chapter 7 Fibre

Mike Last,
group chief marketing officer,
WIOCC Group

Expanding across the continent

Subsea

As predicted in last year's chapter introduction, 2023 has very much been the year of the African mega-systems. The 12,000km Google Equiano cable, containing 12 fibre pairs with 144Tbps design capacity was declared live between South Africa and Portugal early in the year, with landings in Togo, Nigeria, and Namibia. The St Helena branch was activated on 1 October 2023

The Meta-led 45,000km 2Africa cable, with a design capacity of up to 180Tbps on key parts of the system, continues its deployment, ultimately landing at 27 locations across 19 African countries. 2Africa is expected to be fully operational by late 2024, with the eastern seaboard and the Mediterranean Sea expected to come online earlier than this.

As well as increasing inter-continental and inter-country connectivity, these new subsea cables bring other significant benefits. Designed and implemented over cable routes that are diverse to existing subsea systems and with numerous new landing points on Africa's coastline, the cables offer capacity purchasers the opportunity to build greater resilience into their networks and service offerings to customers. The need for more diversity in subsea connectivity was clearly demonstrated in early August when an incident · reported to be a rockfall off the Congo coast · damaged the West Africa Cable System (WACS), South Atlantic 3 (SAT3), Africa Coast to Europe (ACE) and an Angola domestic festoon system, causing widespread network disruption throughout the region. Some service providers were able to implement restoration via east coast subsea systems (although with increased latency and, in some cases, considerable network congestion) and on the new Equiano cable throughout the month it took to complete repairs to the cables and bring them back into full service.

Another key feature of the two new systems is that they are based on open access principles, enabling service providers to access capacity at carrier-neutral data centres and open-access cable landing stations on a fair and equitable

basis, supporting the development of healthy internet ecosystems.

Owners of the PEACE cable, a 12,000km multi-Tbps system (up to 192Tbps on some segments), announced plans to extend the system to Singapore by mid-2024, adding around 13,000km to the system.

New submarine cable builds announced in 2023 include T3, a 45Tbps, 4 fibre-pair system reinforcing the route between South Africa, Mauritius, Reunion and Madagascar, and the Angola-domestic Unitel North Submarine Cable (UNSC), a 1,145km, 38.4Tbps subsea cable comprising two segments running across the mouth of the Congo river. In addition to connecting the province of Cabinda, the UNSC cable also includes branches to connect offshore oil and gas platforms. Finally, the Africa-1 consortium is continuing discussions to bring further subsea connectivity to the east coast of Africa.

Terrestrial

The termination of increasing volumes of international subsea capacity into Africa is a key driver for investment in terrestrial infrastructure. Widespread deployment of 4G/5G mobile technologies continues to underpin mobile broadband rollout, whilst the growing implementation of FTTX is also supporting the increase in remote working practices. Finally, the ongoing migration of services and applications into the cloud, supporting digital transformation in Africa, completes the major influences driving further investment in terrestrial fibre infrastructure.

According to Hamilton Research, Africa's total inventory of terrestrial fibre optic transmission networks passed the milestone of 1 million route-kms during 2018. By June 2023 the amount of operational fibre optic network reached 1,279,026km, compared to 936,102km in 2018 and 524,847km in 2013. In the twelve months since June 2022, an additional 94,998km of fibre optic network has entered service, an average of 260km of new fibre optic network entering service per day. In addition, there was in June 2023 a further 116,580km of fibre optic network under construction, 133,830km planned, and 68,805km proposed.

Approximately one-fifth of the total fibre inventory in sub-Saharan Africa is within cities: of the inventory of 1,279,026km of operational terrestrial fibre in June 2023, at least 294,192km was metropolitan fibre rings and FTTH/B (fibre-to-the-home/ building) networks. These metro rings distribute bandwidth from fibre optic nodes to districts and suburbs around each city. The FTTH/B networks provide the last mile access, delivering fibre bandwidth right to the door.

As in 2022, pan-African operators including Airtel, Liquid Intelligent Technologies, MTN, Paratus, and WIOCC have once again announced network builds in numerous countries during the year.

Many of the 38 fibre network operators (FNOs) in South Africa have continued to build out national backbone routes and have significantly extended their FTTH/FTTB networks. Nine of these pass over 100,000 customers, In August, Vumatel announced that its residential Fibre-to-the-Home (FTTH) network had reached 50,000km, and that it passed more than 2 million homes. At the same time, OpenServe announced that its own fibre networks passed over 1 million homes, up 24.4% year-on-year, with more than half a million homes connected to fibre. MetroFibre, the fourth largest operator, announced plans to pass an additional 85,000 to 100,000 homes on its network during 2023.

West and Central Africa has also seen significant network deployments this year. In February, a ceremony was held in Bangui to inaugurate the completion of a cross-border link from Central

African Republic (CAR) to Congo. This component of the Central Africa Backbone (CAB) project saw the completion of 935km of terrestrial and sub-river fibre-optic network, constituting the first sections of the national optical backbone in CAR and interconnecting the neighbouring countries of CAR, Cameroon and Congo. In March, a new festoon submarine cable entered service connecting Guinea Bissau to the Africa Coast to Europe (ACE) cable in Dakar (Senegal) – making it the first submarine cable to land in Guinea Bissau, previously the only coastal country in West Africa without direct connection to a submarine cable. March also brought activation of Fast Congo's 620km route between DRC's capital city Kinshasa and Muanda, the landing point of the WACS submarine cable. This was more recently complemented by Silicone Connect's deployment of a cable across the Congo river interconnecting Brazzaville (Congo) and Kinshasa. July saw a new cross-border fibre route completed by Unitel Angola and Bayobab Zambia interconnecting Karipande (Angola) and Chavuma (Zambia).

In the East Africa region, Liquid Intelligent Technologies (LIT) announced the deployment of a new 16,576km terrestrial fibre route connecting Mombasa (Kenya) to Johannesburg (South Africa). The Tanzania Telecommunications corporation (TTCL) signed a contract with Huawei to expand the National ICT Broadband Backbone (NICTBB) fibre optic backbone by 1,520km in 23 districts, and signed a further contract to interconnect with neighbouring Mozambique via a 72km extension running between Mangaka and Mtambaswala.

At WIOCC, our fibre pair investment on Equiano is already driving improved services to our clients. During the west coast cable outages in August, we were able to transition clients' traffic onto our Equiano capacity in a matter of hours, as well as helping many other major players in the industry, including those who were not clients previously, to restore connectivity services at short notice. We have also continued to expand our terrestrial infrastructure in key countries, particularly in South Africa and Nigeria - where we have our own 16Tbps-ready national networks - and across much of the SADC region, including Zambia and Malawi. ■

Léa Zouein,
analyst MEA, Dataxis

The market is largely dominated by mobile internet

In 2022, less than 5% of African households were connected to fixed broadband and only 1% to fibre while mobile internet had a population penetration rate of about 45%. This shows the importance of 4G and 5G technologies to reach connectivity in the region.

In sub-Saharan Africa, mobile internet has been a substitute for fixed line which are few and expensive. Not only is mobile internet more accessible, but owning a smartphone is also becoming more common, as shown by the population penetration rates in a range of countries including South Africa (65.73%) in 2022 and Kenya (51%). While 4G would enable a broader and simpler usage of applications such as video streaming, 5G is for now primarily destined for industry usage and to support the deployment of IoT.

However, several issues are still at stake in

the region, preventing a complete development of mobile broadband: technical (deployment of a functional network), financial (price of subscriptions and smartphones) and geographical (how to cover the most remote rural areas) difficulties remain.

For the time being, the low growth of 4G is mainly due to technical constraints as operators need to set up efficient network coverage both in cities and in the more isolated rural areas. Since more than 60% of the sub-Saharan population lives in rural areas, one of the major challenges for telecom companies is to extend their networks and increase the population penetration rate of mobile internet (around 45% in 2022), and 4G subscriptions (around 14% in 2022).

While most countries have a functioning 4G network, very few have begun to commercialize 5G: for instance, Kenya since Q2 2022 through Safaricom offers or Nigeria since Q3 2022 through MTN. More recently, in Q1 2023, both Tigo and Vodacom began commercializing 5G in Tanzania. In Mozambique, Vodacom also began offering 5G subscriptions from Q2 2023. Still, population penetration rate remains low: 0.6% in Nigeria, 0.1% in Tanzania or 0.2% in Mozambique.

The development of both 4G and 5G is still far from complete. However, with the strong demand and the increasing number of licenses issued by regulators, it is estimated that the number of 5G subscriptions will be multiplied by three, and 4G subscriptions by two until reaching 48% of mobile internet subscriptions. The simultaneous development of 4G and 5G allows sub-Saharan Africa to meet the growing demand for connectivity coming from its population, and to set the ground for technological progress and improvements on industry applications.

Fixed broadband infrastructure, especially fibre, is struggling to develop

Fixed infrastructures, and especially fibre, are only starting to develop.

In sub-Saharan Africa, a two-speed connectivity development is currently occurring. On the one hand, in the most developed countries, fibre is the most widely used technology for fixed internet access. This is the case in Kenya with 55% of fixed wireline and wireless internet subscribers receiving fibre against less than 0.5% counted on the xDSL access at Q2 23. In Ivory Coast, fibre subscriptions account for 57% of fixed internet against less than 0.5% for xDSL. On the other hand, in most countries, xDSL remains the main connection mode to bring the internet to African homes. In 2022, in Burundi, xDSL accounts for 92% of fixed internet subscriptions while fibre accounts for only 2%. In Ethiopia, it's 87% of xDSL against 13% of fibre subscriptions. It is estimated that there will be a turnover between xDSL and fibre subscribers between 2027-2028 in many countries where xDSL prevails today. In different countries such as Democratic Republic of Congo, Botswana or Ivory Coast for instance, fibre subscriptions are expected to double by 2028.

In general, network operators follow a similar pattern across Africa: the first fibre deployments are taking place in the largest cities of the countries, usually in capital cities and then in the other major towns. This strategy is explained by a stronger potential market in these areas but also by ease of installation and cost reduction. For instance, after establishing its CanalBox fiber service in Ouagadougou in Burkina Faso in June 2021, Vivendi Africa Group (GVA) extended its network to the country's

second city Bobo-Dioulasso in May 2022. The same model took place in Gabon where GVA launched its fibre offer in Libreville in October 2017 and then in Port-Gentil in June 2022. The potential market is more important in major cities, where many profitable and connected businesses have established their offices, where the population density can create fundamental economies of scale for fibre operators, and where ISPs will find most households with high purchase power, required to subscribe to the costly fibre service. The next step will be to extend these services to the rural areas, where most of the African population lives but which remains very poorly connected to broadband.

The low connectivity rate coupled with the high demand represents an important opportunity for all players, provided that the current cost constraints are successfully overcome. At the dawn of a promising market, the challenge is to balance fiber deployment with profitability. In the most advanced country, such as South Africa, mergers allow network operators to increase their area of influence.

South Africa: a promising market?

South Africa is indeed one of the most developed countries in the region in terms of telecommunications. The country has succeeded in establishing the mobile internet infrastructure needed for 4G to spread successfully. In 2022, 75% of South Africans were connected to 4G on their mobile phones. This figure is expected to rise to over 90% by 2028. However, the country is still in the early stages of 5G developments. The delay in the transition to digital television has contributed to the slowdown in the deployment of 5G. Cutting off the analogue signal should free up bandwidth for mobile internet.

Telecom operators are also steadily increasing their investment in the fixed network. Vumatel is the market leader with 2 million homes covered by fibre at Q3 2023, an increase of 25% in one year. On 9 November 2022, the Independent Communications Authority of South Africa (ICASA) approved the takeover of part of the company by Vodacom which itself covered around 165,000 homes in the second quarter of 2023. The purpose is to consolidate the existing fibre coverage and to outperform OpenServe, which follows closely behind Vumatel with more than 1.1 million homes passed at Q2 2023.

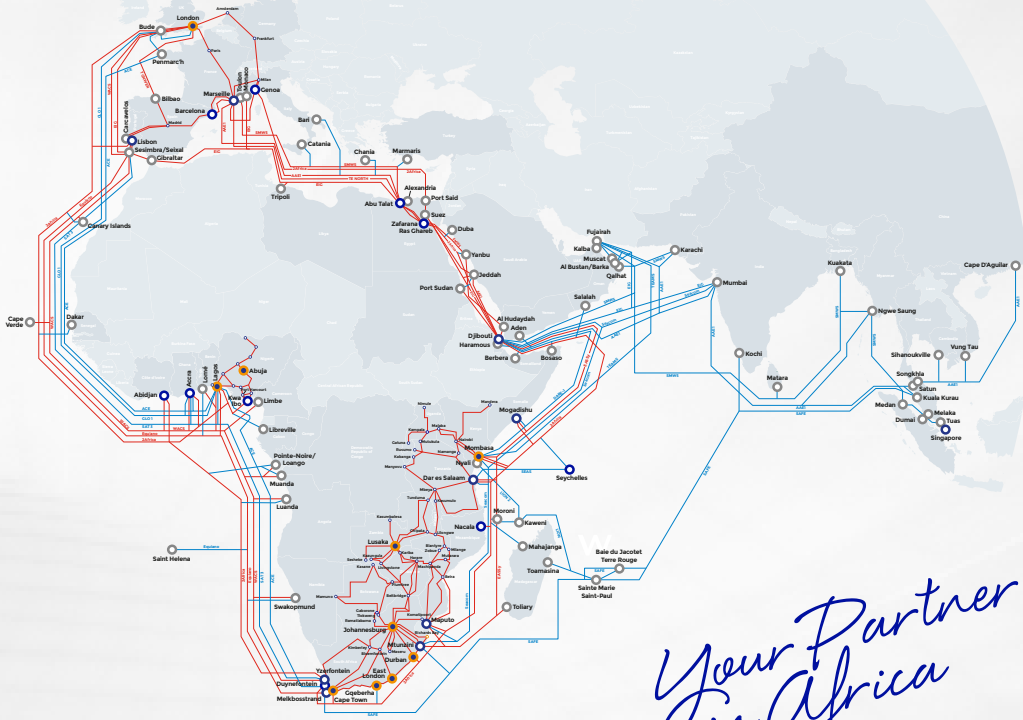
To go further, in February 2022, Vumatel bought a 45% stake in the operator HeroTel whose network covered about 500,000 households at the same time. These commercial transactions are the witness of a more than dynamic market. In 2022, only 8% of homes in the country were connected to fibre, which represented 32% of fixed internet subscriptions. However, it is estimated that between 2022 and 2028, the number of fibre subscriptions will almost double. And yet, it will only represent 11% of households in 2028.

What to expect for the market?

Fixed broadband is far from being widely adopted. To face the lack of infrastructure and high installation costs, some companies are making the craziest bets, as shown most recently by Starlink for instance, which started its commercial activities in Nigeria and aims to cover the most isolated areas with some 2,000 satellites in orbit around the Earth. While the kit costs $599 in the US, it will only cost $99 in Nigeria. Although the amount remains very high for the region, it reflects a desire to make it affordable.

WIOCC

Africa's Digital Backbone



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The company does not intend to stop there, having obtained in 2021 a license in South Africa, in February 2022 a license in Mozambique and in October 2022 a license in Malawi. However, the price remains extremely high compared to the inhabitants' income.

Starlink is not the first company to try new methods to connect more Africans to the internet. Loon, a subsidiary of Alphabet, the parent company of Google, abandoned in 2021 its project of stratospheric balloons floating over Kenya to bring 4G to the population. This idea is now taken up by World Mobile, which has obtained a license in Zanzibar and Tanzania and expects to obtain one in Kenya.

Meta's Aquila project to provide internet via high-altitude drones was also shut down in 2018, as were the company's WiFi hotspots, which are all expected to be deactivated by the end of 2022.

Thereby, whether via fibre, satellite, or drones, the challenges of fixed broadband connectivity in Africa are at the heart of heavy investments for operators who want to conquer this promising market. Broadband deployment should not be considered as an isolated issue in each country, but rather as a whole in the entire region. Not only do fibre networks often cross borders, either because operators are present in several countries or because of collaborations, but it also brings African economies closer together and accelerates the development of the whole region.

Although fibre seems to be the most likely evolution because of its attractive amortization, all innovations are beneficial to connect all the populations of the region, even the most isolated, to a quality, reliable and affordable network. The economic perspectives that can be activated by an improved connectivity to global networks will undoubtedly continue to foster initiatives from operators, well aware of the region's hidden potential. ■

Paul Hamilton,
managing director, Hamilton Research

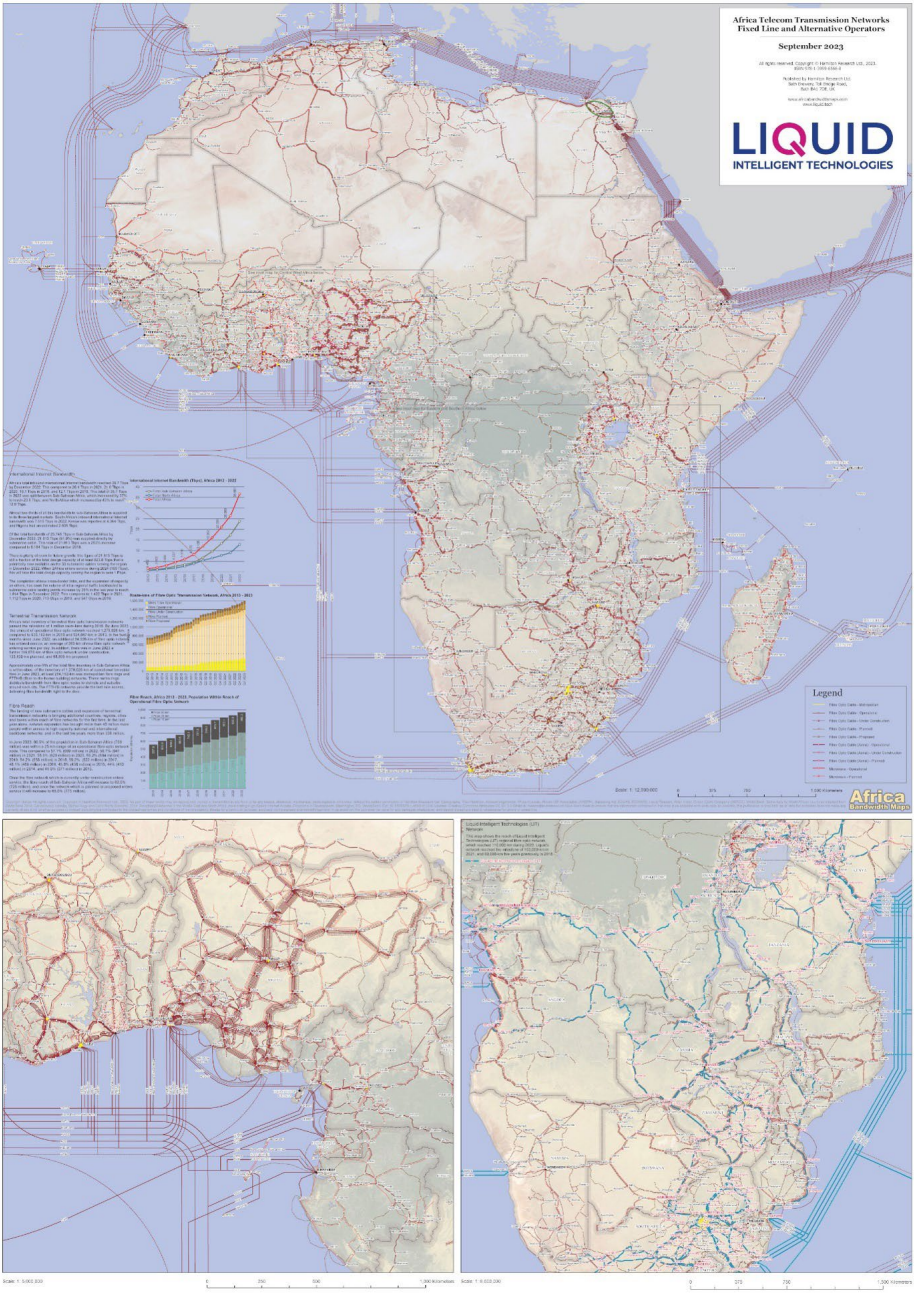
International internet bandwidth

Africa's total inbound international internet bandwidth reached 36.7Tbps by December 2022. This was a 39% increase compared to 26.4Tbps in 2021, 21.0Tbps in 2020, 16.1Tbps in 2019, and 12.1Tbps in 2018. This total of 36.7Tbps in 2022 was split between sub-Saharan Africa, which increased by 37% to reach 23.8Tbps, and North Africa which increased by 43% to reach 12.9Tbps.

"Once the fibre network which is currently under construction enters service, the fibre reach of sub-Saharan Africa will increase to 62.0% (726 million)."

Almost two-thirds of all this bandwidth to sub-Saharan Africa is supplied to its three largest markets. South Africa's inbound international internet bandwidth was 7.515Tbps in 2022, Kenya was reported at 4.364Tbps, and Nigeria had an estimated 2.535Tbps.

Of the total bandwidth of 23.748Tbps in sub-Saharan Africa by December 2022, 21.813Tbps (91.9%) was supplied directly



2023/4 Africa Telecom Transmission Map. Republished with kind permission of Hamilton Research Ltd www.africabandwidthmaps.com

by submarine cable. This total of 21.813Tbps was a 253% increase compared to 6.184Tbps in December 2018. The completion of new cross-border links, and the expansion of capacity on others, has seen the volume of intra-regional traffic backhauled to submarine cable landing points increase by 35% in the last year to reach 1.914Tbps in December 2022. This compares to 1.422Tbps in 2021, 1.112Tbps in 2020, 713Gbps in 2019, and 547Gbps in 2018.

Fibre reach

The landing of new submarine cables and expansion of terrestrial transmission networks is bringing additional countries, regions, cities, and towns within reach of fibre networks for the first time. In the last year alone, network expansion has brought more than 40 million more people within access to high capacity national and international backbone networks, and in the last ten years more than 338 million.

In June 2023, 60.5% of the population in sub-Saharan Africa (709 million) was within a 25km range of an operational fibre optic network node. This compared to 57.1% (669 million) in 2022, 56.7% (647 million) in 2021, 55.9% (620 million) in 2020, 55.2% (584 million) in 2019, 54.2% (556 million) in 2018, 55.2% (522 million) in 2017, 48.1% (469 million) in 2016, 45.8% (436 million) in 2015, 44%, (410 million) in 2014, and 41.8% (371 million) in 2013.

Once the fibre network which is currently under construction enters service, the fibre reach of sub-Saharan Africa will increase to 62.0% (726 million), and once the network which is planned or proposed enters service it will increase to 66.0% (773 million).

"The landing of new submarine cables and expansion of terrestrial transmission networks is bringing additional countries, regions, cities, and towns within reach of fibre networks for the first time."

Terrestrial transmission network

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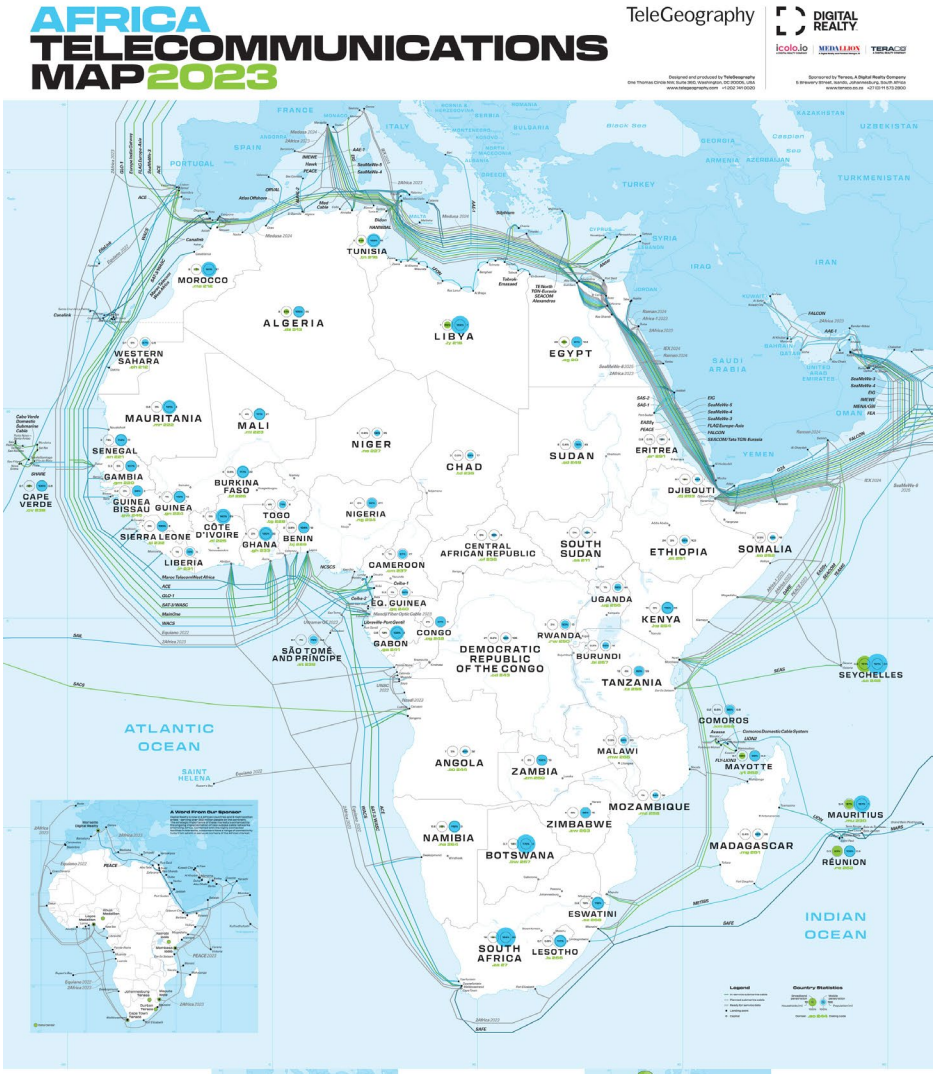
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Ângelo Gama,
CEO of Angola Cables

The global economy has been slow to recover from the COVID-19 pandemic and more recently, the social and political disruptions caused by the conflict in Ukraine and the Middle East. These adverse developments have also had a negative impact on the Pan-African economy. Economic growth in sub-Saharan Africa has slowed to 2.5% in 2023, from 3.6% in 2022.

From an Angola Cables perspective, we feel the impact of the economic downturn. Many client budgets are under pressure, and within a competitive marketplace, it is our responsibility to ensure that we deliver not just on price, but on the intrinsic value of our solutions and services. As an integrated ICT services and solutions provider, we offer both wholesale and enterprise solutions that help business expand and grow - and this is a vital ingredient for a buoyant economy. Our robust international backbone network continues to provide express connections for businesses and users to connect to the world. Now, with the establishment of the Telcables subsidiary businesses in Nigeria and South Africa, we are in a position to offer localised solutions and a suite of services suited to the local environment.

"We are of the view that the global economy and the economies of Africa will take some time to stabilise and recover and this will have an impact on our planning and future investment."

"Southern Africa should continue to grow - but this will largely be dependent on managing the future electricity generation challenges. We also expect markets in West Africa to flourish following several crossborder projects and some of the new cables connecting countries such as Nigeria, Cote D' Ivoire, Ghana, and others."

We are of the view that the global economy and the economies of Africa will take some time to stabilise and recover and this will have an impact on our planning and future investment. Our focus is on expanding our Clouds2Africa solution and increasing traffic across our broad global network. Apart from having express global routes, our sub cable network offers redundancy options which are important for mobile network operators (MNOs), ISPs and content providers. This was made apparent when the West African Cables System (WACS), SACS, SAT-3 and ACE subsea cables experienced a fault that impacted internet connectivity and traffic speeds to and from Africa. As a result of this, Angola Cables was able to make capacity available on SACS and through its partnership on the Equiano Cable to assist businesses and customers minimise disruptions and offer redundancy measures for customers during the extended period it took for the fault to be repaired.

Partnerships and collaboration (or a recently coined term - 'coopetition') is the name of the game. Alliances are important and will be so in the future - especially where capital intensive investments will need to be made. We also believe that data centres will play an increasingly vital role in the expansion of digital networks and cloud computing ecosystems.

There are several differences between the telecom and ICT landscapes in Africa and other regions of the world. These differences are influenced by a variety of factors, including economic development, infrastructure, regulatory environments, and unique challenges specific to each region. Success in the future telecoms/ICT market will depend on how readily operators and service providers can adapt and provide smart, flexible solutions within a specific geography or region. ■

"Partnerships and collaboration (or a recently coined term - 'coopetition') is the name of the game. Alliances are important and will be so in the future - especially where capital intensive investments will need to be made."

Looking ahead: In 2024 and beyond, we believe the adoption of cloud computing and 5G technologies will drive the expansion of connectivity in Africa. We can expect to see much more competition in the cloud space. The introduction of other cloud operators - apart from the big players such as AWS, Microsoft Azure, Google and Alibaba will offer more bespoke and flexible cloud solutions. Our Clouds2Africa offering is well-suited to a range of enterprises from large to small and this solution offers a range of services that can be customised quickly and efficiently.

Regionally speaking, Southern Africa should continue to grow - but this will largely be dependent on managing the future electricity generation challenges. We also expect markets in West Africa to flourish following several cross-border projects and some of the new cables connecting countries such as Nigeria, Cote D' Ivoire, Ghana, and others that they will have access to.

In 2023, Angola Cables has established independent entities in both Nigeria and South Africa under the TelCables brand. In addition, our new node in West Africa gives businesses the option to connect to more than 300 nodes worldwide. In support of our businesses in Nigeria and South Africa, we have a global presence that can offer local solutions that are ideally configured for the unique needs and demands of businesses across central and southern Africa.

The Angola Cables network recently reached the highest peak of 12,664Tbps of data traffic across its international transmission and data internet backbone. The increase in traffic has been recorded over its subsea cable network which incorporates the SACS, Monet and WACS cables and its onward connections to Europe and Asia. This is an historic milestone in the volume of traffic and we expect this traffic to grow exponentially in the future.

Companies like Angola Cables and its subsidiaries, TelCables Nigeria and TelCables South Africa, will continue to play a constructive role in connecting businesses across Africa. Our aim is to provide customers with with a single point connectivity solution that gives them flexible access to local and international markets where they will be able to securely transmit or receive digital data or content wherever their business may operate.

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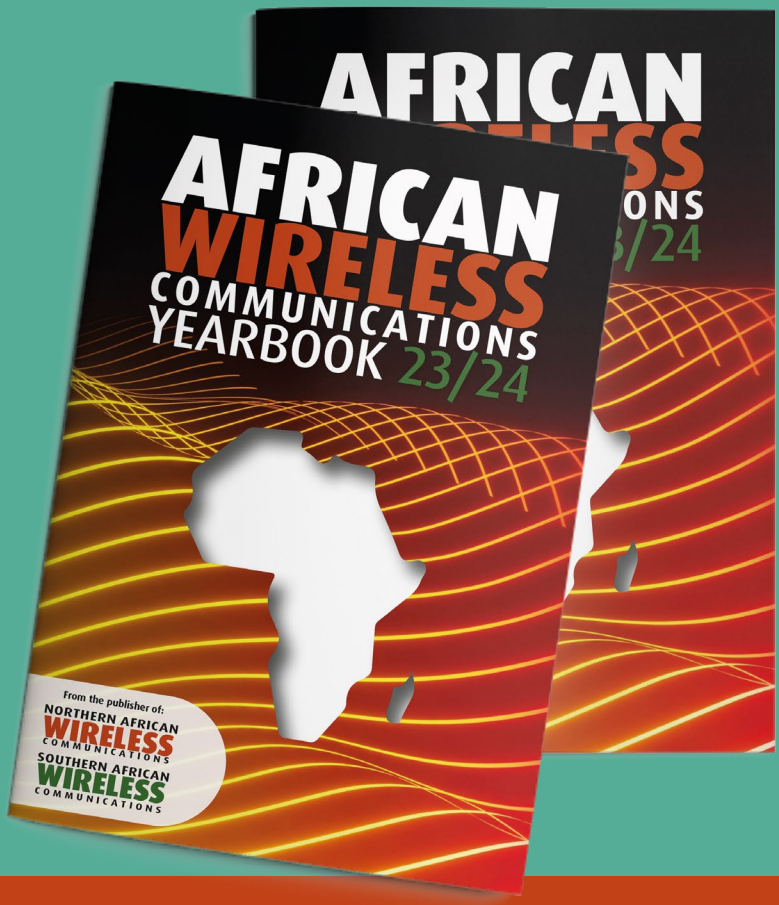

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Mike Last,
group CMO,WIOCC Group

In 2023, WIOCC celebrated 15 years of providing market-leading digital connectivity solutions into, out of, and within Africa.

Exponential growth in digital connectivity-dependent products and services this year have created a surge in demand for reliable, scalable, internet connectivity and placed a strain on existing infrastructure. To meet this need, WIOCC made significant strategic investments in subsea and terrestrial cable systems. We linked our open-access connectivity infrastructure to the carrier-neutral, open-access digital hubs of WIOCC Group company, Open Access Data Centres (OADC), providing a unique, flexible converged open digital infrastructure (CODI) offering that is accelerating the continent's digital transformation and helping content providers, carriers, ISPs, and major enterprises to expand their digital products and services into new markets, when and at the rate they want.

Africa is a diverse, unhomogenised continent where the needs, maturity and economic potential of individual countries and regions vary markedly. What is common is the desire within these markets for reliable, affordable access to high-capacity international connectivity.

South Africa and Nigeria will continue to be at the forefront of the continent's digitisation, meanwhile the transformative international connectivity brought by the recently landed Equiano and 2Africa cable systems will boost the local and regional economies, particularly within the countries where they have been landed.

There have been many user success stories from 2023, but WIOCC landing the Meta-backed, >180Tbps 2Africa cable system at Amanzimtoti, Durban, South Africa, into the open-access OADC Durban data centre, is right up there as it has made this transformational additional international connectivity readily accessible to all providers.

Local data storage and processing are crucial for data sovereignty, reduced latency, data privacy and compliance, enhanced security, bandwidth optimisation, data accessibility, and support for the local economy. Storing data for clients in-country ensures that sensitive information is governed by local laws and regulations, strengthening data sovereignty and protection. Processing data locally minimises latency, benefiting real-time applications and providing a better user experience. It also helps organisations comply with strict data privacy laws. Moreover, local storage enhances security by reducing exposure to external cyber threats. Bandwidth optimisation and improved accessibility during disruptions are further advantages of local data storage and processing.

In certain markets, a protectionist stance adopted by incumbent operators and major players further compounds challenges. These entities may resist open competition, thereby impeding the development of a healthy, competitive environment that could foster innovation, drive down costs, and enhance overall connectivity options. ■

Looking ahead: In the next year, rapid urbanisation will increase demand for digital infrastructure, including internet connectivity and data centres, because the higher concentration of people necessitates network upgrades and last-mile connectivity expansion. Simultaneously, urbanisation leads to greater adoption of digital services, such as e-commerce and online banking, driving digital transformation across sectors like healthcare, financial services, and education.
The urban market presents lucrative opportunities for carriers, ISPs, MNOs, and businesses across Africa offering digital solutions, but it also intensifies competition, requiring constant innovation.

Wim te Niet,
vice president EMEA, EXFO

EXFO has made considerable progress in Africa over the last year, especially regarding Adaptive Service Assurance (ASA). We have successfully extended deployment of EXFO's best-in-class dynamic topology Context solution in the MTN network. EXFO's ASA platform models fibre optic networks, providing critical insight to detect and diagnose issues before outages or degradation of service can take place. In addition, we have been pleased to maintain a solid footprint of passive monitoring in networks that serve western and southern African markets.

We've seen several challenges on the continent this year. The major increase in power cuts due to such issues as aging infrastructure has led to operators having spent millions of dollars on power back-up systems; recession resulting from the pandemic has affected telco business in Africa overall; and the high cost of connectivity is still an important barrier to more extensive telco services penetration in some African markets.

However, we've also seen opportunities. Optical fibre testing and monitoring is in high demand because of massive deployment of FTTH networks. 5G network deployment is an important opportunity for EXFO's Adaptive Service Assurance portfolio, enabling new technology introduction for African operating companies. We're also seeing demand in the areas of submarine fibre optic cables and data centres.

Mobile payments service still have very important penetration in Africa with 70% of total volume worldwide. In some African markets, more than 80% of internet users use mobile payments. EXFO is actively supporting its African partners to proactively monitor this sensitive service through various Service Assurance solutions (passive or active monitoring, SensAI, Context).

When it comes to technology to support mobile networks, in some African markets 4G penetration is still low and operators are actively deploying 4G networks. That said, ZTO (Zero-Touch-Operations) is a recurring ask from our customers, especially with the increased complexity of networks. Overall, as in other geographies, trends of autonomous networking, AI, machine learning, 5G, and high-speed 400G networking are popular trends.

The African market is unique. The continent is vast, and that poses challenges to building fibre optic networks. This makes the monitoring of the fibre during the building phase critically important to ensure successful deployment. Furthermore, fibre cuts due to construction work, wild animals, and vandalism are common in Africa and cause almost daily outages. This is why a 24/7monitoring solution is highly recommended to support service continuity. Also, legacy technologies are still widely used in Africa (2G/3G) which makes the African telecom landscape unique. ■

Looking ahead: We strongly believe that optical fibre deployment - for both backbone networks and FTTH - will be the main technology driver for the African telecom market over the next two years. This will enable the expansion of 4G networks and accelerate adoption of 5G technology around the continent.

South Africa is expected to continue leading the telecom market in Africa thanks to an extensive fibre network and leadership in 5G adoption. Also, we believe countries like Algeria and Nigeria, which are seeing massive fibre deployment, will enjoy considerable improvement in their telecom infrastructure over the next two years.

We see Africa as an exciting and important market for EXFO. With more than 600 million mobile subscribers forecast by 2025, Africa has huge potential and EXFO strives to remain a key player in both test and measurement and service assurance throughout the continent.

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Since 2008 WIOCC, the leading player in the deployment of carrier-scale, future-proofed network infrastructure into Africa, has been helping transform Africa's digital landscape by introducing client-centric innovations.

With the flexibility and scale to meet the ever-growing demand for reliable, high-speed capacity throughout Africa, driven by end consumers, enterprise users and the ecosystem that supports them. WIOCC's policy of continual investment in our network to create Africa's first, truly hyperscale network infrastructure means ongoing investment for growth, ensuring our readiness to meet the future data volume demands of end users throughout Africa.

Operating exclusively as a wholesaler, we have revolutionised the delivery of high-capacity connectivity between Africa and the rest of the world. Widely recognised as Africa's carriers' carrier, we offer carriers, content providers, cloud operators, ISPs and mobile operators reliable, seamless, high-capacity connectivity between more than 30 African countries and key global financial and commercial centres.

Our focus on building and maintaining strong, long-term relationships with each client enables us to develop bespoke solutions that meet their current requirements and have the capability to match future demands for growth, extra resilience and geographical expansion.

WIOCC
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Fleet management

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Mobile Mark is a leading supplier of innovative, high performance antennas to wireless companies across the globe. We've been in the wireless industry for over 30 years and have our roots in the early Cellular trials. We have grown and evolved over the years, along with the industry. Today, we benefit from enhanced design capabilities and expanded production capacity – along with a greater understanding of new and emerging markets – all of which have allowed us to become one of the best antenna developers in our field. Our customers have been our partners throughout the years. We believe in taking the time to understand our customers' individual needs. Through close consultation with clients, we are able to deliver innovative, tailored solutions that meet specific antenna requirements. Rapid prototyping capabilities allow us to take our designs from concept to reality in an extremely short time span, and to verify the performance of the antenna. Mobile Mark antennas are used in many sectors of the wireless industry. Here are just a few examples:

- Emergency services
- Commercial fleet management
- Public transport & bus management
- Smart cities & smart highways
- Remote monitoring & surveillance
- Mining & exploration
- Asset tracking & RFID

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