chapter 6
Broadband

Danson Njue,
senior research analyst with Omdia

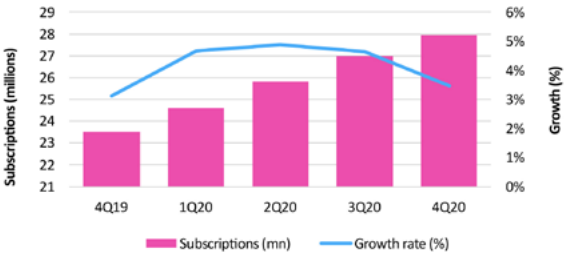
The fixed broadband segment recorded 18.8% YoY growth in active subscriptions, reaching 27.9 million by end-2020 compared to 23.5 million in 2019.

In 2020, a 19.6% YoY growth in fixed broadband revenue was recorded, with strongest growth recorded in 2H20, due to an increase in demand for home and office broadband services to support remote working and home schooling and entertainment.

Overall, Africa continues to see strong growth in the fixed broadband segment, driven by growth in consumer demand and the increase in the deployment of fiber and fixed wireless broadband (FWB) networks across several countries.

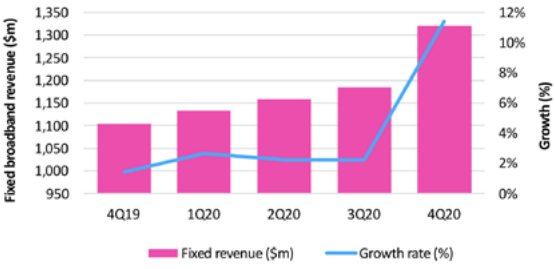
However, Africa's fixed broadband household penetration is significantly lower compared to other regions, hence creating a great investment opportunity for service providers.

Africa fixed broadband subscriptions and YoY growth



Source: Omdia

Africa fixed connectivity revenue and YoY growth



Technology market update

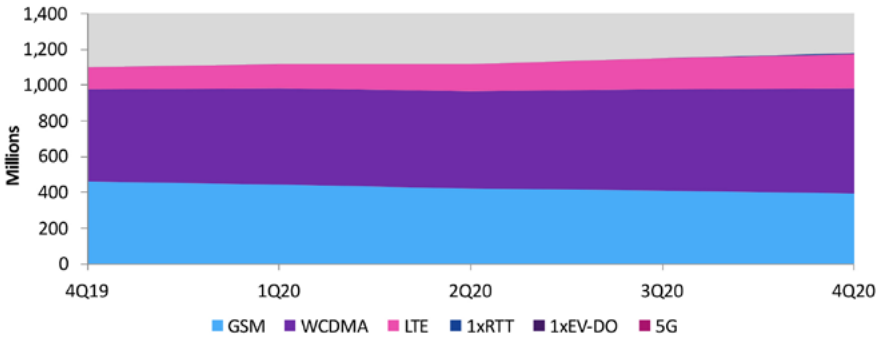
GSM and WCDMA were the dominant mobile technologies in Africa at end-2020, accounting for 33.4% and 50.2%, respectively. Mobile broadband technologies – 3G and beyond – accounted for the largest share (66.5%) of total mobile subscriptions in 2020.

Last year saw an increase in the expansion of mobile broadband networks, particularly 4G, by network operators to meet the capacity demands from consumers. In addition, there was a significant fall in data prices across many markets, which saw an increase in the uptake of data services.

Africa has seen a significant increase in the number of 5G network deployments with South Africa being the leading 5G market in Africa. Some of the mobile operators that have launched commercial 5G services include Vodacom, MTN South Africa, Safaricom Kenya, and Cable & Wireless Seychelles.

In the fixed broadband segment, xDSL, FWB, and FTTx were the dominant technologies, accounting for 57.3%, 34.8%, and 6.3%, respectively, at end-2020. FWB and FTTx are projected to be the dominant fixed broadband technologies in the future due to their convenience in offering high bandwidth to consumers.

Africa mobile subscriptions by technology, 4Q19–4Q20



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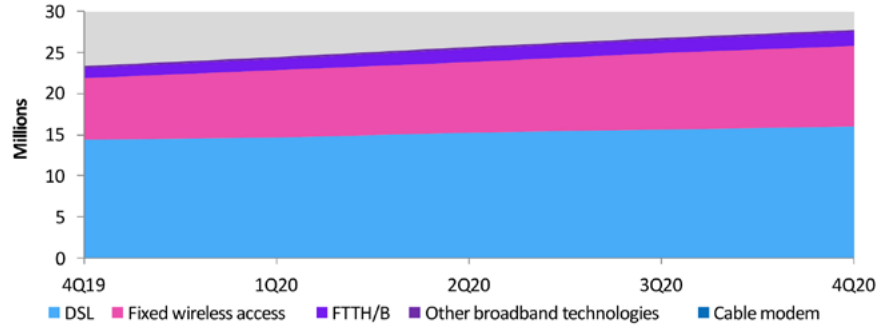
Africa fixed broadband subscriptions by technology, 4Q19–4Q20



Source: Omdia

Fixed broadband subscriptions forecast

Africa's fixed broadband market is projected to record strong growth with active subscriptions increasing from 28.3 million in 2020 to 43.8 million in 2026, a 54.8% growth. The growth will be supported by a strong uptake of FTTx and FWB services.

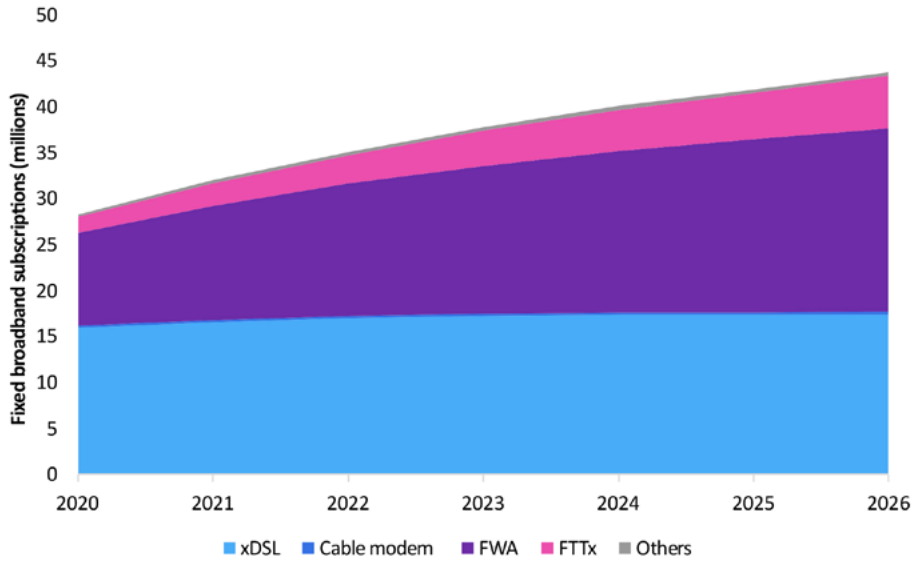
FWA will record 99% growth in active subscriptions over the forecast period, as more service providers choose LTE and 5G over WiMAX to offer wireless broadband services due to their relatively higher bandwidth and low latency.

FTTx subscriptions will grow by 219.8% by 2026 due to strong demand from consumers and an increase in fiber network deployment by service providers.

The fixed broadband market continues to attract new players, hence driving competition and lowering the prices for services.

"Covid-19 may be a blessing in disguise for regional telcos as they have been able to test their resilience during a pandemic. It has also unlocked many opportunities in the digital services segment"

Africa fixed broadband subscriptions forecast, 2020 –26



Source: Omdia

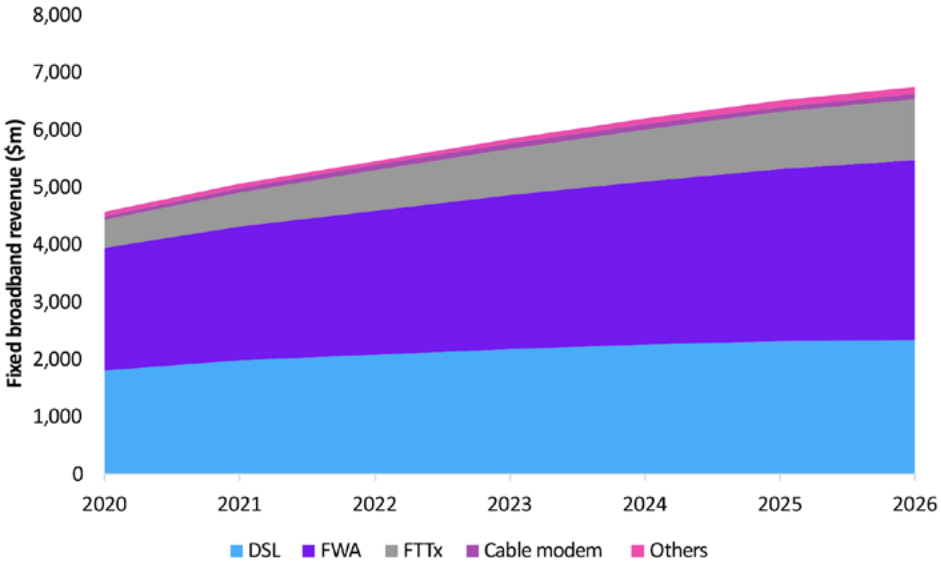
Fixed broadband revenue forecast

The fixed broadband revenue in Africa is projected to grow by 48.1%, increasing from US$4.6bn in 2020 to US$6.8bn in 2026. The growth will be supported by strong service uptake with all the technologies recording double-digit revenue growth over the period.

FTTx will record the highest revenue growth of 122.2% as more consumers and businesses opt for the technology due to the need for higher bandwidth for home and office use. Africa continues to record an increased optical fiber deployment as a key technology to power the region's digital economy.

FWA (which is provided via LTE and 5G) will record 46% revenue over the forecast period. 5G is still a new technology in Africa with only a handful of operators having launched the service. Lack of spectrum is seen as the main inhibitor for increased 5G deployment on the continent.

Africa fixed broadband service revenue forecast, 2020 –26



Source: Omdia

4G will dominate Africa's mobile broadband market as 5G deployment takes shape

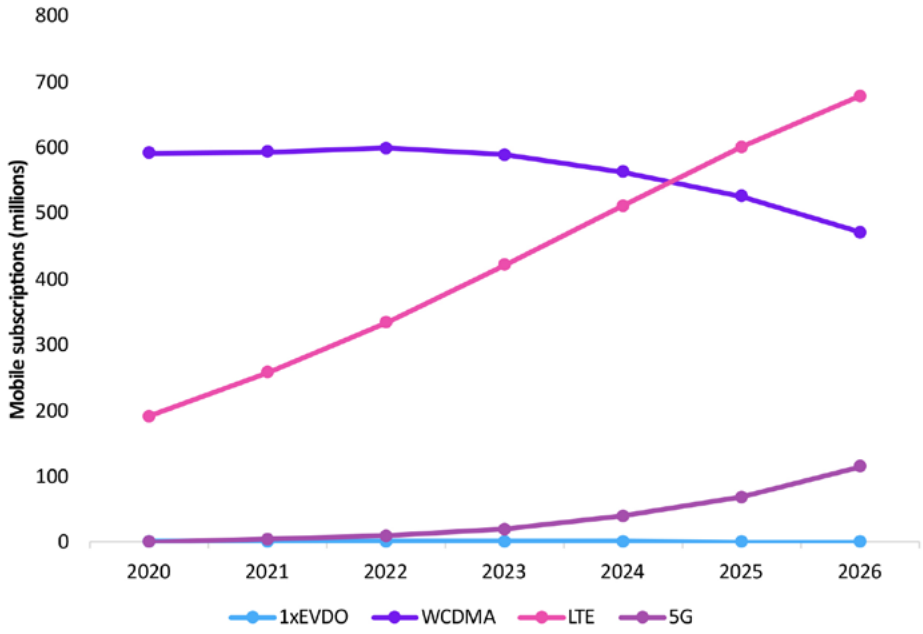
According to Omdia forecasts, 4G LTE will be Africa's most dominant mobile broadband technology by 2026. WCDMA will be popular, but its growth will decline sharply from 2024 as more users will opt for 4G and 5G due to better speeds.

5G will be the fastest growing technology between 2020 and 2026. However, rapid deployment of the technology is still facing a myriad of challenges, including the delay in spectrum auctions and unavailability of affordable 5G devices.

Mauritius is the only country in Africa that has granted 5G licenses and awarded a total of 300MHz of radio spectrum to three main operators – CellPlus Ltd, Emtel, and MTML, in the 2.6GHz and 3.5GHz bands. Operators in other countries including South Africa, Kenya and Seychelles, that have launched commercial services, are using spectrum allocated on a temporary basis.

In Africa, LTE will continue to play a key role through which most users access mobile broadband services. For operators that cannot afford to deploy 5G, LTE will remain the main mobile broadband technology. Consequently, such operators will continue to aggressively expand their LTE networks to meet the data demands from their customers.

Africa's mobile broadband subscriptions forecast, 2020 –26



Source: Omdia

BROADBAND: INTRODUCTION

Martha Suarez,
president of the DSA

In the last year, internet access has provided a lifeline to communities across the World, throughout the global pandemic. Africa is no exception to this, with people turning to the internet for education, information, and communication in a time when normal social interactions have been limited. Continuous review of spectrum allocation is needed, to meet the rising demand for broadband, and to serve communities without access to this vital amenity.

In Africa, fixed broadband penetration tends to be low, an average of just 3.45%, particularly in the residential sector according to Research firm Check Point. Furthermore, in South Africa, according to official statistics, there are a total of 232,108 registered fixed terrestrial wireless subscriptions[1], accounting for 16.92% of the total fixed broadband market. The WISP sector represents a critical contributor to tackling the country's persistent digital divide.

In fact, fixed broadband adoption in South Africa is estimated to have reached 10.05% households[2]. Fortunately, adoption of Wi-Fi (and the value it creates) is growing rapidly not only in South Africa, but also across the continent. Southern Africa's internet penetration rate rose above the global average in 2021, to 62%. Even areas with some of the lower penetration rates such as Eastern and Middle Africa showed a quarter of the population with access to the internet. In 2021, countries such as Kenya showed high internet usage rates of over 85%, with other countries of high penetration rates such as Libya and Nigeria also coming in at over 70%.

Broadband non-adopters are, as expected, concentrated on the lower income population in urban areas and rural geographies. Wireless ISPs tend to have a primary focus on the vulnerable population and part of their deployment is in rural municipalities. In that sense, it is critical to understand the needs of these players. As a result of this rising demand, and especially as an important step towards digital inclusion, regulators must continue to take steps towards effective spectrum utilization, enabling license-exempt access to additional spectrum in the 6 GHz band, that could be used by Wi-Fi, and also by other modern technologies like 5G new radio unlicensed (5G NR-U).

Internet usage is not just on the rise; it's an important aspect of modern life for those living in Africa. In South Africa, smartphone users spend more than half their online time connected to Wi-Fi and in Nigeria, there are an astounding 43 million social media users, which is more than countries like Italy and Canada. For business, education, and healthcare, connectivity is also of the upmost importance. In its National Broadband Strategy 2018-2023, Kenya says it plans to bring fixed broadband connectivity to 100% of tertiary institutions and public health facilities by 2020, and 50% of primary schools by 2022.

Regions like South Africa have also seen a dramatic increase in the number of people working from home thanks to the impacts of the pandemic. In a recent study, it was shown that 46% of people felt even more satisfied with their work while at home, and 50% felt even more motivated while remote working. 63% of respondents even reported that productivity increased. While working from home looks like it might be here to stay for many, it is not possible

[1] Independent Communications Authority of South Africa (2021). *The State if the ICT Sector Report in South Africa*, p. 44.
[2] Calculated by dividing the total number of fixed broadband subscriptions of 1,371,466 by an estimated total households of 13,645,902.

without reliable internet access.

This being said, extreme variations in internet penetration show that the digital divide is still prevalent in the continent. While the regions previously mentioned boast high rates of usage, those like Western Sahara, South Sudan and Eritrea have less than 10% of their population connected to the internet. Particularly in times of difficulty, such as those imposed by the global pandemic, regions without sufficient connectivity are at a major disadvantage.

6 GHz for a digital future in Africa

Wi-Fi is a highly cost-effective wireless access technology due to ease of installation and user control over the network. The global Wi-Fi ecosystem also benefits from enormous economies of scale, enabling manufacturers to produce very cost-effective products. According to Intel, the cost of licensing the necessary intellectual property for cellular 5G alone is 3 times that of a Wi-Fi chipset, and the entire 5G cellular modem cost is 50 times the cost of a Wi-Fi chipset. When trying to deliver affordable connectivity, this means Wi-Fi offers lower cost of coverage for low-population density areas and lower cost of terminals.

The ITU-D Study Group on Broadband development and connectivity solutions for rural and remote areas, in its annual deliverable 2019-2020 has recognized that "Wi-Fi hot spots and local area networks, which can be installed at rural points of community activities, including shopping centres and university campuses, can serve a variety of users. These are also suitable for homes, where all family members can access Wi-Fi connectivity. Wi-Fi technologies are very effective if the backbone landing is not far from the locality and can be used to create a mesh network".[3] According to the report, in India[4], several rural areas have been connected using Wi-Fi, as a last-mile connectivity solution and in Zimbabwe[5] the community information centres constructed by the universal services fund of the country use Wi-Fi technology. Similarly, in the Democratic Republic of Congo (DRC) approximately 52,000 public Wi-Fi hotspots are live in the country, with the installed base set to reach 150,000 by 2025.

Regulators and spectrum authorities are guided by public policy goals focused on providing broadband access to all their citizens, leaving no one behind. They recognize spectrum is the income for wireless access and always try to make the most efficient use of it. In this context, spectrum sharing technologies like Wi-Fi 6E, that make more efficient use of the spectrum, while protecting incumbents and increasing affordable connectivity are being considered by regulators and spectrum authorities worldwide. As countries across the world such as South Korea, Canada, the US, Brazil, Saudi Arabia and others open the 6 GHz band for unlicensed access, countries across Africa should follow their lead. Especially in areas like sub-Saharan Africa, where the average number of people per household is above the global average, the increase in devices sharing a singular hotspot can cause congestion, reducing quality of service.

The African Telecommunications Union (ATU) has this year approved the recommendation by its Emerging Technologies group to enable licence exempt technologies to operate in the lower 6 GHz (5925-6425 MHz) band, and as a

[3] Annual deliverable: "Broadband development and connectivity solutions for rural and remote areas". Question 5/1 Telecommunications/ICTs for rural and remote areas. ITU-D.
[4] Presentation by Mohit Bansal at the workshop on broadband development in rural areas hosted by the Question 5/1 Rapporteur Group,25 September 2019.
[5] Presentation by Batsirayi Mukumba at the workshop on broadband development in rural areas hosted by the Question 5/1 Rapporteur Group, 25 September 2019.

result, some countries in Africa are considering extending licence-exempt access for Wi-Fi and other license exempt technologies to the 6 GHz band. While this is an important step, opening the entire band would provide more economic benefits; for example, the cumulative economic value between 2021 and 2030 associated with allocating the 1200 MHz in the 6 GHz band in in Nigeria amounts to US$ 72.14 billion, broken down by US$ 49.89 billion in GDP contribution, US$ 10.51 billion in producer surplus to Nigerian enterprises, and US$ 11.74 billion in consumer surplus to the Nigerian population. In Kenya it amounts to US$ 20.29 billion and in South Africa amounts to US$ 57.76 billion.

Next year and beyond

Predicted growth by Check Point states that along with the Middle East, growth in fixed broadband subscribers will equal almost 70% by 2030, by far the largest increase when compared to other regions across the globe. As the fastest growing region in the world in this area, regulators should not delay in utilising available spectrum. That is how they will avoid overburdening of spectrum, which is being experienced in regions like North America and Europe where users experience congestion during peak hours.

After the recession in 2020, Africa is expecting a healthy growth in its economy, and countries that recognise the value in spectrum allocation will see their economies benefit. Providing additional spectrum access in the 6 GHz band (5925 – 7125 MHz) to support the deployment of Wi-Fi 6E and 5G NR-U, will offer African citizens one of the most anticipated advancements in affordable broadband connectivity to date. It is time to act now. ■

Craig Thomas,
vice president, strategic marketing & business development, Broadband Forum

Between 2020 and 2021, Internet users in South Africa increased by 1.7 million, a 4.5% increase. This Datareportal report highlights operators' continued efforts to bridge the digital divide and bring connectivity to the unconnected. While Internet penetration in the country has risen to 64%, more work should be done. There's an urgent requirement to connect those left behind and to implement a strategy that will bring about greater change for all inhabitants, now and in the future.

African broadband marketplace is diverse and characterized by limited fixed broadband penetration. Looking back to 2019, regional difference in mobile and fixed broadband penetration was stark. Even in advanced fixed broadband South African market it was 102.22 mobile broadband subscriptions as against 2.14 fixed connection subscriptions. Compared to developed areas outside of Africa, customers have choice of mobile networks such as 4G, 5G, Fixed Wireless Access, fixed access, and satellite technology. Where internet connectivity limit is 3G or 4G, that becomes the expectation of what broadband is. Higher bandwidth, ultra-low latency and reliable connectivity should be the aspiration for all operators.

Leveraging fixed and wireless networks would be critical for South Africa and wider African market as it means operators can

make the most of their limited fixed networks. This means looking to the future and deploying fifth-generation technology to enhance existing service offerings and open new revenue streams.

5G requires highly scalable and future-orientated network architecture to enable deployment of new services and applications. By taking a holistic approach to network management and operation, operators can provide a unified broadband customer experience. This means it's imperative to integrate wireless and wireline convergence at all levels of broadband ecosystem.

Operators must look at utilizing fixed and mobile networks to deliver enhanced customer experience, as a single network will not deliver Quality of Experience that consumers want. For true convergence to occur, a single converged 5G core network must be leveraged regardless of whether they connect via a wireless or wireline technology. Unlocking new revenue streams, fifth-generation technology offers higher bandwidth and lower latency that customers seek. For operators to safely navigate their way past challenges they face while bringing the benefits of 5G to fruition, they must look to leverage key 5G specifications that are already available.

Broadband Forum is providing a global framework for operators to enhance their service offerings. Industry specifications such as Release 16 from 3GPP, and Broadband Forum's Phase 1 document aim to ensure a smooth migration path to 5G and maximize the addressable market for operators. This highlights importance and relevance of standards bodies such as Broadband Forum and 3GPP in jointly developing 5G convergence standards, while bringing together operators and technology providers to help deliver 5G benefits.

Instead of operating two separate, distinct core networks for mobile and fixed access, operators can use the 5G core (5GC) as common core. This enables operators to deliver a unified experience and implement converged and integrated 5GC network capable of handling increases in connected devices. The support of a transformed transport network and standardized interfaces will go a long way in automating away any complexity. As network traffic rises, operators need a competent transport network that seamlessly connects 5G Radio Access Network (RAN) and core networks, as well as delivering enhanced performance and improved Quality of Service.

Previously, the transport network was backhaul-focused and static, whereas high-bandwidth technologies such as 10G PON allow 5G transport network to be utilized for xHaul on a larger scale. For operators across Africa and worldwide, to unlock the range of applications and services of 5G, they need to consider the expenditure required to build out a 5G network. Another key consideration for operators, is whether they migrate their existing networks or fully replace them. When evolving transport networks, undertaking a full migration can reduce disruption to operations and services. This is often the preferred method to enhance current investments and provide greater levels of performance and scalability.

Additionally, with increased activity of new fibre broadband market entrants over the last decade, a new opportunity arises for new operators to offer wholesale fibre services to mobile network providers expanding their 4G and 5G services reach into new territories. Ultimately success of fibre broadband and increasing rollout of 4G and 5G is symbiotic.

5G development within the Broadband Forum is a key focus with many leading players collaborating and developing next steps of fifth generation technology. Broadband Forum's

work is key in allowing carriers to manage all aspects of their services in a more holistic way. This can be achieved by standardizing transport architecture and enabling integration of wireless and wireline at all levels. This provides operators with confidence to deploy standardized technology that's been certified and approved by Broadband Forum. Operators can then effortlessly evolve networks and make sure fixed access is supported by a common unified core network.

Broadband Forum's work in cooperation with 3GPP on Fixed Mobile Convergence (FMC) has resulted in a set of specifications which allow full convergence to take place, with operators able to leverage 5G networks while integrating existing fixed access deployments. FMC helps extend geographical reach of 4G/5G core networks, both from a traditional cellular device and for Fixed Wireless Access. Investing in a single fibre access network that also leverages a complimentary single edge and core architecture whilst offering a migration path from existing network investments is exactly what is motivating operators globally to drive industry wide standards and best practices.

Broadband Forum has released three specifications that will reduce development time and expenditure from the traditionally disparate fixed broadband and 4G/5G networks. Importantly, they will deliver a common and managed broadband experience to customers whatever the final connectivity technology.

Standardization allows operators to build out 5G networks with open, cloud-native platforms that utilize software and hardware components from different vendors, eliminating vendor lock-in. 5G services can be deployed quicker, more securely and more flexibly. Broadband Forum's 'TR-470: 5G Wireless Wireline Convergence Architecture, which was produced in conjunction with 3GPP, describes 5G FMC architecture and provides high-level guidance for network architects and planners. This specification enables fixed and mobile functions to coexist over shared infrastructure and facilitates multi-access connectivity with customers having an access-independent service experience. Network operations are streamlined for operators with common technology, on-boarding, services and subscriber management between fixed and mobile divisions achieved.

Looking ahead

In 2022 and beyond, by leveraging 4G/5G convergence standards, operators across South Africa can take a unified and holistic approach to help deliver high-quality fixed broadband connectivity the country deserves. There is a clear argument to invest once and look at the broadband access network holistically to deliver next-generation access. One unified access network can integrate all technologies, with the final access technology the only variable in a network which can accommodate all broadband access technologies. ■

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Obehi Okosun,
MD Cambridge Broadband Networks (Africa)

The last 18 months Covid-19 rapidly and significantly impacted human interaction. Africans faced lockdown at home unable to interact with others outside their home, connectivity increased in importance. Pandemic brought changes to personal and professional lives, industries worldwide evaluated and implemented processes enabling business continuity, despite workplace closures. With safety paramount, processes were developed ensuring employee safety.

Difficult to predict length of Covid impact. Organisations and employees adapted to new ways of working, with reliable connectivity services being vital for business continuity. Working from home had generally been restricted to certain employees whose roles allowed remote working. The unprecedented pandemic environment led to it becoming normal for most industries. New work approach wasn't as simple as telling staff to work from home, numerous barriers were considered – such as sourcing new IT tools, software and systems for virtualised collaboration and implementing upgrades to employee's home broadband. Both internal and external IT infrastructure were put under intense pressure to cope with rapid changes.

"The drive for greater distributed data coverage can only be delivered rapidly by wireless solutions. This was initially addressed using sub 6GHz unlicensed radios, but saturation is the Achilles heel of license-free bands"

Lockdown initiated a response lag from connectivity providers as they looked for alternative methods to increase bandwidth. 3G and 4G services normally satisfy homeworking requirements for few who worked remotely, with associated sudden upsurge of demand, saturation rapidly occurred. Most Africans now working from home initially relied on existing infrastructure of highly congested 3G and 4G mobile connectivity or localised shared community Wi-Fi services, often unpredictable with limited bandwidth.

Africa has a digital divide and home fibre connections aren't widespread. Connectivity is generally perceived as unreliable, fibres are often damaged, repairs are slow. For locations outside urban areas, cost of high-speed broadband can outweigh willingness to pay. The drive for greater distributed data coverage can only be delivered rapidly by wireless solutions. This was initially addressed using sub 6GHz unlicensed radios, but saturation is the Achilles heel of license-free bands.

Pre-Covid-19, broadband provisioned residential areas capacity for night-time peak loads and weekends, central business districts and industrial areas peak capacity is during business hours. During Covid-19 situation reversed. Data networks adapted and changed topology overnight. Licensed fixed radio networks generally came out top of fast-paced adaptation period, whereas fibre service provision either halted or lagged behind and connectivity using unlicensed radios crumbled under increased demand.

Within licensed radio arena, moving networks from protected 1+1 to 2+0 and thereby shifting the network design strategy from a protective to a higher capacity bias, gave an initial boost. Long term, more infrastructure is needed. Backbone networks have been expanded with radio delivery requirements moving further away from core.

Access and last mile solutions could be relocated away from core or new hardware purchased to facilitate expansion. The former was initially tried during the middle of 2020. Recently, providers have started to rebuild networks to deliver the updated strategy.

This has taken two directions. Firstly, unlicensed (UL) radios have regained favour and big players are looking to address this new market with this technology. Although UL radios have improved significantly over recent years, overutilisation of spectrum and interference will likely bring about quality experience issues for end users. Service level agreement (SLA) demands by end users is expected to significantly decrease deployment of UL radios in more populated areas. Licensed radios therefore provide a second, more reliable direction for operators to take, having been the market solution for years for locations where fibre wasn't a quick or practical choice. Today, the use of the current licensed point-to-multi-point radio successfully provides connectivity to the enterprise market.

In summary, network providers that came out on top during pandemic were those that chose topologies that could provide reliable coverage, over a wide area, that could be rapidly enhanced on a demand basis, without having to rebuild entirely from scratch. This scenario suited those who had previously chosen licensed point-to-multi-point networks.

Pandemic initiated African technology and service providers to adapt and change at unprecedented pace. Those embracing this have been positioned to help Africa better prepare for a post Covid-19 landscape and as discussed, existing point to multi-point licensed networks have had, and continue to have, a major role to play. We foresee significant market shift within coming years to where rollout of FWA 5G networks will likely grow and become dominant solution in enterprise and residential broadband market. Reliable, high data bandwidth 5G FWA delivery solutions in Africa will be realised during coming years becoming default solution over fibre. Is the market ready for such a product? Realistically, market has been ready since Covid-19 started. Bigger question is, are all African continent's regulatory and licensing bodies ready to embrace shift? This question overall remains unanswered. ■

Looking ahead:

1. Mobile network operators (MNOs) haven't had a good decade and continue to suffer low returns on investment. They've been selling assets such as masts trying to reduce debt burden and this will continue in 2022 with sales of subsidiaries and more outsourcing to cloud providers.
2. The shine will start to wear off mobile 5G as coverage in most countries remains relatively limited and new compelling applications prove elusive. It will remain a valuable tool for capacity enhancement but the push to convince consumers it is a big leap forwards will fade.
3. There will be an increased push for home broadband for all, with even more urgency than previous years due to increased home working. This will see more Government grants and more innovation in fixed wireless and satellite broadband.
4. Regulators will turn their attention to the mmWave spectrum band (24-30GHz) now that low/mid band 5G auctions have completed. Some will adopt innovative new sharing approaches.
5. Entire 6GHz band will be increasingly opened for Wi-Fi usage worldwide as the case for 5G in this band is increasingly dismissed. Wi-Fi routers will improve significantly as Wi-Fi6 becomes widely deployed.
6. 2022 will see peak of low earth orbit (LEO) satellite deployments and competition with SpaceX, OneWeb, Telesat, Amazon and others. By year end more clarity will emerge on which companies will survive and if there's a viable business model.

Craige Fleischer,
vice president EMEA, Trustonic

In recent years, we've seen huge investments into Africa's infrastructure development. Mainly from global and domestic operators who have built out 3G and 4G networks, continent wide, to boost connectivity. A good example is subsea cable infrastructure, with several large-scale projects in progress for years, such as Facebook's 2Africa system finally coming to fruition. These efforts have seen Africa's mobile network coverage leap in recent years. However, we are still by no means a fully digital, fully connected continent while millions still don't benefit from mobile internet connectivity. In fact, the digital divide is growing.

There has been a visible shift, in last 12 months, in the way many in the industry are approaching the African market. We've seen further announcements from both traditional mobile operators and big global tech brands like Facebook and Google committing to improve connectivity. Undeniably Covid-19's impact did much to highlight urgent need to take this problem more seriously. We are now seeing companies such as Google and Facebook really start to deliver on promises made over the years.

"Undeniably, the pandemic had the effect of highlighting the urgent need for connectivity improvement not just in Africa, but worldwide. This is one reason why there has been a renewed push from mobile operators and global technology companies to connect Africa"

Google recently announced it would invest $5 billion over next 5 years to improve connectivity and access to digital services including healthcare, education and supporting growing businesses. Similarly, Facebook and Liquid Technologies are rolling out their own fibre network from the DRC to Rwanda. The network will improve connectivity for 30 million people. Traditional mobile operators are doing their bit and recently Vodafone announced launch of its space-based commercial mobile communications service.

What these recent announcements have in common is they mark a change in how global and domestic players are approaching the African market. There has been a realisation that to connect this unique continent's vast population requires bespoke solutions and a tailored approach. This shift is highlighted in Vodafone's recent initiative with the UN's Broadband Commission for Sustainable Development. Initiative looks to connect the 3.4 billion people who currently don't have mobile internet access. When the initiative was launched, in addition to a renewed effort to build out network infrastructure, those involved also highlighted the urgent need to address the lack of digital skills. Importantly, the initiative addresses the need to improve device affordability allowing the unconnected access to networks.

Historically, the African market was approached with a certain degree of naivety. The push for 'affordable' smartphones for example missed the mark in the sense that in Africa, huge swathes of population are priced out, even for devices as low as $50. And those that could afford them were often met with

sub-par features that had the opposite effect. However, the change in attitude over the last 12 months cannot be ignored and marks an exciting time for Africa.

Several reasons have led to this shift in approach. The pandemic played its part and digital transformation has rapidly accelerated as a result. Undeniably, the pandemic had the effect of highlighting the urgent need for connectivity improvement not just in Africa, but worldwide. This is one reason why there has been a renewed push from mobile operators and global technology companies to connect Africa.

At first, Covid-19 was slow to impact Africa, but as new variants began to take their toll, within Africa there has been a local telecoms realisation of the need to be more self-sufficient. Tourism historically accounted for a huge proportion of the economy for many African countries. There now seems to be acceptance that African economies need to be sustained internally, and in my view, digitisation is key to this.

We cannot ignore the economic opportunity that Africa represents. With an enormous population, and it's projected working population increasing 50% by 2035, the opportunity for companies to access this, has been a driving force in renewed efforts to improve connectivity in Africa.

Trustonic's Telecoms Platform lowers the risk threshold of mobile operators and device retailers providing financing deals for mobile devices. We want to help Africa bridge the digital divide by enabling proliferation of internet-enabled smartphones to those previously unable to afford even entry-level devices.

Trustonic operations have always had the same challenge; convincing customers our technology can secure them against risk in what is considered an insecure environment. It has taken time to educate potential partners, but now we are seeing many operators and retailers approaching us for solutions, as they see where the market is moving. Over the last 12 months we have seen a huge increase in interest in technologies and solutions that enable us to put smartphones into the hands of those previously unable to afford them.

Trustonic is a change enabler for Africa. It's exciting to work on technologies to bridge the digital divide, at a time when so many are trying to do the same. We cannot achieve this without help from others in the industry. This year, we have signed deals with large operators and small retailers continent wide. Every deal we make, regardless of size, is equally important, as what matters is that these organisations are doing their bit to drive affordability for the underserved population of Africa. ■

Looking ahead: Africa has always been a place that has embraced entrepreneurship. There are examples of this all over and the enabling power of internet connectivity will allow this to flourish. Network expansion and efforts to increase affordability of devices makes the prospects of Africa's contribution to the world economy an exciting one. It's forecast that over the next two years we will see 4G coverage expand from around 50% to closer to 70%.

The power of digitisation will unleash the entrepreneurial spirit of Africa. It may be a bold statement, but as affordability mechanisms help proliferate internet-enabled devices, African economic growth will outperform what many economists currently indicate. Internet communications will have a direct impact on how Africa drives its own economy moving forwards. But to achieve this, we must be careful to ensure that we don't simply make pockets of excellence in small areas of the continent. It is essential that access to this technology is universal.

Clémentine Fournier,
regional VP Africa, BICS

It is a simple truth, that many people outside of Africa fail to grasp, that the continent is vast and diverse, and that these characteristics must be considered when doing business here. The geographies, cultures, politics, challenges, and opportunities can vary from region to region in Africa and consequently can be reflected in its communications and connectivity ecosystems.

For example, looking at access to connectivity. Internet-enabled devices are becoming more affordable and 3G and 4G coverage is continually expanding. However, some areas are still experiencing connectivity barriers. Sub-Saharan Africa has the highest data costs of all, rated at 10.2% of Gross Domestic Product per capita, according to the GSMA. This helps in the understanding of how this area is predicted to have the world's lowest adoption of 5G over the next five years.

This contrast in connectivity is the digital divide. However, operators are also seeing the opportunity this presents.

The digital divide has become even more apparent over the past 18 months. Stable internet connections have been key to being able to continue our daily lives. Those who can connect digitally have been able to soften the disruption. Those who can't, however, find themselves at a further disadvantage. Schools are a great example. Online learning became a critical tool the world over to continue education during the pandemic. However, according to one estimate, only 1 in 5 children in Africa have a reliable basic internet connection. This gap must be bridged, and continued investment in digital infrastructure by both governments and the telco community will help to do this.

"Combating fraud is an everincreasing priority, however, the growth in A2P SMS over the past year has also increased the opportunity for fraudsters"

Looking back over the last 12 months, we have worked with our partners and forged new alliances with telcos to further accelerate communications across the region. This gives me optimism and fills me with pride to play a central role in this important ecosystem. Even during the worst of the pandemic, we saw resilience from service providers, advancing with exciting developments across the continent.

For instance, many of our partners began to offer application-to-person (A2P) messaging. Around the world, we all turned to our devices to engage with businesses, banks, healthcare providers and so on. A2P allows for two-factor authentication, so consumers can access services securely. A one-time password sent by SMS can allow someone to safely access their bank, for instance. Or a healthcare provider can send appointment reminders to patients.

We are also seeing A2P adopted across Africa for its marketing advantages. With the agreement from their customers, businesses have been able to remain engaged with consumers through SMS updates, promotions and personalized

offers. The global messaging market is expected to grow from $62.1 billion in 2020 to $72.8 billion by 2025, and the African region is predicted to gain steady growth. So, this offering provides excellent opportunities for operators and enterprises alike.

Combating fraud is an ever-increasing priority, however, the growth in A2P SMS over the past year has also increased the opportunity for fraudsters. South Africa saw an increase in Covid-19 related scams, with about 1 in 4 South Africans being targeted. These included text messages telling subscribers they had been in contact with someone who had tested positive for Covid-19. The sender then requested payment for a healthcare worker to visit them in their homes, which was a scam.

It is not surprising, then, that we have seen telcos become more interested in anti-fraud tools in general. There has been growing adoption of SMS firewalls, for instance, these stop spoofed and faked messages, which means the network bandwidth is freed for revenue-generating traffic. Its security prevents content providers from bypassing SMS termination fees, so it makes it a far more secure messaging and roaming environment for operators overall.

Technology and tools are important in fighting fraud, but collaboration is equally as critical. It is important that telcos, regulators, and carriers like BICS work together to share resources and knowledge: there is strength in numbers! We have been supporting operators in Africa to mitigate fraud for years now, and use a crowdsourcing approach with our FraudGuard solution, which is used by most of the telcos operating in Africa today.

We have also seen greater demand for business intelligence tools over the past year. Having complete visibility of a network is becoming more and more important to operators. As well as monitoring for quality, these tools are helping operators understand how subscribers and IoTconnected 'things' are using their network. This insight allows them to allocate the right level of resources and provide a better end-user experience, even offering personalised plans and incentives. ■

Looking ahead: What does 2022 hold for the African market? First, a steady preparation for 5G, with operators sunsetting older technologies to start with. 2020 was a turning point, marking the first time that there were more 3G and 4G connections than 2G, and this trend will continue.

BICS expect the communications ecosystem will evolve to include more players from the global telco community who are waking up to the opportunities of this vast continent. Google recently announced a US$1 billion investment over the next five years, while Facebook has revealed plans to extend its 2Africa subsea cable to serve the African and Middle East region. We expect investments like these, from digital service providers, to continue into next year and beyond.

Africa will remain a strategically important focus for BICS. We will continue to work with telcos and the digital ecosystem throughout the continent and invest in the region's infrastructure. We are in prime position to bridge the gap between traditional telecoms and digital players, and we are sure the evolving landscape will be opportunity to do this. It's a diverse continent, and it's growing closer together through ever-more robust, resilient connectivity.

Susanne Neubert,
African sales director for enterprise & emerging markets, Speedcast

Providing connectivity in Africa has never been an easy task, but strides have been made at some locations over the last years with 5G rollouts, fiber laying and fixed wireless access. But remote areas where these solutions are not viable, satellite is an alternative. The technology remains an important tool in efforts to tackle the digital divide and providing connectivity to those without internet access.

Impact of global Covid-19 pandemic shows importance of communications and keeping in touch and how Internet access isn't a nice-to-have but a necessity, especially in hard-to-reach areas. Satellite providers can ensure remote, rural areas across Africa have the same access to connectivity as those in more accessible, built-up locations, where connectivity is easily deployed via fiber.

People now want connectivity for their homes, but it's essential for businesses. Across the energy, maritime, mining and construction industries and aid organizations, where multiple barriers exist for networks, satellite is key for enabling critical communications to function. Remote site or offshore workers need to be able to connect with other employees and if needed emergency services.

Connectivity has an essential role in industries' operations, whether that be for entertainment, staying in touch with loved ones, or improving and saving lives.

The energy sector has been a changing environment throughout 2021. Earlier in the year, the oil shock and global pandemic created instability in energy markets, but as the year closes, the oil price has returned to a pre-pandemic high. Development of alternative energy sources continues at pace, while global demand for energy continues to increase, we have to be aware that sources of that energy might change. If the locations of energy production continue to be in remote locations, satellite connectivity will remain crucial to their operations.

Connectivity is a large part of creating a productive, fast-flowing environment but reliable connections are often a challenge for operators, which are often beyond the reach of terrestrial networks. For applications that require a real-time connection to function, this poses a problem. Next-generation technologies continue to augment the growing toolkit of options to deliver optimal, ubiquitous connectivity to hard-to-reach locations. Medium and Low Earth Orbit (MEO and LEO) satellites coming to market will help meet demand for rural connectivity, providing stable internet connection to sites that cannot typically connect to terrestrial networks, such as oil rigs.

As the sources of energy continue to change and needs of industry develop, we will adapt for our customers' operations. The energy industry will continue to be a large focus for us, especially as we are ending the year with a renewed focus on sustainability because of the COP UN Climate Change Conference.

Global mining industry also experienced high disruption resulting from Covid-19, as seen at sites in South Africa, Ghana, Namibia and Nigeria along

"The energy industry will continue to be a large focus for us, especially as we are ending the year with a renewed focus on sustainability because of the coming UN Climate Change Conference"

with many other countries. The sector is constantly under relentless pressure to maximize productivity and profit, while reducing costs and maintaining safety. According to McKinsey & Company, production has fallen by around 42% worldwide.

Connectivity is key to relieving pressures of productivity, safety and expenses on mine operators. By harnessing the 'Connected Mine' these remote sites can take advantage of several different connectivity solutions such as radio local area networks (LANs), one-site wide-area networks (WANs) and VSAT connectivity, which facilitates new applications like IoT. Remote staff and crew's quality of life is improved with access to the outside world for entertainment and catch-up time with family and friends, but the Connected Mine also provides essential online support and provides insight for managers from data gathered from every application.

A major African gold producer is experiencing these advantages first-hand after Speedcast delivered a secure satellite communications network for sites in Africa and Australia. The network was seamlessly integrated into the company's existing communications infrastructure to leverage its existing investment and provide higher quality voice and data service. As a result, the producer noticed a boost in crew morale, more reliable communications across sites and a better return on investment due to the uplift in productivity and profit.

Resolute Mining, in Malia, West Africa, used automated vehicles and drills to extract 300,000 ounces of gold yearly. Its operational efficiency has been boosted by 30%, while the robotic technology allowed Resolute to train local Malians to do the work. Therefore, providing jobs for local people, rather than relying on expensive, experienced miners.

During the pandemic the maritime sector saw many crews stuck at sea for longer than the maximum time allowed under international treaty. Isolation for long periods of time can take dramatic tolls on crews' wellbeing and health. Having a reliable connection, to allow staff to communicate with their friends and family is a necessity, not a luxury. During times of hardship, such Covid-19, people reach out to their loved ones more.

The flexibility of offshore entertainment solutions like Speedcast's LAUNCH platform is improving life on-board for both crew and headquarters. There are different components to the platform, with LAUNCH TV and LAUNCH News, for example, providing entertainment and up-to-date information, which combats boredom. The evolution of technologies in recent years to offer lower latency and streamlined bandwidth management enables ship operators to seamlessly provide these now essential applications. ■

Looking ahead: Over the last year, many of the markets Speedcast serves have been hit hard. But, if 2021 taught us anything, it's that demand for connectivity is growing faster than ever. However, we know that one solution doesn't fit all, thus Speedcast's satellite connectivity solutions are important for connecting those in hard-to-reach locations. For its customers, flexibility and automation are key for ensuring seamless and easy-to-manage connectivity – no matter the location or distance from land. At this time software and automation services are especially important. As networks and satellite connections grow, network management becomes crucial to ensure seamless, reliable business operations for on-shore and off-shore customers. We want our customers to have uninterrupted connectivity and access to network management solutions they can rely on to ensure constant connectivity.

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Angola Cables is a multinational operating in the global ICT sector. With a robust transport infrastructure and highly interconnected IP network we offer differentiated solutions to the wholesale and corporate segments. We offer customers access to the largest IXP's, Tier 1 operators and international content providers.

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Angola Cables provides digital services and network solutions to multiple industries with customized cloud and gaming resources available to our global customers.

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Roaming

Global IoT

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As a leading international communications enabler, BICS is at the heart of the communications ecosystem. We enable people, applications and things to connect, wherever they are. We are a global provider of international voice, messaging, mobile data, cloud communications and IoT services. Our solutions, delivered seamlessly and securely, are essential for supporting today's data-hungry consumers and digitally driven enterprises. Headquartered in Brussels, with a strong presence in Africa, Americas, Asia, Europe and Middle East, BICS powers the global communications that connect the world.

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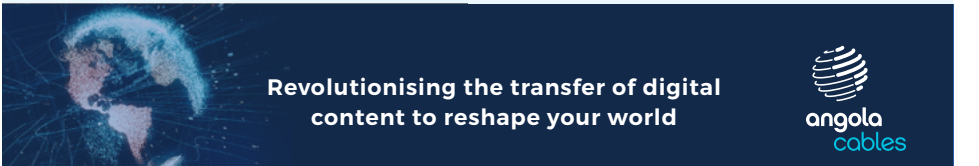

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