municipalities to the fiber optic network by mid-2025 as part of its goal to provide high-speed Internet access to all 77 municipalities in Benin. The extension of fiber optic connections to these new municipalities will help strengthen the national backbone, which currently links 50 municipalities across about 2,550 kilometers. In the long term, the government aims to cover a total of 3,300 kilometers with fiber optic cables. Nine other municipalities will be connected using alternative technologies.

This initiative is part of a broader government project to expand high and very high-speed Internet coverage throughout the country, with a focus on reaching populations and businesses through both public and private investments. The project is estimated to cost about CFA207 billion (around US$330.63 million) and is aligned with the government's 2021-2026 action plan. The Government's plan could improve telecom coverage in Benin, particularly in Internet access. Benin enjoys a 90% population coverage rate for 4G, 90% for 3G and 98% coverage by 2G. The 5G network is currently in the early stages of commercialization.

Source: Statements by H.E. Aurelie Adam Soulé Zoumarou, Minister of Digital Economy and Digitalization during the "PAG 2021-2026: Accountability" program on television, 21/11/2024, quoted at: Benin to Expand Fiber Optic Network, Connecting 18 More Municipalities by 2025 - Ecofin Agency.

How are Africans using the Internet? Interestingly, in 2024, South Africa was the number one country in the world, leading globally for the daily amount of time spent online. By April 2024, Internet users in South Africa spent a reported 9h32 minutes online each day, nearly three hours more than the reported global average of 6h35 minutes, according to WeAreSocial's 2024 Digital Trends report[13].

Social media statistics available for Africa are relatively old and outdated. Statista estimates that there were 271 million Facebook users in Africa in 2022, forecast to reach 377 million by 2025 (however, this includes large Facebook user populations for Egypt, Algeria and Morocco, classified as Arab States for purposes of ITU analysis). Statista reports that Ghana, Kenya, Nigeria, and South Africa favored WhatsApp, while Egyptian and Moroccan users preferred Facebook (https://www.statista.com/statistics/1326371/favorite-social-networks-by-country/).

[13] Slide 45, https://datareportal.com/reports/digital-2024-april-global-statshot

6

A Mobile Success Story

Mobile cellular coverage in Africa (or the percentage of the population living within reach of a mobile cellular signal) was estimated by ITU to be around 88.4% in 2024. Around 77% of the population now lives within reach of a 3G signal, and 44.3% within reach of a long-term evolution (LTE) mobile broadband signal. By 2024, mobile broadband covered 86% of Africa's population, leaving 14% without any possibility of connecting via mobile (25% in rural areas).

In a number of African countries, large operators have played an important role, including the pan-African companies MTN and Vodacom, for example. Orange provides mobile connectivity and digital services in thirteen sub-Saharan African countries. In terms of equipment, Chinese companies such as Huawei have a strong presence in many African countries. Chinese products and services are competitively priced and are helping facilitate ICT solutions in Africa – for example, the M-Pesa money transfer system typically runs over Huawei platforms. Chinese firms are also investing in African technology firms such as Palmpay and Lori Systems.

According to the GSMA, there were 527 million unique mobile subscribers in 2023, equivalent to 44% of the population. 27% of all people in sub-Saharan Africa were connected to mobile Internet in 2023.[14] The GSMA estimates that in 2023 there were around 320 million mobile internet users in sub-Saharan Africa. However, there is still a significant usage gap, with 710 million Africans not using the Internet despite living in an area served by mobile broadband infrastructure (around 60% of population in 2023).[15] Key barriers to mobile Internet adoption include affordability – particularly of handsets – and a lack of digital skills.

A further 160 million people in sub-Saharan Africa are not covered by a mobile Internet network, equivalent to 13% of the population (Figure 4). This is known as the coverage gap. According to the GSMA, almost half of the 350 million people who lack mobile Internet coverage worldwide live in Sub-Saharan Africa.[16]

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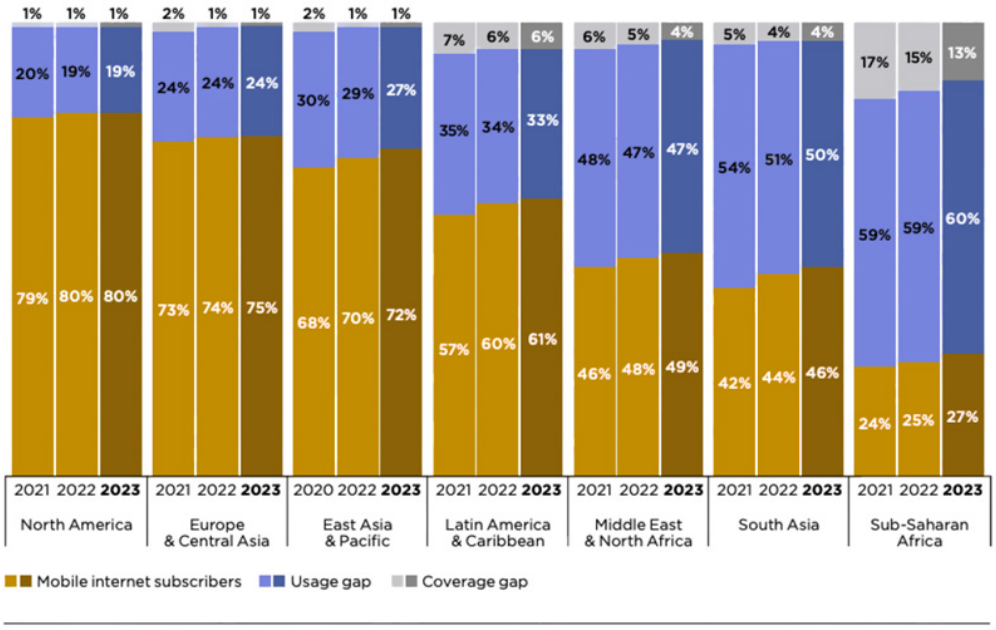
14 https://event-assets.gsma.com/pdf/GSMA_ME_SSA_2024_Web.pdf
15 https://event-assets.gsma.com/pdf/GSMA_ME_SSA_2024_Web.pdf
16 https://www.gsma.com/r/wp-content/uploads/2024/10/The-State-of-Mobile-Internet-Connectivity-Report-2024.pdf

Figure 4: Mobile internet connectivity by region, 2021–2023



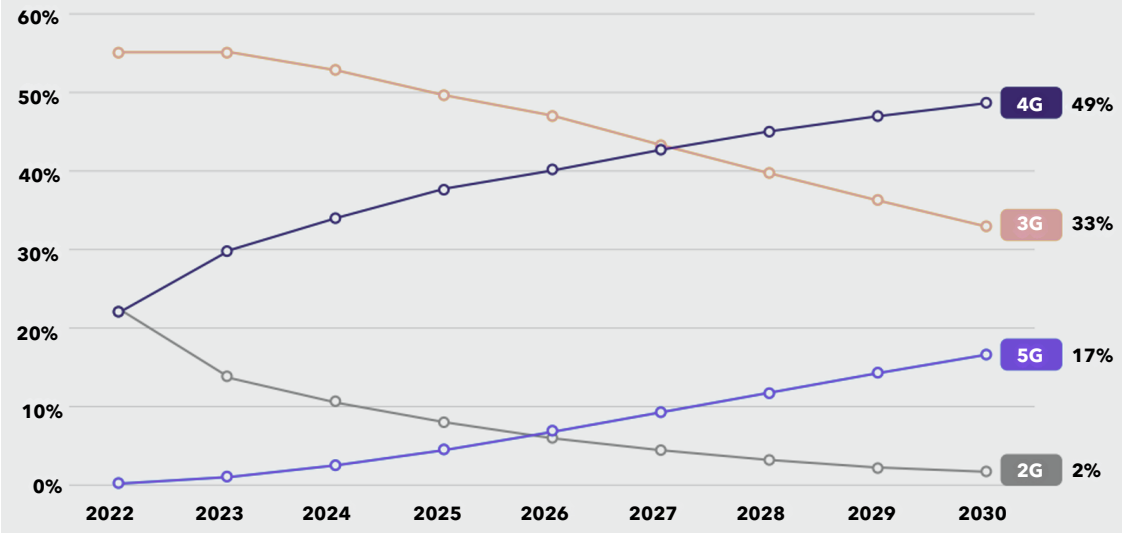
Base: Total population, 197 countries
Note: Totals may not add up to 100% due to rounding. Every year, GSMA Intelligence updates its estimates of the number of mobile internet subscribers in each country, incorporating new (and/or updated) data from operators, regulators, national statistics agencies and consumer surveys where available. In some countries and regions, estimates of mobile internet adoption may therefore differ from what was presented in previous editions of The State of Mobile Internet Connectivity.
Source: GSMA Intelligence

Source: https://www.gsma.com/r/wp-content/uploads/2024/10/The-State-of-Mobile-Internet-Connectivity-Report-2024.pdf

By 2024, 4G connections accounted for a third of all connections, just over half of all mobile connections in Sub-Saharan Africa were 3G and 10% were still 2G, although the proportion of 3G connections will continue to decline as 4G grows. The first 5G networks have been launched, with 5G currently accounting for only 1.2% of connections. 5G is predicted to reach 17% penetration by 2030 (Figure 5).

Figure 5: Sub-Saharan Africa: mobile adoption by technology

(% total connections)



Source: GSMA Intelligence, https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2024/11/GSMA_ME_SSA_2024_Web.pdf

In rural areas where fibre installation is too expensive or too slow, either fixed wireless access or cellular backhaul can be used to connect operators' fixed and mobile sites to address coverage and capacity needs. This can be either permanently (e.g. in regions prone to fibre cuts e.g. seismic regions or areas prone to landslides) or temporarily (i.e. until fibre connections are put in). Fixed sites can include towers, buildings or monopoles, while mobile sites – for example, "cells on wheels" – are used for temporary coverage or as back-up during disasters.

For example, in Senegal, Ericsson, Yas and the Ministry of Education have partnered to connect previously unconnected schools to radio networks using cost-effective, quick-to-deploy Fixed Wireless Access solutions. With schools also benefiting from the introduction of digital tools such as laptops, software and access to digital platforms and content including the national education curriculum, thousands of students can benefit from a comprehensive digital education ecosystem.[17] Box 2 describes the growth and development of the mobile sector in Rwanda over the last decade.

Box 2: Rwanda – a mobile success story

The Rwandan telecommunication sector has shown particularly strong growth in recent years, due to a vibrant economy and championing of Information and Communication Technologies (ICTs) at the highest level. ICT is a central engine to driving Rwanda's transformation to a knowledge-based economy. The SMART Rwanda plan 2015-2016 put broadband at the heart of the national socio-economic development agenda. As a result, Rwanda rapidly caught up with other markets in Africa with increased mobile and Internet penetration rates. Following the liberalization of its telecom market in 2006, Rwanda saw a surge in growth in mobile phone penetration to over 70% of the population in 2015 (in active SIM cards, not subscribers).

According to Corrigan (2023), "well-planned, well-executed state-led investment has proven effective in Rwanda". State funding was behind the backbone fibre network and, ultimately, much other infrastructure. Rwanda developed and operationalized a Wholesale Open Access Network 4G LTE system in a public-private partnership with Korea Telecom (KT), which gained a 25-year licence for the 800 MHz and 1800 MHz bands, made available to providers.

In 2017, Research ICT Africa ranked Rwanda as ninth out of 38 African countries for mobile broadband affordability, better than the leading African markets, Kenya and South Africa, in terms of cost of 1GB data. In 2024, ITU records the standard low-usage basket of mobile cellular connectivity and data-only broadband basket as costing 2.1% of GNI in Rwanda. Airtel's bundled products provide more value for money, more data, and a cheaper option than 1GB of data. However, despite regulatory initiatives aimed at improving broadband access and use, Internet access remained unaffordable for a majority of Rwandans.

In July 2023, MTN and Airtel Rwanda launched 4G LTE services, after the government amended their operating licences to allow them to roll out LTE. The operators were previously only able to offer 4G services using the infrastructure of wholesale provider KT Rwanda Networks (KTRN). This shows that competition at the infrastructure level can help attract investment and improve services for consumers. In 2023, Airtel Rwanda launched a new low-cost 4G smartphone in collaboration with the Rwandan Government as part of the Connect Rwanda 2.0 program. The phone costs 20,000 Rwandan Francs (US$16.15) and for a monthly fee of 1,000 Rwandan Francs (US$0.80), users get 1GB of daily data and unrestricted calls to any network in Rwanda.

Source: Research ICT Africa, https://researchictafrica.net/research/17945/ and Corrigan (2023), "Africa's ICT Infrastructure: Its Present & Prospects" at: https://africaportal.org/wp-content/uploads/2023/05/Policy-Briefing-197-corrigan-1.pdf;; www.connectingafrica.com/digital-inclusion/mwc-kigali-2023-closing-the-mobile-usage-gap-gsma; www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/sub-saharan-africa/ and ITU Data Hub, available at: https://datahub.itu.int/.

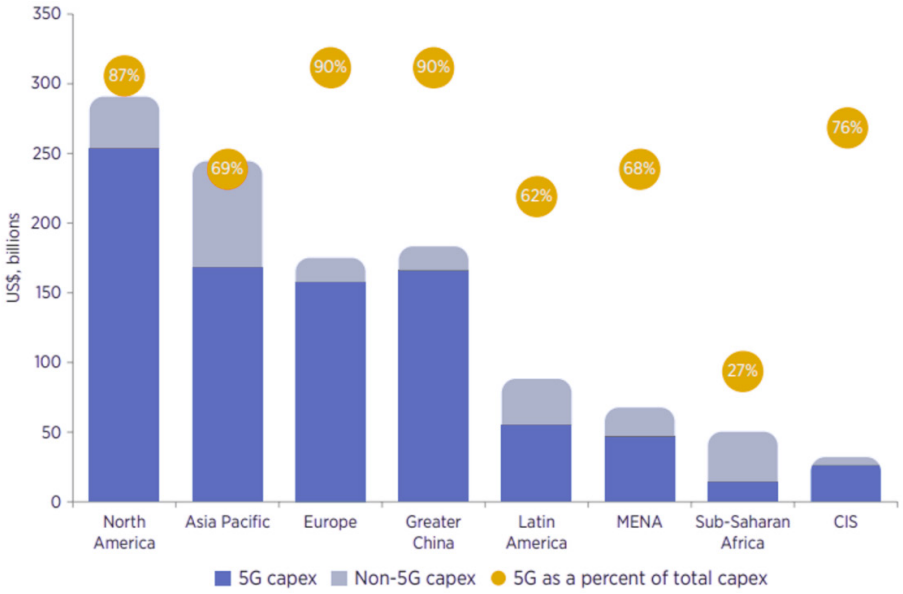
[17] https://www.ericsson.com/48fb5c/assets/local/fwa/doc/fwa-insights4.pdf and https://www.ericsson.com/en/press-releases/1/2024/ericsson-free-and-the-ministry-of-national-education-collaborate-to-improve-the-digital-education-ecosystem-in-senegal

Mobile operators are focusing on extending coverage, along with network upgrades and ramping up investments to roll out 5G. For example, Vodacom Mozambique launched the first commercial 5G services in Mozambique. Benin has also seen 5G services initiated.

Over the past five years, mobile operators worldwide have invested more than US$ 500 billion in global internet connectivity infrastructure.[18] Sub-Saharan Africa accounted for US$28 billion of this investment.[19] Looking ahead, operator capital expenditure in the region is projected to grow significantly, reaching US$62 billion between 2023 and 2030.[20] This regional investment is part of a broader global trend, with the mobile industry predicted to invest US$1.5 trillion worldwide during the same period. The majority of both regional and global investments will focus on the rollout and expansion of 5G networks and beyond.[21] Industry-government partnerships can also help advance 5G connectivity. For example, Ericsson's partnership with the Nigerian government launched in October 2024 aims to foster knowledge exchange and capacity-building in the tech sector. These efforts support the creation of innovation hubs and tech incubators, driving local technological growth.[22]

Figure 6: Capital spending for 5G, 2020-25

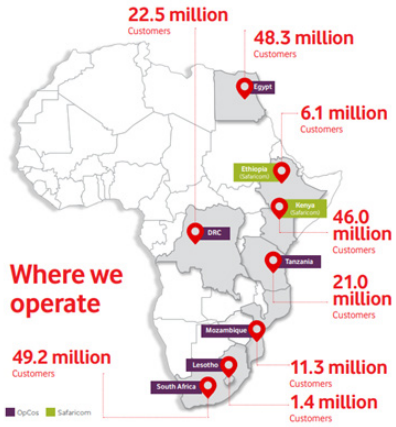
US$, billions



Source: https://data.gsmaintelligence.com/research/research/research-2020/the-mobile-economy-2020

MTN serves 295 million customers across 18 African markets, with the stated ambition to "to enable the benefits of a modern connected life for everyone" and to become "Africa's leading digital platform".

[18] https://www.gsma.com/solutions-and-impact/connectivity-for-good/public-policy/wp-content/uploads/2025/03/Mobile-Infrastructure-Investment-Landscape-1.pdf
[19] https://event-assets.gsma.com/pdf/GSMA_ME_SSA_2024_Web.pdf
[20] https://event-assets.gsma.com/pdf/GSMA_ME_SSA_2024_Web.pdf
[21] https://www.gsmaintelligence.com/research/the-spend-of-an-era-mobile-capex-to-reach-1-5-trillion-for-2023-2030
[22] https://techpoint.africa/news/nigerian-government-partners-with-ericsson-to-advance-5g-connectivity/



Vodacom Group (including Safaricom) currently serves over 200 million customers spanning across the consumer and enterprise segments. From its roots in South Africa, Vodacom has expanded its operations to include operations in the DRC, Egypt, Ethiopia, Kenya, Lesotho, Mozambique, and Tanzania, with mobile networks covering a total population of over 500 million people by 2024[23].

Source: https://www.vodacom.com/pdf/about-us/fact-sheet/2024/vodacom-interim-results-factsheet-2024.pdf

Initiatives are also underway to promote African content. For example, MTN has launched its ayoba "African super-app", which aims to integrate music, sports and content offerings, which has achieved 35 million subscribers across the African continent in December 2023. MTN is planning on adding more podcasts, playlists, education, sports news and lifestyle updates, with a focus on short-form video[24]. Orange introduced its "Max it" super-app in 2023, which already numbers 19 million users in 13 countries and offers a range of services, e-commerce, gaming, e-ticketing, video streaming to Orange customers and non-customers.

Ericsson has developed Ericsson Wallet Platform, a fintech platform that enables telecom operators and financial service providers to offer fast, secure, personalized, and easy-to-use mobile financial services to customers. Ericsson's Mobile Financial Services platform is used across 24 countries, including 16 in Africa, serving 119 million active users and processing around 3.9 billion transactions each month. Such systems help expand access to digital finance in both urban and rural areas, supporting greater access to economic opportunities and everyday financial services across the continent.

Affordability is another major barrier to digital inclusion. In 2024 the median price of an entry-level mobile broadband plan (for 2 GB per month) was 4.2 per cent of gross national income (GNI) per capita, down from 4.6 per cent the previous year yet still the highest of any region and well above the UN Broadband Commission's affordability target of 2%. Fixed broadband is even less affordable, with a median price of 15 per cent of GNI per capita. Initiatives are also needed to reduce the cost of smartphones – for example, Orange has partnered with Google Android to launch the Sanza 4G smartphone priced at around $30 to facilitate Internet access. These high costs disproportionately impact lower-income groups, exacerbating digital inequalities.

[23] https://www.vodacom.com/investor-relations.php
[24] https://www.mtn.com/ayoba-the-african-super-app-announces-achievement-of-35-million-monthly-active-users/

7

Satellite Coverage

The global satellite industry has exploded over the last four to five years, with a massive increase in the number of launches and payload launched, along with considerable technological innovation and new players entering the market. Communication satellites account for the vast majority of these satellites launched. The miniaturization of space systems, deployment of large constellations and growing number of commercial operators, all contributed to the highest launch rate ever achieved to date, in 2023.

New-generation satellites have been deployed to provide fixed high-speed broadband services over entire continents (Africa, Asia and Oceania) as a cost-effective solution. These advanced satellites offer speeds and bandwidths on a par with those of 4G (5-100 Megabits per second), enabling individuals, businesses, schools, and medical centres to connect to broadband Internet.

Multi-orbit satellite networks, inter-satellite links, and the integration of non-terrestrial networks (NTN) are expanding and enhancing connectivity solutions. Satellite NB-IoT (Narrowband IoT) solutions employ small, low-power and low-cost IoT modules designed for efficient operation with satellite networks, making applications more affordable and sustainable. Software-defined satellites and in-orbit satellite servicing are also helping meet the growing needs of firms, governments and users for more reliable and secure communications, with greater capacity.

Another major development is seamless connectivity, with the possibility of roaming between terrestrial and non-terrestrial networks, using non-terrestrial networks (NTN) or the integration of satellite and terrestrial networks for the support of seamless service continuity. NTNs encompass satellite-based networks operating in frequency bands allocated to mobile satellite services (MSS) or fixed satellite services (FSS).

Juniper Research anticipates that commercial direct-to-cell services will start in 2025, generating a modest US$30 million in revenue globally, which will rise rapidly to almost US$1.7 billion by 2029. This development could transform mobile connectivity in Africa, bringing satellite services into more widespread use in rural areas, without additional, expensive handsets.

Direct-to-device (D2D) connectivity envisages connecting satellites directly to smartphones and includes Direct-to-Cell (D2C) and Internet of Things (IoT) solutions. One approach utilizes spectrum already allocated to mobile satellite services (MSS) and leverages the 3GPP NTN specifications. This ensures compatibility and interoperability across platforms by aligning with standard

protocols for voice, data and messaging services. It requires mobile handsets to support relevant MSS frequencies and 3GPP NTN air interfaces. This approach has been authorized in various countries without the need for additional regulatory frameworks to protect terrestrial carriers.

An alternative approach is for D2D to operate in the same frequency bands as those used by mobile operators, as a complementary solution to terrestrial mobile coverage. This approach can leverage the installed base of smartphones and eliminates the need for specialized NTN-compatible chipsets, but there are still significant technical challenges. It requires modifications to the radio access network (RAN) and core infrastructure of satellite-based systems, as well as enhancements to increase range, manage interference and potentially establish exclusion zones or transmit power limitations. As stakeholders navigate these challenges and opportunities, collaboration between satellite operators, mobile network operators and regulatory bodies is required to realize the full potential of satellite D2D and D2C connectivity to usher in a new era of ubiquitous and seamless communication.

Juniper also foresees obstacles to D2C momentum, including regulatory barriers, device compatibility (smartphone must include a radio that is capable of receiving wireless coverage across the various bands in satellite spectrum). Juniper suggests that monetization may be difficult, and operators may struggle to convince mobile subscribers to adopt an additional subscription for direct-to-cell services on top of existing cellular plans.

Insight 1: Enhancing Connectivity through Emerging Satellite Technologies

Satellite communications provide critical Internet, broadcast television and communication services to users worldwide. Satellite services are crucial in remote, unserved, and underserved areas, and in times of natural disasters. Satellite technologies contribute to bridging the digital divide and accelerating a more inclusive digital transformation.[1] The future of connectivity relies on combining the strengths of different technologies to increase economies of scale, cost efficiency and coverage, while delivering more advanced and resilient services.

A range of new innovative solutions in satellite communications, such as Direct-to-Device (D2D), multi-orbit satellite networks, inter-satellite links, software-defined satellites, and in-orbit satellite servicing, are making satellite communications more versatile and cost-effective, meeting the increasing demand for seamless, reliable, and resilient connectivity.[2] These innovations are driving a new era for the connectivity ecosystem, contributing to bridging the digital divide.

AI is also revolutionizing satellite communications, offering unparalleled opportunities to enhance connectivity. AI's transformative applications in satellite communications include network optimization. It can analyze vast amounts of real-time data to predict usage patterns and traffic demands, making dynamic adjustments to optimize network performance. For example, during natural disasters, AI can prioritize connectivity for emergency response teams and affected communities, ensuring vital communication channels remain open when most needed. AI enhances maintenance by analyzing onboard sensors' data to predict failures before they occur. It improves autonomous satellite operations in orbital maneuvering, collision avoidance, reducing the need for human intervention.

The integration of AI into satellite communications can help enhance connectivity and bridge digital divides. However, success requires significant investment in technology and training, as well as a robust regulatory framework which, on the one hand fosters innovation and brings benefits to consumers, while on the other hand it protects human and user rights. As these technologies continue to evolve, satellite communications are playing a pivotal role in achieving universal, meaningful connectivity.

Source: Isabelle Mauro, Director General of the Global Satellite Operators Association (GSOA).

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1 https://gsoasatellite.com/reports_and_studies/satellite-for-sdgs-transforming-lives/
2 https://gsoasatellite.com/wp-content/uploads/GSOA-New-Satellite-Tech-Paper_July-2024.pdf

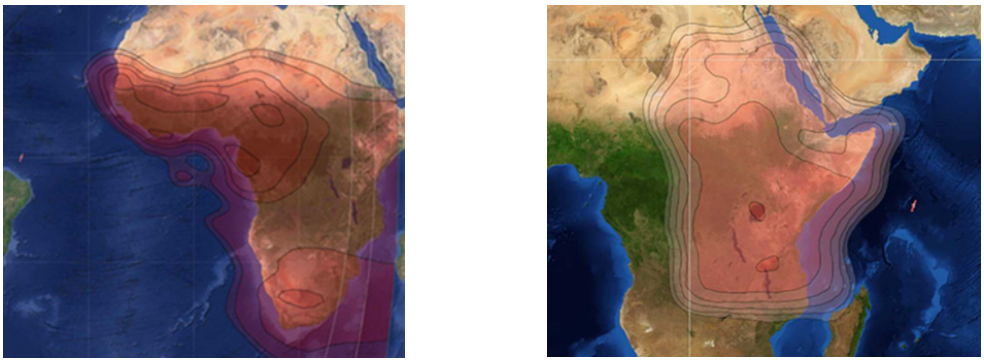
Another major shift in space operations has been the stunning and rapid rise of the private sector. SpaceX is now a major player. By mid-2024, Starlink had already launched services in fourteen countries throughout Africa (Benin, Botswana, Eswatini, Ghana, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Sierra Leone, South Sudan, Zambia and Zimbabwe). Starlink planned to launch in Angola, Lesotho, and Namibia in 2024, and plans to launch services in Comoros and Mauritius in 2025. However, South Africa still does not have a confirmed launch date[25] and by mid-2025, no application for a license from Starlink had been received by the regulator, the Independent Communications Authority of South Africa (ICASA)[26].

Partnerships are also playing an important role in improving connectivity. Intelsat and Africa Mobile Networks (AMN) have deployed over 3,000 rural base satellite antennas across several countries in Africa since 2018, providing new telecommunication services to more than 8 million people[27]. AMN's largest network is in Nigeria, with over 1,350 sites. With over 450 sites added just since June 2023, this collaboration now provides phone and Internet services to some 3.5 million people in previously unconnected Nigerian communities. In October 2024, Intelsat unveiled a new satellite cellular backhaul service platform, located at a datacenter in Nigeria[28].

Globalstar now connects many millions of people across Africa, with 28 ground stations. The Eutelsat Group has pledged to connect 1 million people in Sub-Saharan Africa by 2027. In December 2023, Eutelsat successfully reached 500,000-user mark with Eutelsat Konnect Wi-Fi. Eutelsat's satellite broadband initiative, powered by the new-generation EUTELSAT KONNECT satellite, delivers broadband Internet access to rural areas beyond reach of terrestrial networks. Dimension Data Mozambique has extended its satellite service to Mozambique using OneWeb's constellation of 648 LEO satellites[29]. SES and Telstar offer satellite coverage of Western and Eastern Africa, respectively, using the Ku Band (see Image 1).

Image 1: Ku-Band Coverage of Western and Eastern Africa

SES and Telstar offer satellite coverage of Western and Eastern Africa, respectively, using the Ku Band.



Source: https://www.bcsatellite.net/satellite-coverage-maps/

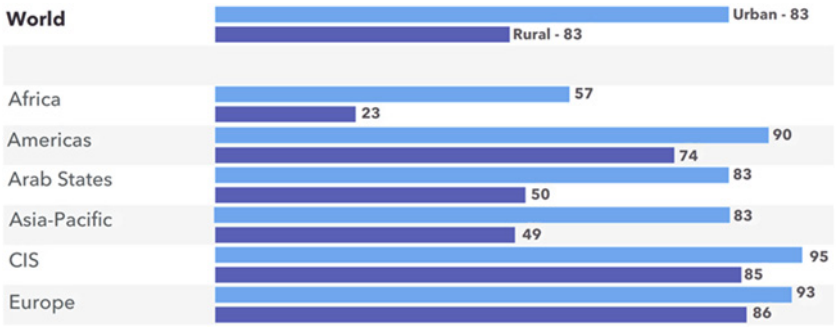
[25] https://mybroadband.co.za/news/telecoms/542211-south-africa-becomes-only-southern-african-country-without-starlink-launch-date.html
[26] https://www.bbc.com/news/articles/cly3d8gd8mno
[27] www.intelsat.com/newsroom/intelsat-and-africa-mobile-networks-expand-cellular-coverage-across-africa/#:~:text=%E2%80%93%20Intelsat%2C%20operator%20of%20one%20of,more%20than%208%20million%20people.
[28] https://www.intelsat.com/newsroom/intelsat-expands-cellular-opportunities-to-nigeria-and-neighbors/
[29] www.budde.com.au/Research/Mozambique-Telecoms-Mobile-and-Broadband-Statistics-and-Analyses

8

Household Access to Internet and urban/rural digital divides

African households that had Internet access at home increased by 0.1 percentage points from 14.2% in 2017 to 14.3% by the end of 2019. However, among this broad average, only 6.3% of rural households had access to the Internet in 2019, compared with 28% of urban households. By 2024, after the pandemic accelerated adoption of the Internet, the statistics are quite different - 23% of rural households had access to the Internet, compared with 57% of urban households (Figure 7).

Figure 7: Percentage of individuals using the Internet in urban and rural areas, 2024



Source: ITU ICT Facts and Figures 2024, available at https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/

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 significant gender gap and a rural/urban divide persist.

Intersectionality is an important issue, with Internet access within a country often confined to the more urban areas of a country with access to electricity, as well as by socio-economic income level. Extending rural access to ICTs is vital. The infrastructure for Internet connectivity is often unavailable in rural areas, as the private sector is less incentivized to invest in rural projects, given higher marginal costs and lower returns from mostly rural, agrarian households.

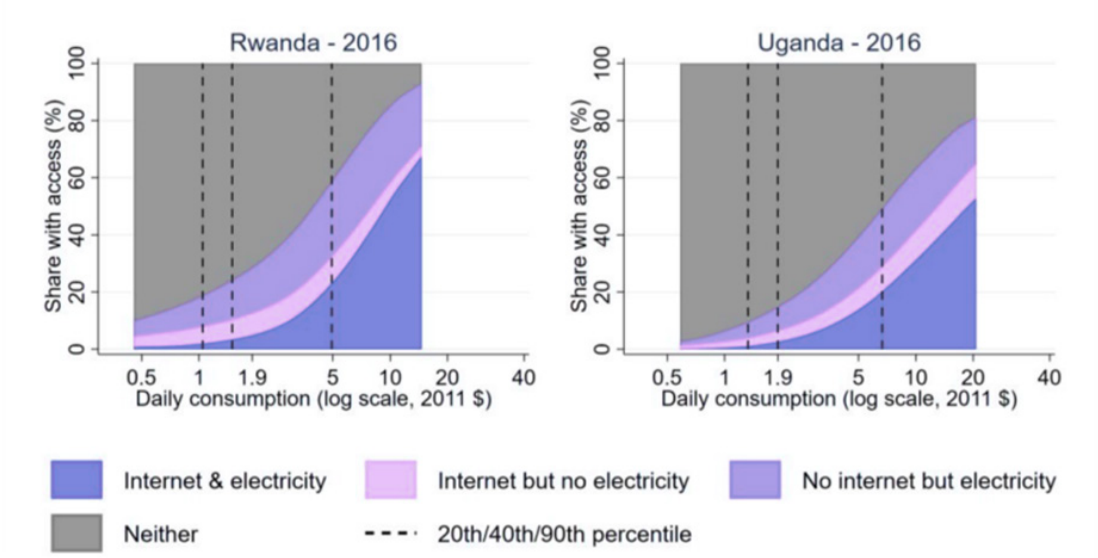
The urban-rural gap in access differs according to household income. For example, in Kenya and Uganda, the World Bank found that ***rural households*** at the 90th percentile of the national distribution (measured by daily consumption) have the same probability of having Internet access as ***urban households*** living at the international poverty line[30]. Rural households may face lower rates of Internet

[30] *'Internet Access in sub-Saharan Africa'*, Daniel Gerszon Mahler, Jose Montes, and David Newhouse, 2019, available at: https://documents1.worldbank.org/curated/en/518261552658319590/pdf/Internet-Access-in-Sub-Saharan-Africa.pdf

access because their geographical location implies that building the necessary infrastructure is less profitable for internet providers.

The World Bank observes that, in many countries, only the capital region has high levels of Internet access, while other regions tend to lag. The lower rates of reported access outside the capital highlight the importance of expanding the availability of internet to secondary cities and towns.

Figure 8: Internet and electricity access by consumption level



Source: 'Internet Access in sub-Saharan Africa', Daniel Gerszon Mahler, Jose Montes & David Newhouse, 2019: https://documents1.worldbank.org/curated/en/518261552658319590/pdf/Internet-Access-in-Sub-Saharan-Africa.pdf

Box 3: Internet Access in Ethiopia

The Ethiopian Government seeks to leverage digital technologies for social and economic development and job creation, with its Homegrown Economic Reform Agenda, Ten Years Development Plan (2021-2030) and Digital Ethiopia 2025.

The latest *Africa After Access* survey undertaken by Research ICT Africa indicates Internet access in Ethiopia has grown from 3% in 2012 to 16% in 2022, still several points below the 20% critical mass usually associated with network effects associated with economic growth and development. The telecommunication sector is the fastest growing service sector in Ethiopia, boosted by the liberalization of the telecom market in 2018, but remains hampered by poor Internet access capability.

This is no longer a supply-side issue – the coverage of mobile networks has increased in recent years in terms of access to voice services, with 98% of people having access to 3G networks. High-speed 4G coverage is still low, with only a third of the population (33%) covered in 2023. Fixed broadband amounted to 618 300 subscribers in 2023, less than 1% of the population. Despite nearly 100% 3G broadband coverage, access is highly unequal. There are significant gaps in access between men and women, literate and illiterate, urban and rural, and rich and poor. Women and rural dwellers are the most marginalized from acquiring meaningful access. Modelling of the survey data reveals that education and income determine access to the Internet. Only a very small elite have access to the Internet.

Source: Adam L, E Alemneh, Omar N and Partridge A (2024), 'African After Access 2023: Ethiopia', Post the Pandemic Policy Paper Series, Policy Paper 3, Research ICT Africa, at: https://researchictafrica.net/research/internet-development-in-ethiopia-high-level-findings-from-the-after-access-survey/

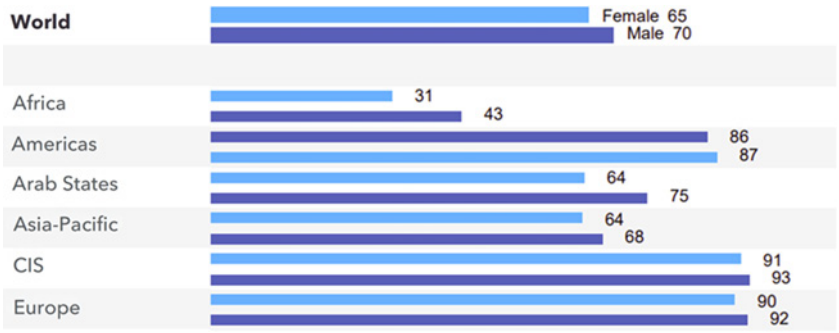
9

The Digital Gender Divide

The analysis of ITU data over the past five years reveals an increase in Internet usage among women in Africa. Since 2019, the number of women using the internet in Africa has been steadily rising. However, Africa is still working towards achieving digital parity between men and women in Internet access.

In general, more women are using the Internet each year. There is still a lot of work ahead to achieve equal Internet access between men and women, however. Women make up just over half (50.05%) of Africa's population, but only 31% of all women used the Internet in 2024, compared with 43% of all men in Africa, one of the largest regional digital gender divides observed (Figure 9). Nevertheless, this is a considerable improvement from the 21% of all African women who used the Internet in 2019, according to ITU.

Figure 9: Percentage of female and male population using the Internet, 2024



Source: ITU ICT Facts and Figures 2024, available at https://www.itu.int/itu-d/reports/statistics/facts-figures-2024/

Several barriers contribute to this gap, including lack of digital skills and financial affordability, especially for smartphones with Internet access. According to the "Mobile Gender Gap Report 2023" by the GSMA, women in sub-Saharan Africa are 13% less likely than men to own a mobile phone, and the gap widens to 28% for smartphones[31]. Moreover, women who do own mobile phones often do not fully utilize Internet services. In sub-Saharan Africa, women spend 32% less on mobile services compared to men. This disparity is linked to lower employment rates, income levels, and financial independence among women.

[31] https://www.gsma.com/r/gender-gap-2023/#:~:text=The%20Mobile%20Gender%20Gap%20Report%202023&text=Women%20are%2019%25%20less%20likely

Better connectivity can help women access online educational, professional, medical, and social resources more easily. Social media can provide a supportive space for women to share experiences, even in remote areas. However, specific actions are necessary to improve access.

The GSMA recommends that mobile operators offer low-cost smartphones and facilitate purchases with microloans or installment payments. It also urges governments to implement policies that reduce the costs of phones and data, which would benefit women. The GSMA suggests creating grant programs aimed at disadvantaged women and incorporating basic digital skills into school curriculums. Offering training tailored to women's needs and preferences can further enhance their digital inclusion. Box 4 details the experience of the operator Vodacom, in offering skills training to underprivileged young girls.

Interestingly enough, gender disparities are not very evident in social media statistics. Napoleon Cat reports that 51% of Facebook users in South Africa were women, compared with 49% men, a negligible difference[32].

Box 4: Vodacom's Code Like a Girl Programme in South Africa

The Vodacom Code Like a Girl Programme, initiated in South Africa in 2017, aims to bridge gender gaps in ICT by equipping underprivileged young girls with STEM skills through a structured ICT training. The programme fosters problem-solving, sequential thinking, creativity and design skills via coding. Open to girls aged 14-18, it needs no prior school knowledge.

Offered in a hybrid format, the programme includes:

- A virtual self-paced learning environment for those with computer and internet access, spanning a month with IT support.
- A weeklong boot-camp for those without such access, hosted at universities, Vodacom Foundation computer labs, and schools nationwide.

The curriculum spans Level 1 to Level 5, starting with basic ICT and programming skills, such as web-page design, and advancing to more complex topics. Accredited by the Sector Education and Training Authority, the programme has benefited over 6,000 South African students in enhancing their coding and ICT skills.

Internationally, the programme has been implemented across Vodacom's markets in Lesotho, Mozambique, DRC, Tanzania, Vodafone Egypt, and Safaricom's markets in Kenya and Ethiopia, with over 16,000 girls having now graduated from the programme.

Source: Vodacom, Code like a Girl | Our purpose | Vodacom Group; www.vodacom.com/news-article.php?articleID=13448.

[32] https://napoleoncat.com/stats/facebook-users-in-south_africa/2024/03/

10

Modern Policy & Regulatory Frameworks

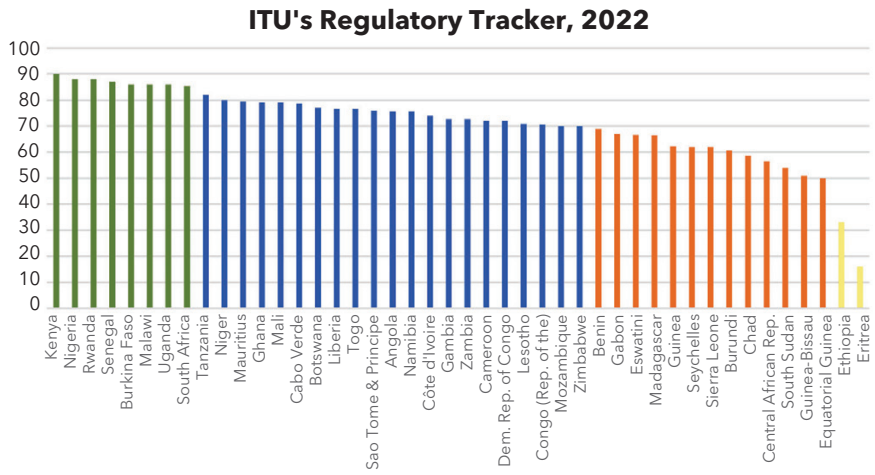
The ICT Regulatory Tracker is an evidence-based tool to help decision-makers and regulators make sense of the rapid evolution of ICT regulation. The Tracker pinpoints the changes taking place in the ICT regulatory environment. It facilitates benchmarking and the identification of trends in ICT legal and regulatory frameworks.

The Tracker is made up of a total of 50 indicators, grouped in four clusters:

- Regulatory authority (focusing on the functioning of the regulator);
- Regulatory mandates (who regulates what);
- Regulatory regime (which regulations exist in major areas); and
- Competition framework for the ICT sector (level of competition in the main market segments).

Over the past decade, many African countries have strengthened their ICT regulatory frameworks. However, policy and regulatory frameworks still tend to lag behind global trends. According to ITU data, two countries in Sub-Saharan Africa do not have an independent regulator – Eritrea and the Seychelles. Ethiopia and Eritrea qualify as the only two G1 countries in sub-Saharan Africa. A majority of African countries (21 countries) have established G3 regulation, according to ITU's Regulatory Tracker– see Figure 10. Eight countries are G4, while thirteen countries are G2.

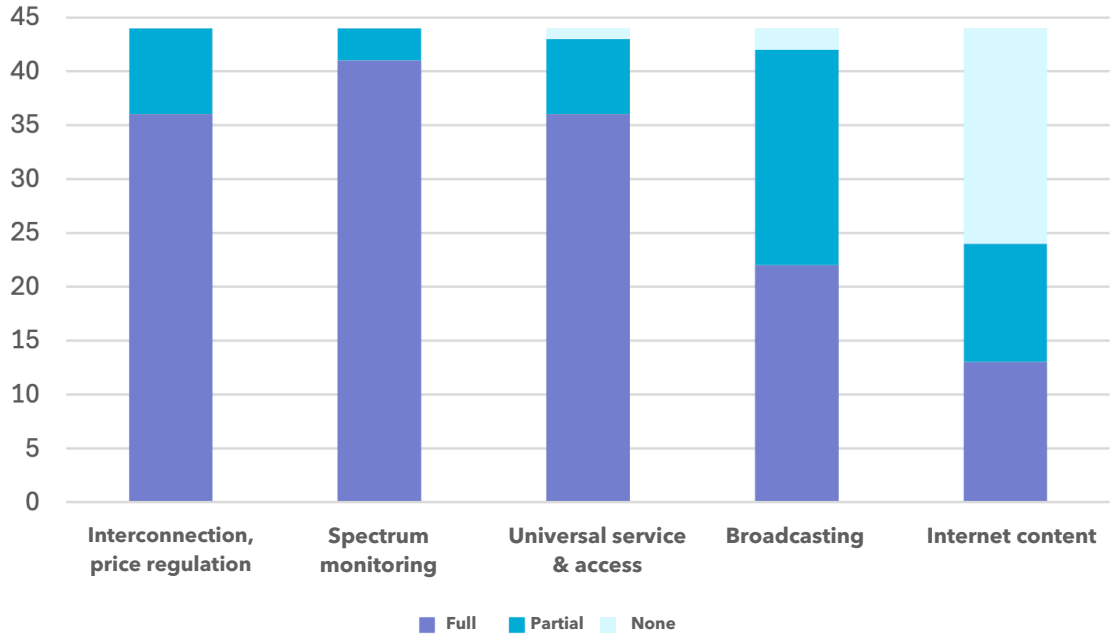
Figure 10: ITU's Regulatory Tracker, 2022



Source: ITU World Telecommunication Regulatory Indicators database.
Note: Green bars denote G4, blue bars G3, orange bars G2 and yellow bars G1.

Initially at least, many governments concentrated on market liberalization, including establishing an independent regulator, establishing competition, reviewing and updating licenses. Subsequently, the mandates of telecom regulators have expanded from 'traditional issues' of spectrum monitoring and allocation, interconnection and price regulation to include issues of broadcasting and Internet content (Figure 11). Regulatory mandate may prove separate from market developments, however – Box 5 describes the general experience of telecom reform in Mozambique, while Insight 1 details how Ghana has sought to establish an enabling regulatory environment for telecoms and, more recently, the safe adoption of AI. Countries still need to adopt robust digital policies that drive infrastructure investment, targeted initiatives in digital identity and skills, and cross-sector collaboration to improve regulatory frameworks[33].

Figure 11: Regulatory Mandates of Sub-Saharan telecom/ICT regulators, 2022



Source: ITU World Telecommunication Regulatory Indicators database.

[33] P.2, State of digital development and trends in the Africa region, April 2025: https://www.itu.int/itu-d/reports/statistics/wp-content/uploads/sites/5/2025/04/2500037E_SDDT_2025_Africa_FINAL.pdf

Box 5: Telecom Reform in Mozambique

Mozambique was one of the first countries in Sub-Saharan Africa to embark upon telecom reform and opened up its telecom sector to competition in 2001. Mobile telephony has shown strong growth since the launch of Vodacom Mozambique to compete against mCel, the then mobile subsidiary of the national telco Telecomunicações de Moçambique. Additional competition followed in late 2020 with the launch of services by Movitel.

TdM and mCel were merged in early 2019, creating a new operator Mozambique Telecom (Tmcel). In the process, the structure of the market changed from having four operators (TdM, mCel, Vodafone Mozambique, and Movitel) to three (Tmcel, Vodafone Mozambique, and Movitel). At the same time, a new licensing regime ensured that by mid-2019, all three operators had been provided with universal licenses, enabling them to offer all types of telephony and data services. Tmcel has launched the second phase of a network modernization program, although it was struggling to develop network infrastructure sufficient to compete effectively with Vodacom and Movitel, and the state took over the day-to-day running of Tmcel in April 2023.

Source: www.budde.com.au/Research/Mozambique-Telecoms-Mobile-and-Broadband-Statistics-and-Analyses

Box 6: Uganda's National Digital Agenda Strategy

Uganda's National Digital Agenda Strategy was launched in August 2025, designed to propel Uganda towards a future of greater innovation and equity. It highlights the **role of education** in Uganda's development, particularly in nurturing Uganda's youthful population (over 70% of the total 46 million citizens) as an innovative and productive workforce.

It emphasizes the role of the Technical and Vocational Education and Training (TVET) sub-sector in providing employment opportunities for young Ugandans. The Islamic Development Bank has financed the expansion of TVET infrastructure. Nine technical institutes across Uganda are targeted for expansion, including Minakulu, Moyo and Kabale. ICTs and the Internet offer robust tools to deliver education throughout Uganda. UNICEF is also contributing to the Strategy's implementation, through its collaboration with private sector partners, including Airtel Africa in the aim of expanding digital education and skills to 400,000 teachers, children, and adolescents across Uganda.

The strategy reflects Uganda's commitment to leveraging digital technologies for improved education outcomes, as well as future challenges and disruptions – for example, the recent COVID-19 pandemic. The Digital Agenda Strategy should help ensure that Uganda is better positioned to navigate future challenges, including pandemics. Cybersecurity also plays a vital role in the implementation of the Digital Agenda Strategy, with a strong need to protect learners and educators from harmful online content.

The Strategy encourages collaboration across government, private sector, academia, and civil society to support the implementation of the Digital Agenda Strategy and unlock Uganda's full potential. It is hoped that Uganda can take advantage of digital technologies and innovation to build a brighter future.

Source: www.media.gcic.go.ug/education-ministry-launched-ugandas-digital-agenda-strategy-alongside-the-expansion-of-nine-technical-institutes/ and https://nilepost.co.ug/news/213076/govt-launches-digital-agenda-strategy-expands-technical-institutes

Insight 2: Ghana's Enabling Environment for Telecoms and the Safe Adoption of AI

Among the strategic objectives of Ghana Data Strategy is to develop National ethical guidelines for Artificial Intelligence (AI) and data protection in AI. Consequently, Ghana has developed to implement national ethical guidelines for AI development and use, ensuring that AI technologies are designed and deployed to respect human rights and ethical standards. A specialized agency, the Data Protection Commission (DPC), has been established to ensure that AI systems comply with data protection laws and standards, safeguard personal data, and ensure that AI systems do not compromise user privacy. Also, Ghana engages in international collaboration to align its AI regulations and ethical standards with global best practices and to participate in global discussions on AI governance.

In partnership with UNESCO, Ghana is undertaking the readiness assessment methodology and a comprehensive GAP analysis, which is fundamental in ensuring that Ghana can effectively implement its Ethical AI Framework. The goal of the assessment is to provide a clear roadmap for transitioning from the current state to the desired state, ensuring that all aspects of AI /Data governance, from legislation to infrastructure and cultural alignment, are adequately prepared to support ethical AI practices.

Ghana's Shared 4G & 5G Greenfield Deployment

Ghana is set to launch a nationwide 4G and 5G greenfield deployment on 28 October 2024. Per Broadband Commission Advocacy Target 1, the shared infrastructure by a consortium of mobile operators and original equipment manufacturers will give immediate and improved broadband access to the 22 million Internet users. The 4G&5G deployment will adopt AI-driven algorithms to monitor network traffic, predict peak usage times, and manage bandwidth more efficiently to ensure reliable internet access and enhance user experience.

The shared 4G and 5G deployment makes high broadband service more affordable by minimizing capital and operational costs. Internet users in Ghana are likely to benefit from reduced internet usage prices. The deployment will enhance the digitalization of various sectors, including education, healthcare, and agriculture, satisfying Advocacy Target 3 of getting everyone online. 4G and 5G deployment will support precision farming, driven by AI and the Internet of Things (IoT), to allow farmers to use data to make informed decisions about crop planting and management to optimize resource use, increase yields, and ultimately enhance the livelihoods of rural farmers, contributing to regional economic growth and reducing the urban-rural economic divide.

Digital Skills Programmes

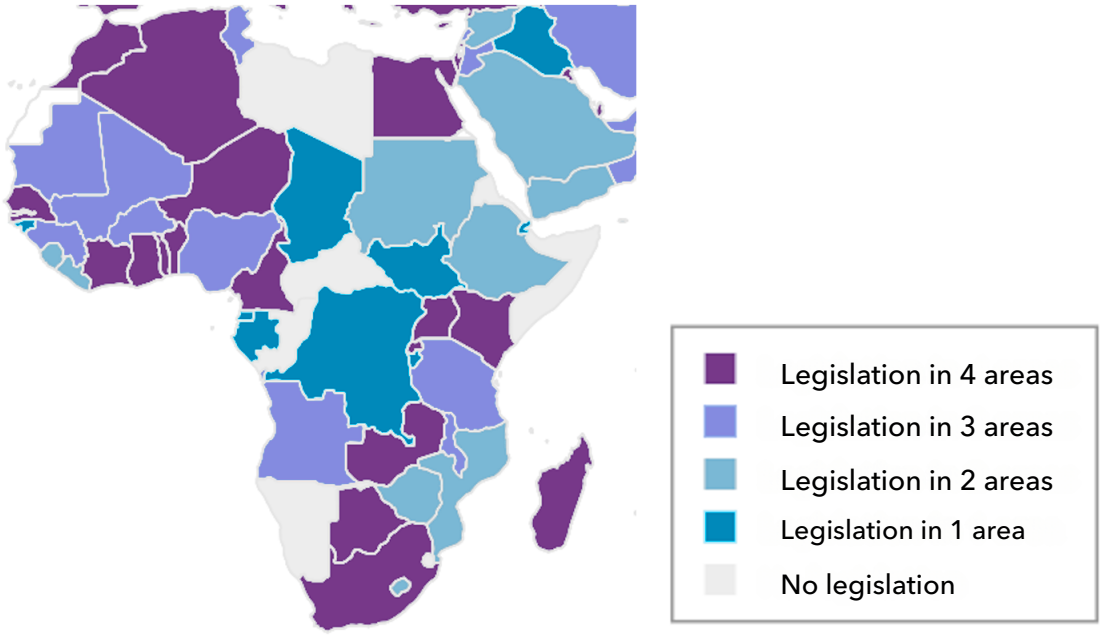
Ghana is pursuing several digital skills programmes to promote digital skills development and help bridge the digital gender divide. Under the ITU Girls in ICT programme, Ghana has trained 13,981 girls and 1,300 teachers in Python and other coding programs. Also, Ghana has successfully trained 22,192, of which 70 % were female under the ITU-NORAD-CISCO Digital Transformation program. There were 3,574 marginalized individuals, including persons with disabilities, who were trained on how to use the internet. 903 teachers and 6,489 students were trained in programs such as AI and IoT, and 1528 pupils under Coding clubs were trained. 4,955 women entrepreneurs have been trained on using the Internet for digital marketing.

Source: H.E. Ursula Owusu-Ekuful, Minister for Communications and Digitalisation for the Republic of Ghana.

More recently, Governments and regulators are seeking to review and update legislation for recent developments. UNCTAD tracks the state of e-commerce legislation in the fields of (1) e-transactions; (2) consumer protection; (3) data protection/privacy; and (4) cybercrime adoption (Figure 12). UNCTAD data covers whether or not a given country has adopted legislation or has a draft law pending adoption. For Africa, by 2021, 33 countries (61%) had adopted legislation on e-transactions and data protection/privacy. Just over half (28 countries or 52% of all African countries) had adopted legislation on consumer protection, while 39 (72%) had adopted legislation on cybercrime.

Regulators are having to consider a broad array of issues. For example, in November 2024, the Liberia Telecommunications Authority (LTA) launched the *Consumers Protection Regulations* to ensure that customers receive value for money and to promote transparency and accountability in telecoms[34]. There is a temptation to think that more extensive legislation might indicate that policy-makers are considering a greater number of areas, but efficiency and regulatory enforcement are separate questions. It may be better to have a single piece of well-designed legislation that is properly enforced than multiple areas existing in law books, but not in practice.

Figure 12: African countries with digital-related legislation, 2021

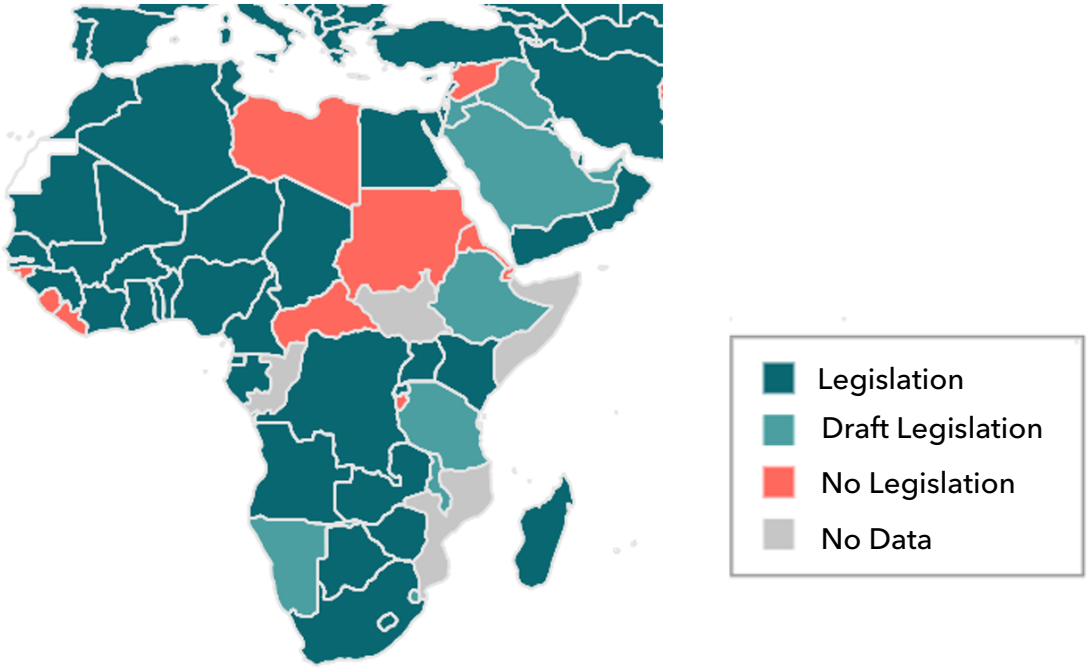


Source: UNCTAD's Global Cyberlaw Tracker, available at: https://unctad.org/topic/ecommerce-and-digital-economy/ecommerce-law-reform/summary-adoption-e-commerce-legislation-worldwide

In terms of preparing for AI, according to UNCTAD's latest data for 2021, 33 African countries (61%) had approved legislation for data protection and privacy, with a further six countries (11%) having draft legislation under review – see Figure 13. However, ten countries (over a fifth) had still not enacted any legislation for data protection and privacy (data unavailable for 5% of countries).

[34] Liberia Launches "The People's Regulations" to Protect Telecom Consumers - Ecofin Agency

Figure 13: African countries with data protection & privacy legislation, 2021



Source: UNCTAD, at: https://unctad.org/page/data-protection-and-privacy-legislation-worldwide

More recently, the African Union has designed a Policy for Data Protection and a African Union 2024 Continental AI Strategy and Implementation Road Map 2025-2030 to harness AI for Africa's Development and Prosperity in November 2024.

11

Artificial Intelligence (AI)

Artificial Intelligence (AI) and AI technologies are very varied, encompassing everything from facial recognition to Machine Learning to generative AI (for images, text and video). Although AI has been understood as a set of emerging technologies, in fact, it encompasses considerations from infrastructure (data centres and electricity supply) to data processing to socially embedded decision-making. Slowly but surely, AI is permeating every domain of our lives, from online search to marketing to news to street navigation.

Network operators in Africa are making use of AI in new and novel ways – to research, identify and reach new customers, to position mobile masts, to optimize network management, to analyze vast datasets, or to channel appropriate products and services to customers, as telcos and social media platforms become conduits for marketing and sales.

For example, in July 2024, MTN and Huawei launched a Technology Innovation Lab at its HQ in South Africa to stimulate the African digital ecosystem and promote the adoption of cutting-edge innovative solutions[35]. Research in the lab will concentrate on vital areas including 5G, AI, big data analytics, cloud computing, Fibre To The Home (FTTH), automation and digital financial services. MTN hopes that the Technology Innovation Lab will serve as a hub for experimentation, demonstration and skills-building, open to MTN staff, partners and other stakeholders. MTN has also unveiled its customer service AI-based chatbot in MTN Nigeria, MTN Zigi, with OpenAI-powered capabilities. It released an AI-powered assistant designed to streamline its employees experience in South Africa (MTN SiYa) in December 2023[36].

Vodacom has deployed various AI tools (including machine learning and big data) to provide new services to customers in line with their needs, including mobile financial services products and loans. One service using AI is the 'Just 4 You' service deployed in South Africa in 2017 and in the Democratic Rep. of the Congo, Lesotho, Mozambique and Tanzania from 2019. It provides affordable, tailor-made bundles using machine learning and big data to design deals for each customer. This package is available to over 40 million customers in Africa, including people on very low incomes, and it has evolved

[35] www.mtn.com/mtn-and-huawei-launch-joint-technology-innovation-lab-to-drive-africas-digital-transformation-and-sustainable-development/

[36] P.33, MTN Investment Report 2024, https://mtn-investor.com/mtn-ir2023/pdf/mtn-fy23ir-final-2024.pdf

to offer smart discounts on fintech services and third-party offerings, as well as regional offers on voice & data bundles.

Vodacom has deployed various health and IoT solutions across Africa, as well as implemented procedural improvements across numerous areas, including in its call centres. Vodacom implements these innovations ethically and responsibly, taking various factors into account including each country's specific consumer protection laws and human rights laws.

Alongside rapid private sector innovation, governments and regulators are seeking to review and adapt policy frameworks to accommodate these technological developments. However, technologies and regulatory environments generally advance in tandem. Governments clearly believe that the onus on the technological platforms (and/or operators) to conform to the legal and regulatory frameworks in place, but the regulatory frameworks also have to adapt to the technological developments.

Indeed, AI and technological innovations can:

- Require review and update of existing laws and frameworks (e.g. Intellectual Property, where some types of AI may rely on identifiable adaptation and replication of existing copyrighted IP material).
- Stretch and adapt existing laws and frameworks (e.g. cryptocurrencies may extend, exist outside of or require alterations to financial regulatory frameworks).
- Provide new tools to replace older methods and purposes (e.g. the use of facial recognition for border controls; the automated design of new engineering blueprints).
- Labor substitution and replacement of existing workers (e.g. generative AI for generating reports, marketing materials, speeches, text).

Against this backdrop, Governments and some regions are seeking to adapt regulatory frameworks for AI at both the national and regional level (Insight 3).

Insight 3: Harnessing AI & 5G for connectivity in Smart Africa Member States

The transformative potential of emerging technologies such as AI and 5G in bridging the digital divide offer unique opportunities to accelerate sustainable development, particularly in Smart Africa Member States. However, realizing their full potential requires overcoming significant challenges, particularly within the context of regulation and skills development.

AI and 5G can enhance connectivity and drive economic growth in Africa. AI's ability to analyze large datasets can optimize resource allocation, improve public services, and support decision-making processes in sectors like healthcare, agriculture, and education. Meanwhile, 5G's high-speed, low-latency connectivity can facilitate the deployment of AI applications, enabling real-time data processing and the growth of smart cities.

Despite these opportunities, existing regulatory hurdles pose a considerable challenge. The rapid pace of technological advancement often outstrips the development of appropriate regulatory frameworks. For AI and 5G to flourish, there must be harmonized regulations across the continent that foster innovation while protecting privacy, data security, and consumer rights. This requires close collaboration between governments, regulators, and industry stakeholders. Second, the successful deployment of AI and 5G requires a workforce with specialized skills in data science, network engineering, and cybersecurity among others. However, a skills shortage exists.

Smart Africa has launched several initiatives to support its Member States to overcome challenges and harness the full potential of AI and 5G. The "Africa AI Uptake Accelerator" program aims to accelerate awareness, adoption, and use of Artificial Intelligence across Africa, ultimately fostering innovation and digital transformation continent-wide. This program addresses key challenges related to AI awareness & literacy, infrastructure, and implementation, seeking to position Africa as a significant player in the global AI landscape and drive socio-economic development through advanced technologies. It includes the following initiatives: AI DPG Platform; an African AI Action-oriented Hub; a pan-African AI Innovation Challenge; and an African AI Practitioners Network (AAPN).

In partnership with various private sector members, Smart Africa has also developed a draft white paper on 5G regulation. It addresses essential points to guide regulators in the full implementation of 5G for the benefit of citizens: (1) Regulatory Harmonization: Establishing coherent and harmonized frameworks across Africa; (2) Infrastructure: Encouraging investments and the deployment of necessary infrastructure; and (3) Digital Inclusion: Ensuring that the benefits of 5G are accessible to all, including rural and remote areas.

The Smart Africa Digital Academy (SADA) has implemented some training and peer-learning sessions on AI and 5G. Over 1,112 policy and decision-makers from African Member States benefited from these sessions. All stakeholders, particularly in Africa, need to work together to harness the potential of technologies such as AI and 5G in bridging the digital divide.

Source: Mr. Lacina Koné, Director General and CEO, Smart Africa.

One of the issues for using AI in Africa is limited training data in online texts and images, which means that results may be biased and neither fully representative nor accurate for African contexts. This issue is particularly acute with regards to digital translation, where only a limited number of digital texts available online in a limited number of languages means that results may not be accurate or culturally appropriate. For example, concepts may be either absent or imposed from other cultural contexts from outside of Africa, preventing or skewing translation and misleading readers.

In 2013, a number of African languages were added into Google Translate, including the three major Nigerian languages (Igbo, Hausa and Yoruba), Zulu and Somali[37]. In 2022, Google announced its 1,000 Languages Initiative, a commitment to build AI models that will support the 1,000 most spoken languages around the world. Also in 2022, Google added 24 new global languages using Zero-Shot Machine Translation[38] (where a machine learning model learns to translate into another language without ever seeing an example text, sometimes the only option where there are very limited training texts).

Thanks to the PaLM 2 large language model, 110 new languages were added in 2024 to Google Translate, the largest expansion ever. Around a quarter of these new languages originated in Africa, including ***Afar, Fon, Ga, Kikongo, Luo, Nko, Swati, Venda*** and ***Wolof***. For example, ***Afar*** is a tonal language spoken in Djibouti, Eritrea and Ethiopia and had the most volunteer community contributions among the languages launched in 2024. ***NKo*** is a standardized form of the West African Manding language group, that unifies multiple dialects into a common language.

OER Africa found that Google Translate now supports 25 African languages: Afrikaans, Amharic, Arabic, Bambara, Chichewa**,** Ewe, Hausa, Igbo, Kinyarwanda, Krio, Lingala, Luganda, Malagasy, Oromo, Sepedi, Swahili, Sesotho, Shona, Somali, Tigrinya, Tsonga, Twi, Xhosa, Yoruba and Zulu, although they note there is no single source to verify which African languages are covered, which can only be determined through searches within Google Translate[39].

The Masakhane community consists of over a thousand participants from 30 African countries with diverse educations and occupations, as well as several countries outside Africa. Masakhane is a grassroots natural language processing (NLP) network formed for NLP research in African languages, for Africans, by Africans. It believes that Africans should be in charge of owning, driving and participating in the NLP research process, rather than as observers or data providers. It operates in over 38 African languages with more than 35 contributors on GitHub[40]. Masakhane is collaborating with the African scientific preprint server, AfricArXiv to translate African research papers that AfricArXiv[41] receives into African languages.

The inclusion of AI tools for these languages is helping extend access to new and different applications, such as storytelling applications, application for preserving ancestral knowledge in agriculture, local language dubbing tools for videos in other languages (e.g. from French or English into local languages such as Fon, Yoruba, or Dendi), making content more accessible to speakers of indigenous languages (Insight 4).

37 https://africa.googleblog.com/2013/12/google-translate-now-in-80-languages.html
38 https://blog.google/products/translate/google-translate-new-languages-2024/
39 https://www.oerafrica.org/content/artificial-intelligence-and-underrepresentation-african-languages
40 https://www.masakhane.io/
41 https://info.africarxiv.org/

Insight 4: Using AI for Language Processing and Video Dubbing in Benin

In January 2023, Benin adopted an AI strategy with a clear action plan focused on priority areas such as agriculture, education, health, living environment, and tourism. To leverage emerging technologies, Benin, rich in its cultural and linguistic diversity, is seizing the opportunities offered by artificial intelligence to preserve and promote its linguistic heritage. This is evidenced by the recent AI hackathon organized at the Digital Entrepreneurship and Artificial Intelligence Fair (SENIA) 2024, which highlighted the potential of AI for natural language processing and video dubbing.

Dubbing audiovisual content into local languages can enable more people to access information and content, promoting digital inclusion. By using local languages in audiovisual productions, the transmission of local languages to future generations can be preserved. Dubbing opens up new prospects for the Beninese audiovisual industry, creating jobs and fostering the production of local content.

The SENIA 2024 AI Hackathon

This AI hackathon provided an opportunity for developers, linguists, and technology enthusiasts to come together and work on concrete projects related to natural language processing and video dubbing. Participants were asked to develop prototypes for several use cases, including:

- **A local language dubbing tool for French or English videos**: This tool is designed to dub videos from French or English into local languages such as Fon, Yoruba, or Dendi. It facilitates access to video content, making it accessible to speakers of indigenous languages.
- **A storytelling application on cultural heritage**: This application aims to reconstruct historical scenes and stories from Benin using local language narrations and generating corresponding images. This innovative application will preserve the wisdom of the elders and promote cultural tourism, offering users an engaging and immersive experience.
- **An application for preserving knowledge in ancestral agriculture**: This application aims to visually recreate traditional agricultural practices by analyzing descriptions in Fon or Yoruba, thus helping to preserve and share ancestral knowledge with new generations of farmers.

The advances made during the AI hackathon open up promising prospects for the future of dubbing in Benin. By continuing to invest in R&D, it should be possible to improve the quality of AI tools for natural language processing and video dubbing; train new talent in AI and natural language processing; and create a thriving digital ecosystem around the production of audiovisual content in local languages.

AI represents a unique opportunity for Benin to strengthen its cultural identity, reduce the digital divide, and develop a dynamic audiovisual industry. By building on the results of the SENIA 2024 AI hackathon and through the implementation of a television channel producing content exclusively in local languages, Benin can become a model in the use of AI to promote linguistic diversity and foster sustainable development.

Source: H.E. Aurelie Adam Soule, Minister of Digital Economy and Communication, Republic of Benin.

The deployment of AI-driven tools and solutions is catalyzing economic growth and innovation, including in trade. For example, an AI-driven tool is helping young entrepreneurs to draft business plans and secure crucial funding in Senegal, while in Ghana, a WhatsApp-compatible AI tool is helping make financial services more inclusive (Insight 5).

Insight 5: The impact of AI on trade

Artificial intelligence (AI) is offering new opportunities and challenges for businesses of all sizes. For entrepreneurs and small businesses, especially in emerging economies, AI is more than just a technological advancement—it can transform industries, create new market opportunities, and bring the SDGs closer within reach.

Recently, the deployment of AI-driven solutions can catalyze economic growth and innovation. Across Africa, the International Trade Center (ITC) has witnessed the impact of AI on entrepreneurship among companies we have supported. In Senegal, the AI-driven tool ADIA, developed by the start-up CONCREE, has become a valuable resource for young entrepreneurs by helping them draft business plans and secure crucial funding. In Ghana, Paybox has developed a WhatsApp-compatible AI tool to make financial services more inclusive, enabling users to track their finances easily, while discussing topics such as their daily mobile-money revenues or the number of customers they had today.

Ugandan entrepreneurs are making transportation safer with AI – for example, using the AI-equipped dashcam introduced by 3D Services in Kampala, with its innovative driver support features. In Nigeria, smallholder farmers are learning how to use generative AI tools to create content, such as social media posts and product descriptions, that boosts their visibility in the digital marketplace. These applications highlight AI's potential to empower more communities to compete in the global economy.

AI's value also extends to more strategic areas, such as business intelligence and trade competitiveness. The use of AI within platforms such as the Global Trade Helpdesk offers a glimpse into global trade's future. By incorporating AI-driven tools like advanced search functionalities and multi-language support, these platforms make critical trade information more accessible for SMEs in developing countries, where language barriers and limited resources can hinder participation in global trade.

ITC is now exploring how AI-powered tools including "Trady," an AI Trade Strategy Advisor, can help provide policy-makers with valuable insights quickly, while making sure these are reliable. By analyzing vast datasets, AI can identify policy solutions to trade competitiveness challenges, offering models for how emerging technologies can improve governance and economic strategy. Education and skills development are other areas where AI is proving transformative. In online learning, AI is enabling more personalized and interactive experiences, in use by ITC's SME Trade Academy. Users receive tailored feedback and real-time assistance, making their learning more effective and accessible.

These examples illustrate AI's diverse applications. AI has the power to democratize access to information, enhance safety and efficiency, and drive economic growth. AI is a powerful set of technologies for addressing the unique challenges that entrepreneurs and small businesses in developing economies face. However, it can only achieve this potential—and drive sustainable development that benefits everyone—if we tackle its risks and limitations, while ensuring that these technologies are inclusive and accessible to all.

Source: Ms. Pamela Coke-Hamilton, Executive Director, ITC.

In agriculture, AI can be used to boost crop yields. For example, in Botswana, the start-up Anton Technology is using drones, satellites and cameras to detect pests and diseases, predict soil health and provide farmers with targeted recommendations to improve crop yields[42]. In Cote d'Ivoire, the firm Adara is using digital technologies such as QR codes and IoT[43] to improve the traceability and management of agricultural, commercial, financial, and logistical activities

[42] https://agribusinessbotswana.com/botswanas-tech-driven-battle-against-food-insecurity/
[43] https://adara-group.com/management-and-traceability/

in rural communities[44]. In Cameroon, Clinic Agro has partnered with Orange to deliver an app dispensing advice on agricultural crops, techniques, weather warnings and irrigation[45].

In Burundi, AgriHyphen leverages advanced AI to enhance crop production, enable early disease detection and promote sustainable agricultural practices. It has developed a multi-model AI system for detecting 37 different diseases affecting 7 crops (potatoes, tomatoes, peppers, maize, beans, cassava, and apples) using computer vision, with an accuracy rate of 93.8%, enabling identification of crop diseases at an early stage to prevent losses[46]. In Senegal, Africa Smart Citizens uses smart collars and geolocalization techniques to monitor cattle[47].

In Senegal and Cote d'Ivoire, the Tolbi app uses AI and precision farming techniques to boost crop yields, taking into account climate and weather data[48]. In Zambia, AgricPredict offers a range of services from pest detection to early warnings of severe weather and market information to help farmers increase their yields[49]. Also in Zambia, Netagrow has launched a mobile app to help farmers connect with certified agricultural experts in their own local language and get recommendations based on soil and weather data[50].

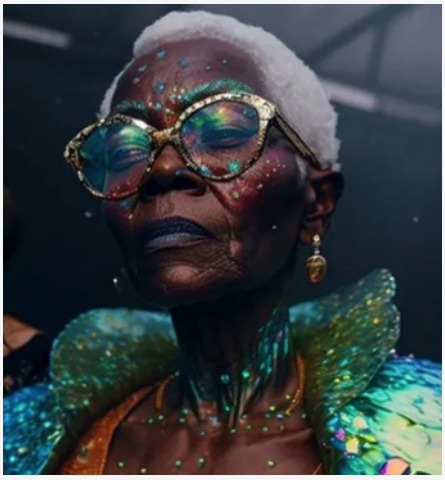
In Kenya, Apollo Agriculture uses AI and machine learning to bring commercial farming to smallholder farmers and provide them with access to credit, farming advice, supplies they can collect locally and market information and connections[51]. Also in Kenya, Farmshine is a platform which aggregates farmers, buyers and service providers on a single platform to trade on mutually beneficial terms, as buyers prefer to trade with one seller rather than many smallholder farmers[52]. Sadly, Gro Intelligence, a similar Kenyan market intelligence platform, closed down in 2024, after experiencing financing difficulties[53]. In energy, in Zimbabwe, NeedEnergy is enabling energy consumers to make use of solar power using big data analytics, ML and AI to design tailormade energy solutions.

AI is raising many issues, such as the blurring of boundaries between facts, misinformation and disinformation, or the merging of real world and virtual worlds. In developed countries, debates around AI and job substitution and replacement have taken centre-stage. Technological developments are having massive impacts on society, art and culture. For example, Box 7 explores the use of AI to develop fashion avatars of elderly models wearing African fashions.

44 https://adara-group.com/our-story/
45 https://www.orange.cm/fr/orange-my-farm/clinic-agro.html?srsltid=AfmBOorCpvKA8hkXZl2xldwFjUuWHBHll_9WXO65ABY9fJDNA9mLzHUX#?controls=0
46 https://agri.hyphentech.tech/
47 https://africasmartcitizens.com/
48 https://tolbi.ai/fr/about
49 https://www.agripredict.com/services#warning
50 https://netagrow.com/
51 https://www.apolloagriculture.com/about
52 https://www.farmshine.io/
53 https://www.dabafinance.com/en/news/la-start-up-kenyane-gro-intelligence-sp-cialis-e-dans-les-donn-es-climatiques-ferme-ses-portes

Box 7: Reimagining African fashions for seniors using AI in Nigeria

Artworks generated by AI are sometimes controversial. Nigerian filmmaker and artist Malik Afegbua is making a case that it can challenge us to create a better real world - and a more stylish one for older people. The models are not actual, real people, but the result of Afegbua's imagination and AI software, showing older-looking models in beautiful clothes. One obvious objection is that there are real elderly people, and real fashion designers, who could have been photographed in the real world, but Malik Afegbua argues his attractive images offer hope.



The same artist has mixed traditional African Nigerian fashion with something 'Afro-futuristic' in his Fiction series to represent the people of Ngochola, an imagined ancient African civilization in a world of his creation dating back to 250,000 years ago, inspired by the stylings of Black Panther's Wakanda army.

Source: Fashion Show for Seniors, "The Nigerian AI artist reimagining a stylish old age", 15 January 2023: www.bbc.com/news/world-africa-64260739 and https://www.instagram.com/slickcityceo/p/CmI6O-TtdFh/?img_index=7

The acceleration of the digital ecosystem through the global adoption of AI has impacted artists and cultural professionals whose online digital content is feeding generative AI. Today, many of these individuals as well as associations representing them are calling for policies and measures to protect their intellectual property rights, demand fair remuneration, transparency

and co-creation of AI tools that respect the UNESCO 2021 Recommendation on the Ethics of AI. There is a pressing need to strengthen the role of culture in the implementation of AI, recognizing culture as a key driver of AI innovation. Currently, 'culture' and the cultural and creative sectors are largely missing from national and regional AI policies, measures, and regulations (Insight 6).

Insight 6: Protecting Cultural Heritage and African Intellectual Property (IP)

Currently, 'culture' and the cultural and creative sectors are largely missing from national and regional AI policies, measures, and regulations, and UNESCO will host the MONDIACULT 2025 World Conference on Cultural Policies to mobilize Ministers of Culture from around the globe to review progress made on implementation of the MONDIACULT 2022 Declaration, notably regarding the structural impact of digital transformation on the cultural sector.

WIPO and other UN agencies together with many NGOs (notably, CISAC and IFRRO) are working to protect IP rights of artists and cultural professionals in the digital environment. For example, WIPO and CISAC are collaborating to empower African creatives through their timely capacity-building programme "CLIP" (Creators Learn Intellectual Property).

Following UNESCO's 2017 Operational Guidelines on implementation of the 2005 Convention on the Protection and Promotion of the Diversity of Cultural Expressions in the Digital Environment, UNESCO has been supporting Ministries for Culture with developing policies and measures to protect and promote the diversity of cultural expressions in the digital environment. Our UNESCO Policy Monitoring Platform currently features 352 examples of these policies and measures. For instance, in 2021, Côte d'Ivoire launched a project to expand Wi-Fi infrastructure across all public universities, aiming to provide affordable Internet access for students and staff. This initiative was driven by a collaboration between the Ministry of Digital Economy, the Ministry of Higher Education, and INSAAC (Institut National Supérieur des Arts et de l'Action Culturelle).

In response to evolving digital challenges, in 2024, UNESCO established a Reflection Group on the Diversity of Cultural Expressions in the digital environment who have formulated recommendations for the promotion of the diversity of cultural expressions in the digital environment, which will be presented at the eighteenth session of the Intergovernmental Committee for the Protection and Promotion of the Diversity of Cultural Expressions, in February 2025. Their recommendations are focused on linguistic diversity of cultural content; discoverability of national and local cultural content; transparency regarding cultural issues, notably artistic freedom; and impact of AI on the cultural and creative industries.

Although many artists and cultural professionals from Africa face the same challenges as others, their content may be less readily available online than artist and cultural professionals from "developed countries". This may be an opportunity for Africa to leapfrog the risks of IP infringement from Generative AI by imposing policies and measures to protect African creatives, before the majority of African artists' content is posted online and eventually used in the AI ecosystem.

As the African Union 2024 Continental AI Strategy notes: *"Africa's nascent digitalisation process of its heritage and culture is making it less vulnerable to AI misuse and presents opportunities for the effective protection of its identity online as well as Africa's demographic makeup, characterised by a youthful population that largely consists of digital natives, further accentuates this trajectory" (AU AI Strategy, 2024, p. 24).*

Sources: UNESCO and the African Union 2024 Continental AI Strategy.

12 Conclusions

African countries are generally experiencing strong growth in ICTs, albeit with generally lower average income levels and slower adoption rates than some other countries and regions. Africa's vast and varied geography makes the roll-out of terrestrial communication infrastructure to remote areas more challenging. The mobile sector has proved especially successful, with strong growth in mobile broadband and the development of large mobile operators (such as Vodacom and MTN). Technological developments, government commitments and strong investments by the private sector are boosting growth in ICTs and satellite connectivity.

As a result, Internet usage in Africa continues to increase steadily, driven by growth in demand, with more affluent households adopting Internet access for communication, work and/or education. However, challenges still persist in terms of quality of experience and affordability. Given the large rural and remote areas found in many African countries, the central challenge of overcoming the urban-rural divide is even more important for African countries, especially landlocked countries with the additional problem of transit. The digital gender divide is also marked for Africa.

The future of connectivity in African countries will rely on using an effective mix and combining the strengths of different technologies to increase economies of scale, cost efficiency and coverage to deliver more advanced services to users. The strong expansion of submarine cables has helped reduce latency, increase bandwidth capacities, and lower Internet costs. The number of IXPs in Africa has also increased steadily, making domestic exchange of Internet data traffic more efficient and avoiding wasting valuable international bandwidth. Satellite connectivity has exploded, offering prospects of providing satellite connectivity to mobile handsets.

Many African countries have strengthened their ICT regulatory frameworks; however, policy and regulatory frameworks often still tend to lag behind global trends. Countries still need to adopt robust digital policies that drive infrastructure investment, targeted initiatives in digital identity and skills, and cross-sector collaboration to improve regulatory frameworks. There is progress in the number of countries adopting legislation on data protection/privacy, e-transactions, consumer protection and cybercrime. More recently, the African Union has undertaken policy initiatives and designed a Policy for Data Protection and a African Union 2024 Continental AI Strategy and Implementation Road Map.

Around the world, governments and regions are grappling with how to adapt regulatory frameworks for AI, and African countries are seeking to adapt and adopt these technologies in their own ways. Limited training data in terms of online texts and images means that results from AI platforms may be biased and neither fully representative nor accurate for African contexts. Google Translate now supports around 25 African languages (with a larger number of dialects).

AI applications are being developed for translation, video dubbing, storytelling, business intelligence and trade competitiveness. Promising areas for further growth include AI applications to boost crop yields, efficient water irrigation, pest and disease detection in agriculture. Artists are also exploring the use of AI tools, with efforts underway to protect the Intellectual Property (IP) rights of artists and cultural professionals in the digital environment.

Africa is making steady progress in digital connectivity, thanks to collaboration and initiatives among governments, the private sector and civil society. African entrepreneurs and people are exploring ways to create, use and apply digital technologies for their needs and purposes.

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