chapter 6 Broadband

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Africa's mobile communications market continues to grow at a steady pace and take up shows no signs of slowing. Subscription numbers were up 5% in 2021, following growth of 7% the year before and 6% in 2019.

According to figures from TeleGeography's GlobalComms Database, at the end of 2021, the continent was home to 1.22 billion mobile subscriptions, up from 1.16 billion 12 months earlier. Nigeria is by far the biggest single market, with 190.6 million subscriptions at the end of 2021, followed by South Africa with 110.9 million and Egypt with 101.3 million.

Hot markets

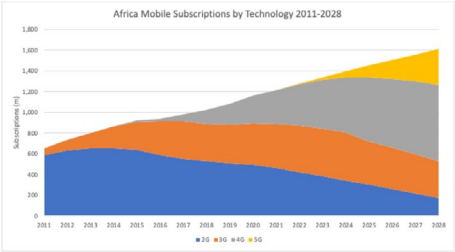
In country terms, Africa was home to almost half of the top 40 fastest growing mobile markets worldwide in 2021. Some of the strongest performers included Niger, where mobile subscription numbers rose 23% to 14.2 million, Ethiopia (up 20% to 58.7 million), Malawi (up 19% to 11.3 million), and Mozambique (up 16% to 17.3 million).

The West African nation of Niger offers good prospects for future growth, with only around 56% of the population subscribing to a cellular service at end-2021, well below the regional average.

Demand for mobile voice and data is now booming, having previously been restricted by a lack of competition, high prices, and low network coverage. Orange Group cited the country's "unfavourable market environment" as the reason behind its exit in November 2019. It is now served by four players: Airtel, Zamani Telecom (formerly Orange Niger),

Country	2021 Growth	Mobile Subs at End-2021
Niger	23%	14.2 million
Ethiopia	20%	58.7 million
Malawi	19%	11.3 million
South Sudan	17%	3.3 million
Burundi	17%	7.7 million
Mozambique	16%	17.3 million
Congo, Dem. Rep.	15%	46.9 million
Benin	14%	12.7 million
Guinea-Bissau	13%	1.9 million
Central African Republic	13%	1.9 million
Burkina Faso	12%	24.7 million
Chad	12%	9.7 million
Mauritania	11%	5.5 million
Eswatini	11%	1.3 million
Liberia	10%	3.7 million

Africa's 15 fastest growing mobile markets in 2021



Africa mobile subscriptions by technology 2011-2028

Moov, and Niger Telecoms. Airtel controls over 47% of all subscriptions.

Meanwhile, Ethiopia's mobile sector has exhibited strong growth, despite still being one of the world's few remaining monopolies, with state-owned Ethio Telecom the only player, at the end of 2021. This has changed, however, with the recent commercial launch of Safaricom Ethiopia which has brought competition to the market. The new operator is hoping to be covering 25 cities by April 2023.

The Malawi mobile market has remained a duopoly since Airtel Malawi started operations as Celtel in October 1999, when it joined Telekom Networks Malawi, which had launched four years earlier. Since 2002, the Malawi Communications Regulatory Authority has sought to introduce new competition to the sector, but none of the licensed companies proceeded with a commercial launch.

In Mozambique, Vodacom is the dominant player, with almost 52% of all subscriptions at the end of 2021, followed by Movitel with 29% and TMCEL with just over 19%.

Future expansion

There is still more room for growth regionally, with population penetration of mobile services in Africa standing at 89% at end-2021, increasing from 87% some 12 months earlier. To put this in a global context, that was more than 15% points behind regions such as Asia, the Middle East, and Latin America.

Looking ahead, mobile subscriptions in Africa are set to rise to 1.61 billion by the end of 2028, a compound annual growth rate (CAGR) of 4% for 2021-2028.

One country set to drive the future take up is the Democratic Republic of Congo (DRC), where population penetration was around 45% at the end of 2021, roughly half the regional average.

The Congolese market has vast untapped potential for future growth, but development remains hindered by many of the challenges facing similar sub-Saharan states, such as poor transport/energy infrastructure, widespread poverty, limited access to investment, weak institutions, and corruption. These barriers are exacerbated by the DRC's size, challenging terrain and dispersed and diverse population.

Technology split

4G subscriptions will soon surpass both 2G and 3G as the most popular platform in Africa. By the end of 2023, 4G is expected to be being used by almost 470 million people on the continent, just ahead of 3G.

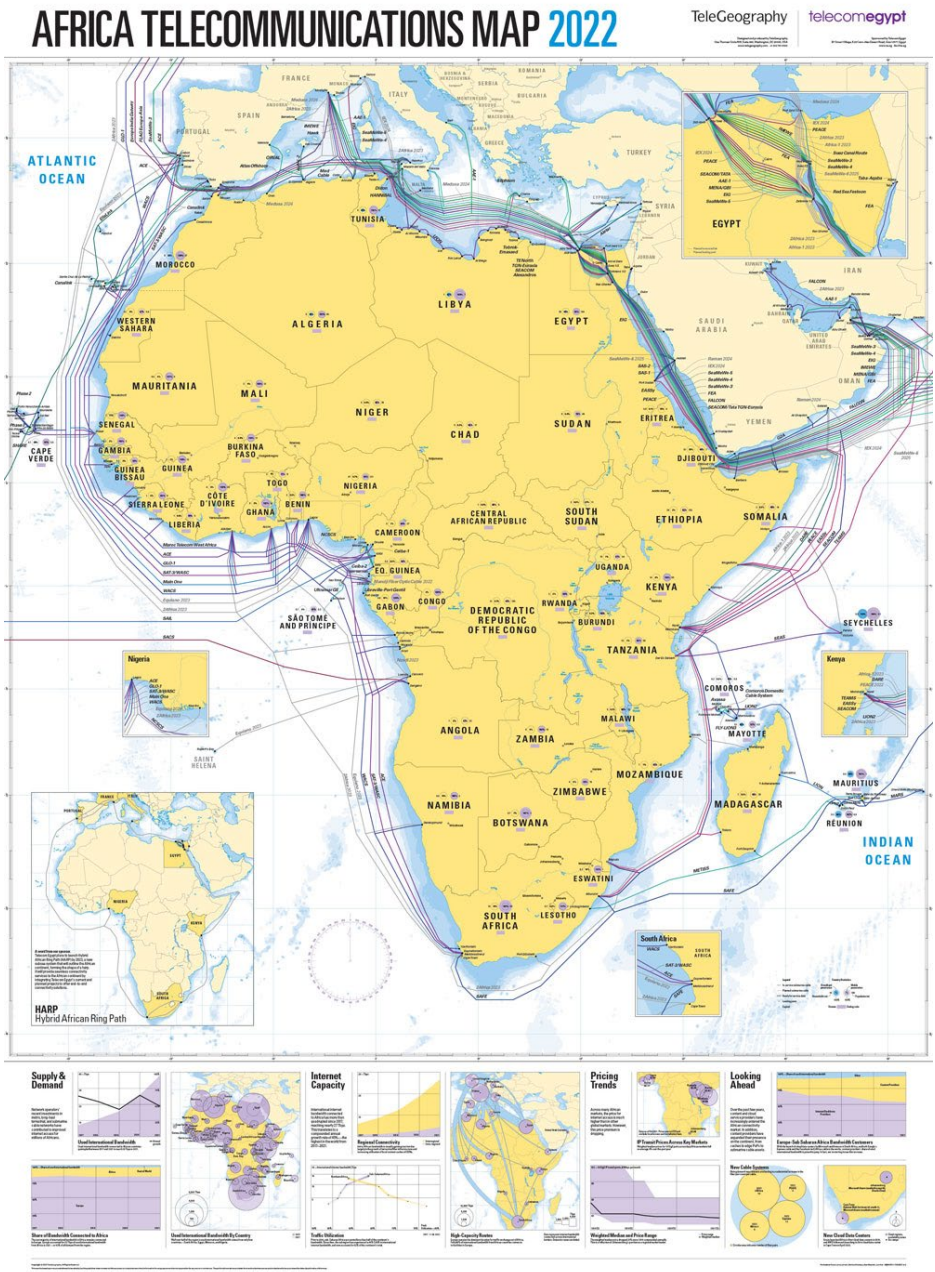
4G and 5G growth

As 3G usage goes into decline, 4G will continue to grow in popularity, with a predicted 730 million 4G subscriptions by end-2028.

5G services have already been introduced in several African markets, in countries such as South Africa, Botswana, Togo, and Zimbabwe, plus island nations including Reunion and Seychelles.

In May 2022 the Nigerian Communications Commission confirmed that the winners of last December's 3.5GHz spectrum auction, MTN Nigeria and Mafab Communications, had each been officially issued with their spectrum licenses. Network rollouts are now underway.

5G networks are forecast to be serving almost 350 million subscriptions in Africa by the end of 2028. ■



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Sylwia Kechiche,
principle industry analyst, enterprise, Ookla

South Africa spearheads 5G

Narrowing the digital divide for wider societal benefits

According to GSMA Intelligence, there were almost one billion mobile connections across sub-Saharan Africa (SSA) in Q1 2022. Unfortunately for those users, mobile performance and coverage in Africa have been subpar.

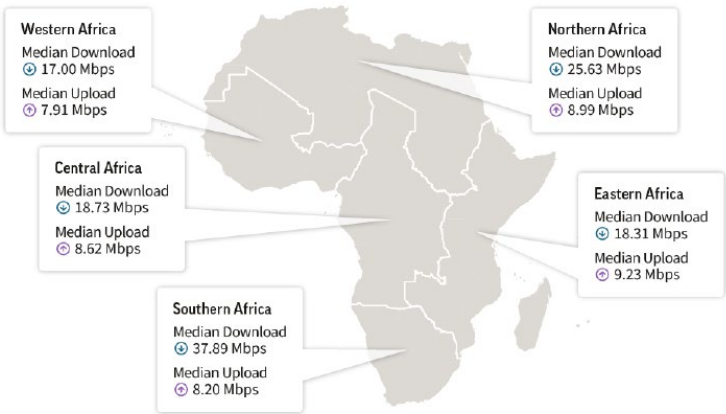
Affordable 4G smartphones and targeted financing for underserved demographics are key for bridging the digital divide, but that's not the only benefit: a World Bank Study found that 4G coverage can help cut poverty by up to 4.3%. Additionally, the International Finance Corporation estimates a 10% boost to mobile broadband penetration in Africa could lift GDP per capita by 2.5%.

Using Speedtest Intelligence® data, we analysed mobile performance on modern chipsets during 2021 (full year) across the African continent. Modern chipsets include all mobile tests, regardless of connection technology used, if they are taken on devices that are identified as being capable of achieving the fastest speeds available in a market.

We aggregated speeds across countries that fall within the five African regions as defined by the United Nations. When looking at median download speeds in 2021, Southern Africa ranked first, with a median download speed of 37.89Mbps, followed by Northern Africa at 25.63Mbps, Central Africa at 18.73Mbps, Eastern Africa at 18.31Mbps, and Western Africa at 17.00Mbps. Eastern Africa had the fastest median upload speed at 9.23Mbps, followed by Northern Africa at 8.99Mbps, Central Africa at 8.62Mbps, Southern Africa at 8.20 Mbps, and Western Africa at 7.91Mbps.

To support the growing demand for faster speeds there is a growing investment in both surface and undersea cables. Google's new subsea cable,

Mobile Performance Across Regions in Africa, Modern Chipsets
Speedtest Intelligence® | 2021



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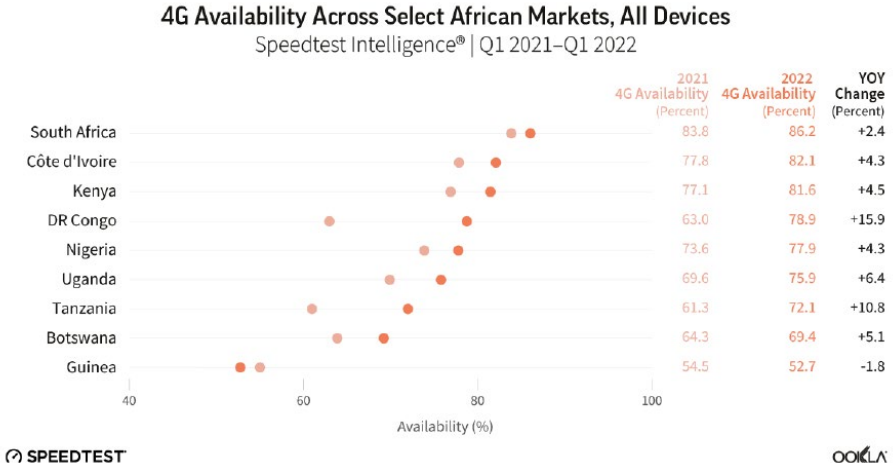


Equiano, landed in Togo in March 2022 and Nigeria in April 2022. The cable is set to become operational by the end of the year and is expected to bring connectivity to areas such as Namibia, South Africa, and neighbouring regions.

We have chosen nine countries for our analysis as they were home to over half (56%) of the region's connections, including:

- Eastern Africa: Kenya, Tanzania, and Uganda;
- Southern Africa: Democratic Republic of Congo, South Africa, and Botswana;
- Western Africa: Côte d'Ivoire, Guinea, and Nigeria.

Analysis based on data from Speedtest Intelligence shows that mobile speeds varied widely across African countries during the first quarter of 2022. When looking at mobile performance on modern chipsets across the nine countries of the sub-Saharan African (SSA) region, our results showed that median download speeds ranged between 11.11Mbps (Tanzania) and 48.76Mbps (South Africa). Median upload speeds were between 6.45Mbps (Tanzania) and 12.58Mbps (Botswana).

4G availability describes the percentage of users on all devices who spend most of their time connected to 4G technology both roaming and on-network. Across the nine countries we looked at, 4G availability exceeded 50% across the board. South Africa had the highest 4G availability at 86.2%, followed by Côte d'Ivoire (82.1%), Kenya (81.5%), Democratic Republic of Congo (78.9%), Nigeria (77.9%), Uganda (75.9%), Tanzania (72.1%), and Botswana (69.4%). Guinea ranked last at 52.7%, largely because only Orange Guinea offers 4G services. According to Ookla Map Elements®, Orange's LTE network covers 14% of the Guinean population. However, that should change soon with MTN being awarded a 4G operating license in February 2022.

When it comes to speeds in African capital cities, Johannesburg was fastest with a median download speed of 65.54Mbps — nearly 35% faster than that of the next-fastest city, Cape Town at 48.27Mbps. Gaborone stood out for posting the third-fastest median download speed on the list at 42.29Mbps. Meanwhile, Nairobi, Kampala, Lagos, and Abuja ranked closely together in terms of

median download and upload speeds, with median download speeds ranging between 27.77Mbps and 33.38Mbps, with upload speeds ranging between 8.48Mbps and 11.92Mbps.

The early days of 5G in Africa show green fields for operators

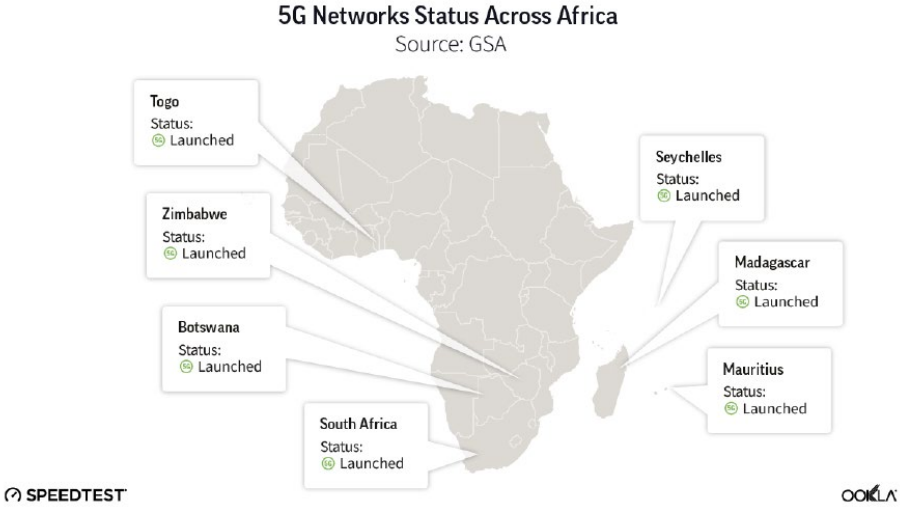
As 4G continues to expand in Africa, 5G is on operators' radar. In SSA, the 5G journey has already begun, but it is still early days for 5G deployment and commercialization.

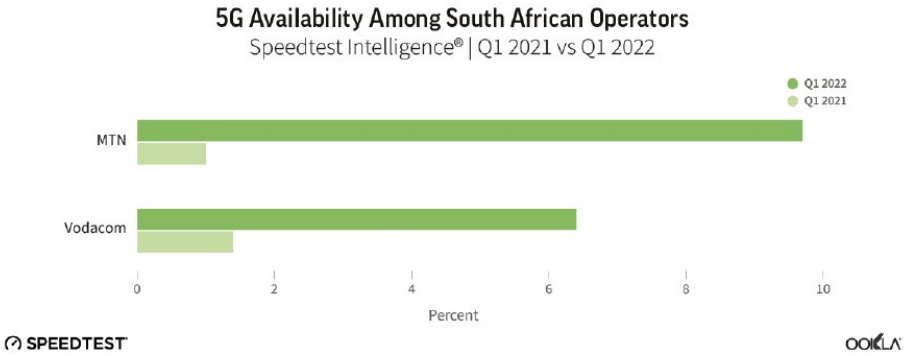
South Africa was the first country in the region to launch 5G and has since been joined by a handful of countries: Seychelles, Zimbabwe, Botswana, Mauritius, Madagascar, and Togo. According to GSA, there were nine commercial 5G networks in seven markets across the region by the end of May 2022. In these markets, 5G coverage remains limited to major cities. Furthermore, just over two dozen operators are either planning, or testing 5G technology or are already in the deployment stage. Regulators across the regions have also started to make spectrum available for 5G.

Botswana: In February 2022, the Botswana Communications Regulatory Authority (BOCRA) offered operators an opportunity to apply for spectrum in 5G frequency bands, which will allow operators to expand their existing 4G networks and roll out 5G. Operators are allowed to re-farm their existing spectrum to augment new spectrum to enable them to roll out 5G. Shortly after, Mascom launched four 5G sites in the capital Gaborone as part of plans to roll out 111 sites across Botswana by the end of 2022.

Kenya: The Communications Authority of Kenya (CA) developed a roadmap to facilitate 5G deployment. CA is preparing to reallocate spectrum in the 3500MHz band, which was previously assigned for FWA networks in Kenya but will be re-farmed for 5G by June 30, 2022. In May 2022, Safaricom was allocated 60MHz of spectrum in the 2600MHz band, which was previously used by the security agencies but has been released following a change in the technology that they use.

Nigeria: In December 2021, MTN and Mafab Communication won 100MHz TDD each in the 3.5GHz spectrum band. The telcos are expected to





commence the rollout of their 5G networks from 24 August 2022. While Airtel Africa pulled out of Nigeria's 5G auction, its CEO stated they have sufficient spectrum in other bands to launch 5G.

South Africa: In March 2022, the Independent Communications Authority of South Africa (ICASA) completed a delayed 5G auction, selling spectrum across 700MHz, 800MHz, 2.6GHz, and 3.5GHz bands. Rain and Vodacom got new low-band frequency assets in the 700MHz band while Telkom and MTN gained spectrum in 800MHz.

MTN leads on 5G in South Africa

Even though the 5G spectrum auction was completed in March 2022, Vodacom and MTN had both launched 5G services beforehand using emergency, temporary spectrum allocated during the COVID-19 pandemic.

In May 2020, Vodacom launched the first 5G network across Africa, in partnership with Nokia in the 3.5GHz band. At the time of launch, the network was available in three cities — Johannesburg, Pretoria, and Cape Town — with a total of 190 5G sites. MTN followed in June 2020, using spectrum across 1800MHz, 2100MHz, and 3500MHz bands. In its latest report, MTN said that in 2021, it had over 1,000 5G sites across several spectrum bands with plans to significantly scale up with 3.5GHz spectrum.

Using Speedtest intelligence data, we compared operators' 5G performance in the first quarter of 2022 against data from the same quarter of 2021. In Q1 2022, MTN's median 5G download speed reached 213.37Mbps — decreasing by a third when compared to Q1 2021 (320.10Mbps). Median upload speed suffered a nearly 40% decrease, going from 46.05Mbps to 27.32Mbps. When we examined the State of 5G Worldwide in 2021, we concluded that it's common to see new mobile access technologies slow down as adoption scales, particularly early in the tech cycle. As such, the downward tendency in MTN's performance is not surprising. Vodacom, on the contrary, almost doubled its median 5G download speed from 69.93Mbps to 132.11Mbps.

5G availability, which describes the percent of users on 5G-capable devices that spend most of their time on 5G, continues its upward trajectory across South Africa, from just 0.9% in Q1 2021 to 5.6% in Q1 2022. MTN had shown a stronger improvement to its 5G availability in the Q1 2021 to Q1 2022 period than its rival, growing from 1.0% to 9.7%.

Since the award of temporary spectrum in 2020, MTN has intensified its investment to increase

network coverage, improve speeds, and enhance the overall customer experience. It has also invested in an expansion drive into rural and peri-urban areas and a major 5G rollout, reaching 15% of South Africa's population at the end of 2021. MTN is also planning to extend its 5G coverage to 25% of the population by the end of 2022, and 60% by 2025. As part of its 'Modernization of Network South Africa' (MONZA) project, MTN has allocated a budget to extend network reach into rural communities, support 5G expansion, and restore vandalized infrastructure: ZAR624 million for Eastern Cape, ZAR749 million for Western Cape, ZAR820 million in Limpopo and Mpumalanga.

Vodacom's 5G availability had grown from 1.4% in Q1 2021 to 6.4% in Q1 2022. Vodacom reported in its FY 2022 results (for the year ended March 2022) that in South Africa, capital expenditure was directed at improving capacity and resilience of the network and increasing 5G roll-out. As of March 2022, the operator's 4G network covered 97.9% of the population, and it had also extended 5G sites to 624.

This investment drive is paying off. According to ICASA, 5G population coverage reached 7.5% in 2021, an increase from 0.7% in 2020. However, there is a disparity between urban and rural population coverage. 5G was present across all urban provinces, with Kwazulu-Natal in the lead with 20% 5G population penetration, while only three regions (Free State, Gauteng, and Western Cape) reported 1-2% population coverage in rural areas.

Having invested into spectrum and network rollout, the operators look for ways to monetize 5G. MTN has partnered with Australia's Emerge Gaming to allow people to play cloud games on their Huawei P40 Pro phone using MTN's 5G network. This is all to attract more consumers, especially video games' enthusiasts. MTN also partnered with Huawei South Africa, Miniandante Mining, and Minetec Smart Mining to transform old mining processes using 5G.

African nations still face many hurdles to modernizing networks

It is still early days for 5G across most of Africa. One of the key challenges across Africa in terms of network rollouts regardless of technology relate to the cost of mobile base stations, the backhaul technology that connects mobile sites to the core network, and energy supply, as outlined by a recent World Bank Report.

To alleviate the challenges operators are taking steps and looking to innovative approaches to improve the situation. Orange DRC partnered with NuRAN to construct and operate 2,000 solar-powered mobile towers, with a particular focus on rural communities, which will cover at least 10 million people in rural areas. These lower cost 'light towers' are better suited to covering remote locations with small populations and come with significant cost savings thanks to the use of solar renewable energy.

Device affordability is another issue. There are currently a few initiatives across the continent aimed at expanding connectivity to areas where it's lacking.

Google partnered with Safaricom in Kenya for a program that allows customers to pay for 4G-enabled phones in installments, while MTN Uganda reinforced a partnership with M-Kopa in March 2022 to introduce 4G smartphones on installment payment terms. MTN also inked a partnership with M-Kopa in 2021 that facilitated the sale of more than 70,000 smartphones, financing over 2 million customers across Africa.

Orange in Cote d'Ivoire launched a similar initiative in partnership with Yabx and Cofina. Yabx, a Dutch firm that offers credit across multiple countries in Africa, will provide the technology and manage the complete customer journey that will enable Cofina, an Ivorian financial institution that provides SME financing, to launch plans for Orange subscribers. Bringing 5G devices into the African markets will be even more challenging.

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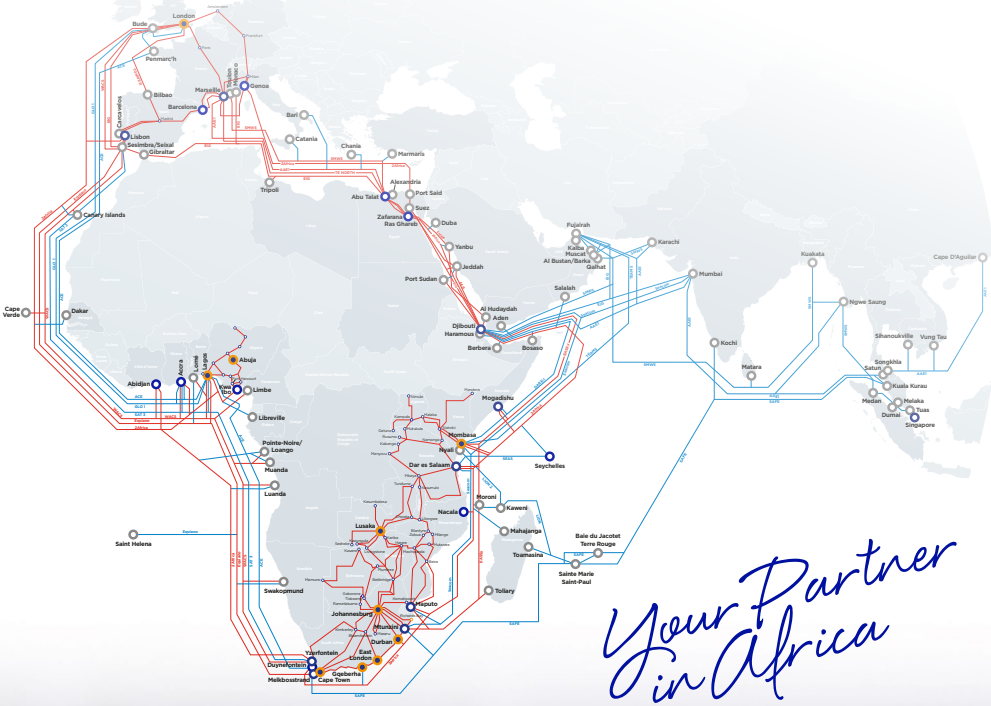
Africa's Digital Backbone



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Martha Suarez,
president, DSA

Digital inclusion across Africa: establishing reliable connectivity for all

Over the past year, we have seen significant advancements from governments and regulators across the globe when it comes to enabling reliable broadband connectivity for all, but the great strides made in Africa have been especially valuable in beginning to bridge the digital divide. It is now vital that regulators within the continent retain the good practices learnt because of the COVID-19 pandemic, such as valuing the importance of fixed broadband connectivity within the home, whilst recognising the need for enhanced connectivity within public spaces. This includes libraries, schools, airports and more.

Bridging the digital divide is a constant, ongoing challenge; more and more countries across the world are now showing the benefits of dedicating additional spectrum for WiFi, as a powerful complement to other technologies such as mobile, fixed wireless, satellite, and fibre. At the start of 2022, Southern Africa was the region with the highest internet penetration rate in Africa, at 66%. The share of people using the internet in this part of Africa was even above the world average, which stood at 62.5%. This is promising, but more can still be done to promote digital inclusion. Eastern and Middle Africa, for example, recorded the lowest rates across the continent with 26% and 24% respectively. The end goal for countries in Africa should be digital inclusion, and one of the crucial pillars for this is affordable broadband connectivity, making sure no one is left behind.

Africa's digital future

The African Telecommunications Union (ATU) Task Group on Emerging Technologies recommended at the start of the year that African administrations should review their national ICT policies, broadband and digital economy strategies, and recognize that the continent is at a pivotal point regarding the future of WiFi and other relevant technologies.

To drive productivity, economic growth, and societal development through the deployment of the next generations of WiFi, it is essential that the regulatory framework ensures that Africa can respond to the expected increased demand for WiFi connectivity and unlock the digital innovation enabled by this technology, in particular for start-ups and small and medium enterprises (SMEs), which should be at the forefront of digitalization.

WiFi is key to the digitalization across society (public services, SMEs, industries, etc.) and is the primary way citizens and businesses access the internet. Thanks to their low cost, easy deployment, and enhanced performance, WiFi 6E (designed to operate in the 6GHz band) and WiFi 7 (the new standard in the pipeline) networks will support the widespread adoption of new digital applications and services that will enhance African productivity.

This year the Communication Authority of Kenya's (CA) decision to publish guidelines enabling the use of short-range radio devices within the 6GHz band has led them to become the first sub-Saharan country to allow partial access for wireless technology. This is a welcome decision from the government, and as certain radio frequencies can now be used for different types of wireless electronic equipment in homes and

businesses, we expect crucial connectivity across the region to be improved. Adaptable connectivity for wireless broadband services, security applications and wideband data transmissions leads to delivering affordable connectivity for the millions of people where it is required most.

The guidelines authorize the use of short-range radio devices (SRDs) within the 6GHz band to provide low-cost communication solutions, including many different types of wireless equipment used in data collection such as local access networks (LANs), ultra-wideband sensors and radars, and other types of common electronic equipment that rely on such transmitters to function.

This is a significant step in the right direction and should be applauded. We expect other countries in Africa to soon follow suit, and even decide to follow prominent economies and digital pioneers around the world such as the US, Canada, Korea, Brazil, and Saudi Arabia that have already led the way on this front releasing the entire 6GHz (5925-7125MHz) band for WiFi.

There remains a coverage gap of over 840 million people with no access to reliable and affordable internet access. The guidelines in Kenya will go a long way to reduce this number, but for clear-cut results, unlicenced access to the entire band remains the optimal way to achieve great change.

Taking the next step

The importance of the 6GHz band for wireless internet service providers (WISPs) cannot be understated. Wireless Access Providers Association (WAPA) recently collaborated with the DSA in South Africa for a report which identified that the country could benefit by up to nearly US$58 billion over the next 10 years by getting ICASA to enable 1,200 license-exempt megahertz in the 6GHz band, helping the country to bridge the digital divide, as well as improve access to remote education, work, and commerce. This has yet to be released by ICASA, but hope remains this will be done soon to enable huge economic benefits.

Studies published by the DSA, conducted by Telecom Advisory Services LLC and with funding by the FCDO demonstrated the staggering benefits of enabling unlicensed access to the 6GHz band, and we hope the governments and regulators across the region pay heed to this. By providing affordable paid services and free access over WiFi hot spots, over 1.4 million unconnected Kenyans would be able to gain access to the internet by 2030. The economic value associated with enabling license-exempt access would add up to US$20.29 billion to the Kenyan economy over the next 10 years, equating to 1.35% of the country's current GDP.

Should South Africa enable the same level of access to the 6GHz band, it would mean over 1.25 million of the population would be predicted to gain access to the internet by 2030. By the same year, the effects of licence-exempt access to the 6GHz band would add US$57.76 billion to the South African economy, representing 1.39% of the country's GDP.

For Nigeria, the allocation of the entire 6GHz band to unlicenced use would result in a similarly significant contribution to a reduction of the country's digital divide. Around 1.2 million Nigerians would be able to gain access to the internet by 2030, as equipment capable of operating within this band continues to develop. The economic benefits are numerous, and an estimated US$72.14 billion would be generated within the next ten years, so long as unlicenced access to the full band was granted.

If regulators within these countries – and Africa as a whole – implement these recommendations, we can see a brighter and more connected future for the region. ■

Amy Saunders,
editor, African Wireless Communications Yearbook

Broadband speeds: the next bastion of the digital divide?

The development of connectivity infrastructure in Africa has historically lagged behind other world regions, held back by underinvestment and hindered by civil turmoil, insurgencies and environmental phenomenon like droughts.

Today, the story is quite different. Heavy investment from governments and private sector actors is transforming the African continent bit by bit. New installations across the cable, fibre, satellite, and cellular sectors are seeing increasing proportions of the African population coming online, and with ever-faster speeds. Policy makers are addressing barriers to access, and some markets are maturing.

The delivery of high-speed connectivity to Africa is essential for the continued development of the 54 countries on the continent. Over and over, we hear how increasing connectivity, bridging the digital divide, drives huge economic benefits and positive societal impacts, expanding opportunities for improved healthcare, education, global market competition, job opportunities, etc.

Broadband speed has been identified as one key aspect of the digital divide. Those who remain underserved by fixed and mobile connectivity remain subject to the negative impacts caused by the connectivity gap.

Interestingly, the Federal Communications Commission in 2015 defined 25Mbps down and 3Mbps up as the bare minimum connectivity speeds required to meet the definition of 'broadband.' Earlier this year, FCC chairwoman Jessica Rosenworcel has proposed that these speeds be increased to 100Mbps down and 25Mbps up, in line with the increasingly bandwidth-heavy requirements for modern life such as working from home, video conferencing, content streaming, etc.

Such speeds are significantly higher than the global median of 33.17Mbps down and 9.03Mbps up for mobile broadband, and 71.39Mbps down and 30.64Mbps up for fixed broadband (Independent analysis of data published by Ookla in September 2022). The world leaders for mobile and fixed broadband download speeds right now, respectively, are Norway at 126.94Mbps and Chile at 217.43Mbps. In fact, only eight countries have mobile download speeds exceeding 100Mbps, while just 28 countries have fixed download speeds higher than the FCC's latest proposal.

Mobile and fixed broadband speeds

African nations as a whole lagged far behind average global speeds. Of all the African countries assessed by Ookla, South Africa achieved the highest median mobile broadband download speed at 34.75Mbps, while Egypt boasted the highest median fixed broadband download speed at 44.45Mbps. At the other end of the scale, Ghana had the lowest median mobile download speed at 7.16Mbps, and Ethiopia had the lowest fixed broadband download speed at 3.73Mbps.

Angola, Cameroon, DRC, Ethiopia, Kenya, Libya, Morocco, Mozambique, Namibia, Nigeria, Sudan, Tunisia, Uganda, Zambia, and Zimbabwe all had significantly higher mobile download speeds than fixed broadband

speeds. Mobile networks are faster and more cost-efficient to deploy, and with most Africans accessing the internet via mobile phone, it's only logical that MNOs have prioritised wireless networks vs fixed. In contrast, Burkina Faso, Cote d'ivoire, Egypt, and Ghana had significantly faster fixed broadband download speeds than mobile.

Sub-Saharan mobile performance on modern chipsets

Exploring the four leading MNOs in sub-Saharan Africa – Airtel, Orange, MTN and Vodacom – in Ookla's 'MTN Performed Best Among Operator Groups in sub-Saharan Africa' report earlier this year, Sylwia Kechiche concluded that MTN South Africa achieved the highest median download speeds in quarter two of 2022 at 65.95Mbps; however, Vodacom in Johannesburg achieved the fastest speeds across top cities at 81.36Mbps.

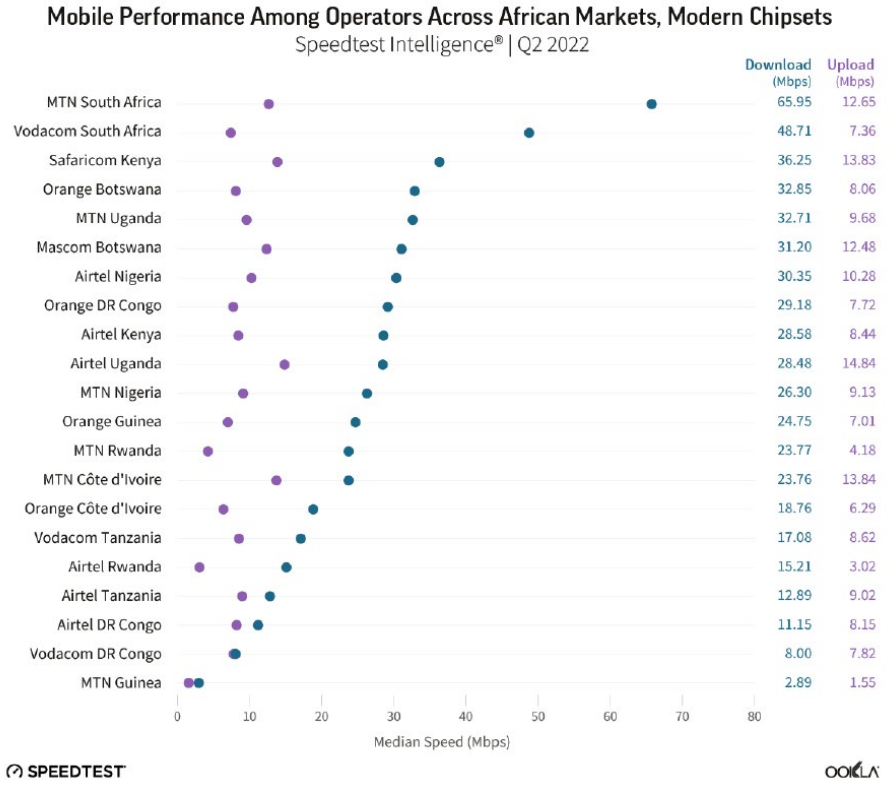
For sub-Saharan African nations, the differences between upload and download speeds bears a stronger relation to the country than the operator itself due to the installed (or lack of) infrastructure. Leading the pack is South Africa, with median download speeds of 65.95Mbps for MTN South Africa and 48.71Mbps for Vodacom South Africa. At the other end of the scale, the DR Congo had median download speeds of 11.15Mbps for Airtel DR Congo, while Vodacom DR Congo achieved 8.00Mbps down.

Northern African broadband speeds

In the latest update for the North of Africa in 2021, Ookla reported that every nation in the

	Mobile download speed / Mbps	Fixed download speed / Mbps
Algeria	13.01	11.14
Angola	20.39	13.19
Benin	·	15.18
Botswana	·	7.35
Burkina Faso	13.27	41.02
Burundi	·	5.19
Cameroon	12.05	7.48
DRC	18.27	10.28
Congo	·	29.01
Cote d'ivoire	16.89	36.03
Djibouti	·	7.25
Egypt	23.07	44.25
Equatorial Guinea	·	5.21
Ethiopia	18.11	3.73
Gabon	·	38.31
Gambia	·	6.01
Ghana	7.16	27.00
Guinea	·	6.72
Kenya	16.92	8.92
Lesotho	·	18.93
Liberia	·	7.45
Libya	12.37	8.26
Madagascar	·	33.88
Malawi	·	9.02
Mali	·	21.29
Mauritania	·	17.73
Mauritius	20.59	25.46
Morocco	32.52	16.96
Mozambique	17.43	5.96
Namibia	19.86	8.26
Niger	·	4.05
Nigeria	19.37	10.69
Rwanda	·	9.39
Senegal	16.29	20.94
Seychelles	·	33.64
Sierra Leone	·	11.05
Somalia	10.78	8.87
South Africa	34.75	37.22
Sudan	10.62	4.14
Tanzania	11.86	11.79
Togo	34.15	30.45
Tunisia	23.06	8.31
Uganda	20.82	10.18
Western Sahara	·	14.85
Zambia	12.13	7.30
Zimbabwe	11.23	7.80

Data sourced from Ookla Speedtest Global Index September 2022. Note: data for Cabo Verde, Central African Republic (CAR), Chad, Comoros, Eritrea, Eswatini, Guinea-Bissau, Sao Tome and Principe, South Sudan was not available.



region improved upon their fixed and mobile speeds year-on-year.

Speedtest Intelligence data revealed that while speeds vary widely across North Africa, every country in the region except Egypt has faster median mobile download speeds than fixed broadband. Mobile download speeds were highest in Morocco at 25.53Mbps, followed by Tunisia at 21.28Mbps, Egypt at 14.95Mbps, Libya at 11.65Mbps, and Algeria at 9.76Mbps. Compared with data from 2020, Libya showed the largest percentage increase at 67.4%, followed by Algeria at 65.1%, Morocco at 10.7%, Tunisia at 10.0% and Egypt at 0.1%.

Data sourced from Ookla Speedtest Global Index September 2022 showed a small order difference for this year: while Morocco still came out ahead in the second quarter of the year at 32.52Mbps, Egypt had leapfrogged to second at 23.07Mbps, leaving Tunisia down a place at 23.06Mbps, Algeria up one spot at 13.01Mbps, and Libya down one at fifth with 12.37Mbps.

For fixed broadband download speeds, Egypt had the fastest median speed in the first quarter of 2021 at 26.58Mbps, followed by Morocco at 10.01Mbps, Libya at 8.71Mbps, Tunisia at 6.95Mbps and Algeria at 4.82Mbps. Every Northern African country saw fixed broadband download speed improvements greater than 25% year-on-year except Tunisia.

"Load shedding has had a significant impact on network operators and consumers in 2022, with rolling blackouts hindering the delivery of services nationwide."

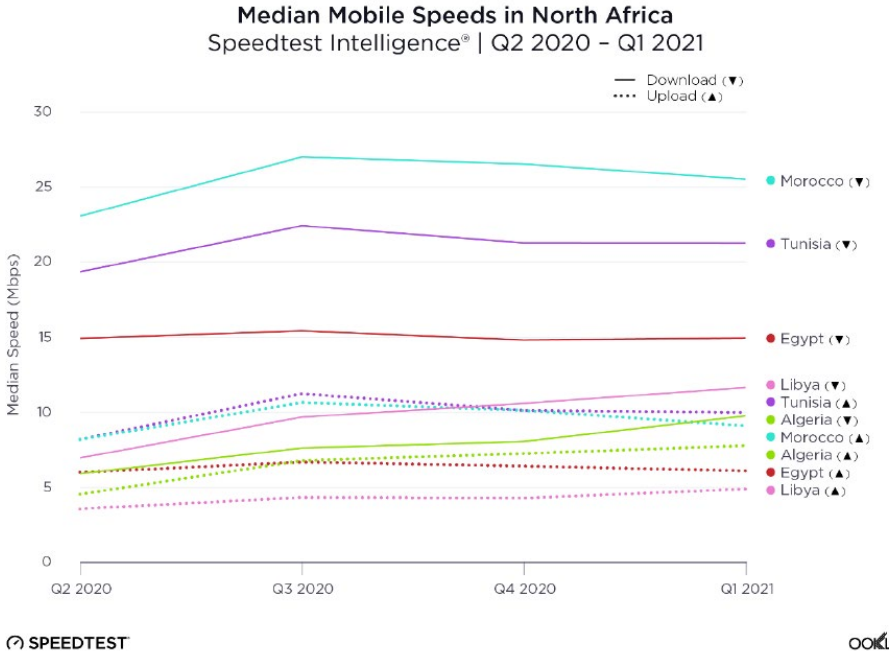
Algeria's speed increased by 105.5%, Egypt by 94.6%, Libya by 59.8%, Morocco by 28.5% and Tunisia by 12.3%.

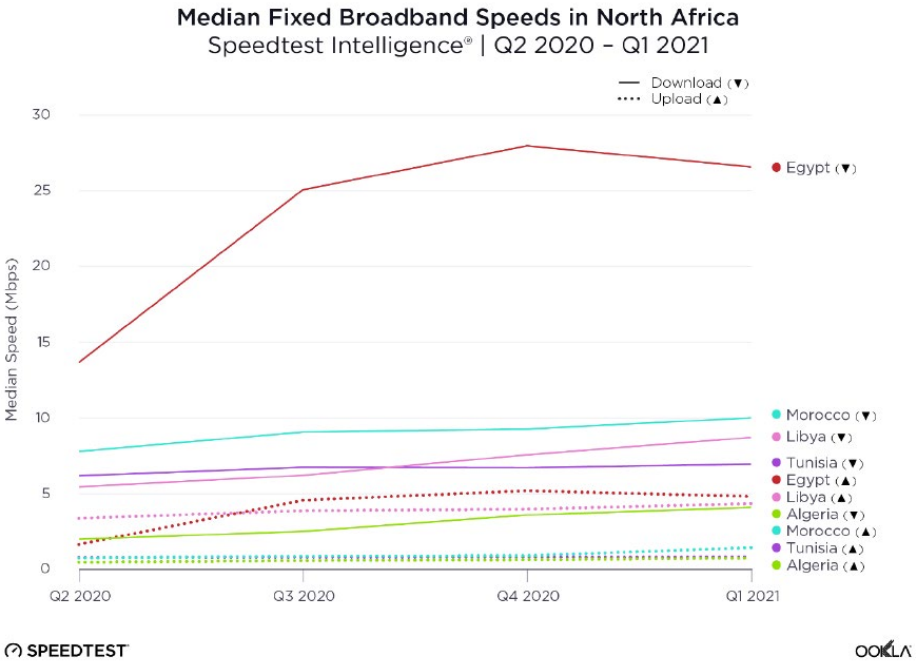
Again, data from the Ookla Speedtest Global Index September 2022 showed a small order difference for this year: Egypt remained on top with the fastest speed in the second quarter of 2022 at 44.25Mbps, followed by Morocco at 16.96Mbps, Libya at 12.37Mbps, Algeria up one place at 11.14Mbps, and Tunisia down a spot at 8.31Mbps.

Load shedding woes

Despite leading the way on both median download and upload speeds for mobile broadband in the second quarter of 2022, South Africa has been severely plagued with load shedding this year, to the extent that in October, the Pan South African Language Board (PanSALB) named 'load-shedding' as the 2022 South African Word of the Year.

"Ultimately, the SA Word of the Year reflects the preoccupations of South Africans for that given period, and this year South Africans had to contend with the impact of the energy crisis in the country. The term 'Load-shedding' has superseded the first runner-up, Phala-phala, with over 40,000





clip counts and mentions across a broad range of media," said PanSALB CEO, Lance Schultz.

Load shedding has had a significant impact on network operators and consumers in 2022, with rolling blackouts hindering the delivery of services nationwide. Such outages have naturally impacted on connectivity speeds. During the second quarter of 2022, Vodacom customers reported 46,810 incidents and MTN customers reported 34,882. The top two issues reported for Vodacom, according to Kechiche, were no signal (46%) and no mobile internet (36%), while for MTN, more customers reported no internet (43%) than no signal (40%). Total blackout reports of 7% for Vodacom and 5% for MTN were highlighted.

Both MNOs have enacted contingency plans against outages due to load shedding, with networks of generators and batteries now in place.

A long way to go

It's clear that there remains a long path ahead until mobile and fixed broadband connectivity reaches the levels required, both in coverage and speed, to truly close the digital divide.

However, some countries have made positively alarming progress in recent years amidst a backdrop of uncertainty – pandemic, war, fuel crises – demonstrating that it's perfectly possible to connect the world, fill the digital inclusion gap, in the years to come.

With new infrastructure rolling out every month, and giant technological leaps forward delivering new mobile generations, more efficient connectivity, at lower costs, Africa is truly on its way to a digital future. ■

John Tenidis,
marketing director, wireless solutions portfolio, Intracom Telecom

Intracom Telecom is a global telecommunication systems and solutions vendor present in the African market since 2010. We serve the telecom markets of the continent through offices in Johannesburg and Dubai. Our company provides support and maintenance for networks, and we now see new investments in the expansion of these networks.

We supply networks for fixed wireless access (FWA) to ISPs and telcos, for wireless transmission to cellular operators, control and management networks for electricity companies, private networks for armed and police forces and for the mining industry.

The last 12 months have been a period of transition from the sudden halt caused by the COVID-19 pandemic, and gradual return to normal. Despite the crisis and the devastation, the COVID-19 pandemic motivated our clients to think proactively about the capacity and expanse of their networks as well as addressing the demand for more remote than physical interaction in business and private lives. We see this in our booked business for the last 12 months and our forecast looking ahead.

Since our establishment in African telecom market, we have taken into consideration the diversity between the countries on the continent and the impact that this has on business conduct. To address the demands from customers coming from so many different countries, we must understand and embrace the different cultures and mindsets. With our local sales teams and network of partners in various countries we meet this challenge.

"Having addressed adequately the challenges of the past we are now ready to face those of the future."

As we recover from the COVID-19 restrictions, it will be possible to spend more time again with our clients, listening to their problems and presenting solutions from our portfolio of telecommunication products. Having addressed adequately the challenges of the past we are now ready to face those of the future. Our customers now have a completely different mindset about the way they want to operate and expand their network.

We are bringing our experience gained globally and adapting that for local use in Africa. We offer mature, yet innovative solutions, based on the international standards of the telecoms industry. In some cases, our African customers were frontrunners in technology adoption compared to other parts of the world, and we learned from them while adjusting our products. Thinking globally and acting locally is not as easy as it sounds!

We see a big opportunity in building networks for quality of service at the epicenter. High quality pays back quickly and increases ARPU, while lack of quality causes frustration and subscriber churn.

We are proposing solutions from our mature product portfolio for our clients' networks, whether this is for FWA or for wireless transport networks connecting machines to machines, allowing human administrators to manage every part of their assets. Our portfolio of products, the WiBAS™ for multipoint access, the OmniBAS™ and the UltraLink™ for point-to-point connections and the un|iMS™ for

network lifecycle management and automation have simple yet modular architectures to cater for many different applications at the field of operation.

We see demand from telcos and ISPs for fast and reliable connection to the internet, and we meet demand from utilities and enterprises to connect their assets for control and monitoring. These two segments have our uninterrupted attention, and this is what we expect to drive our growth in Africa for the next 12 months.

The pandemic taught everyone a big lesson - that of being connected with people and assets at any time. If physical presence is not possible then remote access must be possible. This is causing a trend for the build-up of public and private networks. We see the increased demand for access to people, to services and functions, which drives the expansion and the upgrade of networks.

Although some will claim that quality of service does not matter when reachability is the primary objective, we are trying to help our customers think proactively; quality when designing a network for long reach and connecting the digitally unserved and underserved is important. We see this trend

"The pandemic taught everyone a big lesson - that of being connected with people and assets at any time. If physical presence is not possible then remote access must be possible."

in our two leading African markets, South Africa, and Nigeria. We are also developing new markets which are influenced by this trend, and we will be able to announce more success stories in the coming 12 months.

Intracom Telecom expects to significantly grow its PMP business throughout the African continent to address the constantly increasing bandwidth demand, frequency spectrum congestion and the failure of the currently used unlicensed technology to meet the required quality of service. The company is a familiar brand for Tier-1 operators and wireless ISPs of the continent, and this is used as the foundation of the promotion strategy for the new generation of ultra-broadband products, such as the new series of WiBAS PMP systems and E-band Ultralink radios. ■

Looking ahead: We hope that the COVID-19 pandemic is behind us and will not create any further devastation from the loss of human lives, nor disruption of private and business routine.

We firmly believe in Africa's huge potential to invest in modernizing and expanding telecommunication infrastructures. The vastness of the land, the diversity of the population and the magnitude of nations on the continent has no comparison on our planet, yet with one distinct characteristic; the wide gap between those who have connection and those who do not.

We see a tremendous opportunity for our solutions enabling access to communication networks, ones that provide real broadband and uncompromised quality to citizens no matter where they are.

During the past years, our industry has focused on improving connectivity while on the move and neglected fixed location services. Our solutions come to fill the gap and we are striving to develop technologies which bring ultra-broadband connectivity to the populations of the great nations of Africa.

Obehi Okosun,
CEO CBNL Africa

Africa has always been a goldmine for the telecoms market. The potential is enormous but getting to the high value business takes time and a great deal of effort.

I see change in two major areas. The rise of 5G has produced bottlenecks in capacity which has forced the second area of growth – network operators are now forced to make changes in their backhaul and wireless offloading technology mix. The current generation of PTP microwave backhaul does not provide the required capacity. Accordingly, we now see huge investment in fibre being deployed, towing capacity lanes constructed, and upgrades to existing networks to connect 5G sites.

Most countries are focusing more on enterprise and home delivery FTTx solutions. Metropolitan fibre is now being introduced where before commercial backhaul technologies like microwave were used.

We have come to understand the impact the investment in fibre backhaul has had on 5G mobility performance; we are very interested in the costs. Both time and money costs are major factors in doing effective business in Africa. Since fibre is costly and timely to deploy, we have been working to introduce new 5G Fixed Wireless Access (FWA) radio technologies to assist with offloading 5G from mobility networks, to enhance capacity and handset user experience. Such 5G FWA solutions require high capacity and long range, robustness, be fast to deploy and cheap to fully complement rather than compete with FTTx. 5G FWA will eventually work alongside fibre to provide a more efficient TCO for last mile connectivity.

We've seen two significant areas of challenge this year.

With the rollout of 5G, different countries are implementing different policies resulting in frequency reshuffling between operators, which is affecting service delivery. These new regulations are seeing operators needing to swap out infrastructure, equipment, etc. and replacing it with new technologies. Although we can't control this, it offers an opportunity to strategize, to really think about when you use those technologies.

The second challenge is currency exchange. Rates have become very changeable, and it has impacted on business. When a customer has ordered products at a specific cost, because of fluctuations in exchange rates, you could make a % loss when orders are delivered.

The continent's government regulators and financial institutions must find a way to enable telecoms suppliers and operators to ensure 5G adoption is as seamless as possible and that target TCOs are realized. Only when this happens will Africa become the true economic and technological powerhouse it could be. ■

Looking ahead: The African market is very dynamic, so you need to also be very dynamic in your approach, particularly when doing business with Tier 1 operators.

To make our customers' uptake faster and easier, we want to begin to deliver our brand of technology as a service. Thus, our customers would not have to pay outright for a solution; they could receive a network as a service and pay over time.

We want to gain more ground in Africa and offer more services with more effective, efficient delivery. Our clients in West, East, South and Central Africa have always preferred to do business with us locally. For 2023, we plan to have more open offices, so that we will be on hand for any key issues that arise.

Vaibhav Magow,
vice president, Asia Pacific, Middle East/Africa, Europe and Russia/CIS regions, Hughes

According to the World Bank, less than a third of the African population has access to broadband connectivity. That digital divide exists in large part due to underserved or unserved populations in rural areas without access to reliable internet service, yet the demand for connection is greater than ever before. The stark contrast of those with and without adequate internet access was especially apparent in rural areas of sub-Saharan Africa during COVID-19, where students and teachers often lack both electricity and digital devices.

Even though Africa has the lowest internet penetration rate in the populated world, its telecommunications market is among the fastest growing, and much of that growth is driven by satellite solutions. Laying fibre takes considerable time and can cost US$30,000 per mile. Satellite is an affordable, near immediate solution for bridging the divide for those who live outside the densely populated urban centers.

In late 2021, the National Company for Telecommunications Services (NCTS) in Egypt selected the Hughes JUPITER™ System to deliver the ground segment requirements for operation of the Ka-band TIBA-1 satellite. The deployment of the Egyptian government-owned TIBA-1 satellite is a major milestone in the country's mission to connect the unconnected; the Hughes JUPITER System will enable delivery of internet and telecom services to millions of people in remote and rural areas of the country.

Hughes has a proven track record of successful private partnerships in Africa. In 2018, the company entered a joint venture with Yahsat to provide satellite broadband services across Africa, the Middle East and Southwest Asia. Today, the YahClick partnership continues to provide unserved and underserved communities with reliable, high-speed broadband service over Yahsat's Al Yah 2 (AY2) and Al Yah 3 (AY3) Ka-band satellites leveraging the capabilities of the Hughes JUPITER™ System for ground services. In South Africa alone, thousands of Hughes terminals support connectivity for consumers and enterprises.

Hughes also provides the ground system technology that enables service from Eutelsat's Ka-band Konnect satellite, which became operational in late 2020. Hughes has delivered more than 60,00 VSAT terminals to date to support the Konnect service in Africa, and there are more to come, including locally operated gateways (employing local labor) in Nigeria, Ethiopia and South Africa. The partnership between Hughes and Eutelsat has helped deliver high speed internet coverage to 650 million people in rural and urban areas across 22 countries in Africa with speeds up to 50Mbps and 100Mbps. ■

Looking ahead: The biggest growth market for satellite in Africa is mobile backhaul.

Thanks to the emergence of new ISPs, Africa may no longer be a 'mobile-only' market, but it is certainly mobile-first. According to Gallup, internet access in Africa rose significantly between 2019-2021 due to the increased affordability of mobile devices and the need for connection during the pandemic. Making sure those mobile users have reliable coverage is a daunting task.

With the expanded coverage provided by new LEO constellations, satellite is a more convenient than ever solution for backhaul and will continue to drive solutions to help bridge the digital divide.

Nehal Osman,
fixed network business center lead, network infrastructure business group, Nokia MEA

A lot has changed in the broadband market over the last 12 months. Broadband has been growing enormously post COVID-19, so 24+ months now. That's not only in Africa, but all over the globe.

Still, a digital divide remains between developed and developing countries. Technology fitting the needs of users is critical, but broadband deployment also depends on structural market characteristics, such as competitiveness and purchasing power, international connectivity, geography, and several other factors.

In certain markets, we have seen how the move to XGS-PON is accelerated to give end customers high speeds and a better experience especially with the increased data demand day after day due to various applications such as VR gaming, 4K and even 8K TV and many other applications and content that require more speeds as well as throughput. Gigabit fibre broadband services are available in the world today for many customers and even residential 10Gbps broadband is available in some countries such as South Korea, Singapore, Norway, Switzerland, and the US.

"The potential for digital growth opportunities in Africa is enormous and now, more than ever, Africa is looking to digital solutions to increase productivity and drive development."

In Africa, more fibre deployments have been happening during the last two years with more investments and governmental funds that are provided to drive economic growth and provide services to more people - not just homes, but businesses and enterprises as well.

Indeed, we can confidently say that fibre is the fastest, greenest, and most widely deployed broadband technology. However, we are seeing 5G deployments becoming more mature with fixed wireless access (FWA) as the main use case to offer fixed like services using the 5G spectrum. In a nutshell, we can say that fixed and mobile broadband connectivity is expanding globally.

With COVID-19 and the subsequent lockdowns, digital connection suddenly became a critical resource for work, school and staying in touch. For service providers, sustaining connectivity and high data rate demands have never been more critical. That created a great challenge in demand and supply to cope with the unpredicted increased demand timely to expand networks, upgrade networks or even build new networks.

The potential for digital growth opportunities in Africa is enormous and now, more than ever, Africa is looking to digital solutions to increase productivity and drive development.

Although we've seen increased broadband connectivity and related infrastructure development in Africa during the last years, the continent remains behind much of the rest of the world in terms of fibre network and broadband connectivity, as well as spectrum and data centre processing capabilities. Indeed, COVID-19 pushed to accelerate the

digital growth across the continent.

All of that created many opportunities for investments and growth.

We are experiencing one of the significant developments today; broadband is everywhere and for everyone. Perhaps the ultimate trend in advanced wireline and wireless broadband technologies is the ability for users to access networks seamlessly, whether at work or at home, in shops or restaurants, on planes, trains, at sea and in the most remote areas.

Broadband connectivity is expanding globally, and connectivity is no longer a luxury, but it has become a basic need especially with the human impatience and high demand for data day after day.

When it comes to Africa, the potential for digital growth opportunities is vast, but it will depend critically on ensuring that digital access is affordable and widespread which is a key factor.

Given the time, cost and resources required for the deployment of wireline broadband, wireless is still more likely to be the broadband solution for users in many cases in the developing countries, particularly in rural and remote areas.

Nokia is committed to innovation and technology leadership across mobile, fixed and cloud networks. For fixed access technologies, Nokia is a leading global equipment vendor delivering copper, fibre and wireless access technologies. Our focus will always be to offer sustainable broadband through offering innovative solutions, to protect our customers' investments. Our leading position in openness adds to our credibility and authenticity when helping our customers decide what's right for their business. Also, our ability to take our customers beyond the network termination point and deliver gigabit broadband throughout the home is another factor and focus area.

Sustainability is a key component of Nokia strategy and purpose. We believe digitalization and connectivity solutions are critical to resolving many of the global problems facing society today – environmental, social, and economic. Nokia embraces environmental, social and governance (ESG) principles while providing secure, reliable networks to operators and enterprises to enable digital transformation. Nokia builds the critical networks with sustainable technologies for meaningful digital transformation in fast-growing and evolving markets. ■

Looking ahead: The most important trends driving broadband networks in the coming year are a natural extension of the progress and challenges during the last two years. In particular, the global response to COVID-19, building momentum in network investments, and continued innovation in broadband technology are all contributing to the next phase of evolution in broadband.

Technology will continue to evolve year over year, and connectivity will more and more become a basic need leading to continuous growth in broadband especially fibre deployments.

Fibre to the home is a major growth phase which will continue growing. So, fibre deployment expansions, continued bandwidth growth, and extended access to broadband will shape the investments and growth in coming years.

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FibrePoynt manufactures and sells solar-powered wireless broadband antennas, termed HomePoynts, that enable the implementation of a telecommunications network infrastructure system for last mile delivery of broadband data services to underserved high-density residential communities

About us

How it works

Projects

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Hughes Network Systems, LLC (HUGHES), an innovator in satellite and multi-transport technologies and networks for more than 50 years, provides broadband equipment and services; managed services featuring smart, software-defined networking; and end-to-end network operation for millions of consumers, businesses, governments and communities worldwide.

The Hughes flagship internet service, HughesNet®, connects millions of people across the Americas, and the Hughes JUPITER™ System powers internet access for tens of millions more worldwide. Hughes supplies more than half the global satellite terminal market to leading satellite operators, in-flight service providers, mobile network operators and military customers.

A managed network services provider, Hughes supports more than half a million enterprise sites worldwide for customers ranging from petroleum retailers to financial institutions to mobile network operators. Headquartered in Germantown, Maryland, USA, Hughes is owned by EchoStar. To learn more, visit www.hughes.com or follow HughesConnects on Twitter and LinkedIn.

Broadband

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Multinational Networks

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Intracom Telecom is a global telecommunication systems and solutions vendor operating for 45 years in the market. The company has become the benchmark in fixed wireless access and it successfully innovates in the 5G/4G wireless RAN transport and small-cell SON backhaul international arena. Intracom Telecom offers a comprehensive revenue-generating software solutions portfolio and a complete range of ICT services, focusing on IoT, SDN/NFV, Big Data analytics & data-driven intelligence, and Smart City solutions. Moreover, it addresses the Energy & Utilities industry, emphasizing on smart metering and end-to-end IT solutions. Intracom Telecom is also active in the defense sector providing security integrated systems for critical infrastructure protection and border surveillance. The company has extensive know-how and a proven track record in the market, serving fixed and mobile telecom operators, public authorities and large public and private enterprises. Intracom Telecom maintains its own R&D and production facilities, and operates subsidiaries worldwide.

Home & Business
Ultra Broadband FWA

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Parallel Wireless is a leading provider of centralized RAN over cloud-based Open RAN technology for wireless network operators. We design our Centralized RAN solution to introduce new innovations and reduce total cost of ownership (TCO), improve scalability options, and increase power efficiency for global MNOs.

We achieve this through full RAN centralization, RU-DU separation, and power efficiency. We are engaged with over 50 global MNOs and have been recognized with over 74 industry awards. We believe the power of software can unlock amazing opportunities for the telecom industry by helping customers reimagine their networks. At the core of what we do is our team of re-imaginers who value innovation, collaboration, openness, and customer success.

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Company

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Stratosat Datacom forms part of the German based SCHAUENBURG International Group, which is a fast-growing family business with more than 30 affiliated companies worldwide. Investments are focused on niche technologies in electronics, plastic processing, engineering and industrial solutions on a global scale.

Stratosat Datacom, established in 2002, provides cost effective tailor-made turnkey satellite and microwave communication solutions in Sub-Sahara Africa. We have rendered products and services to the majority of Telco and Satellite Operators in Africa.

Our customer focussed team provide expertise in equipment supply, installation, systems integration, commissioning, handover, training, maintenance, support and network monitoring.

Stratosat's main solution offerings are:

- High-Speed Satellite Managed Broadband Connectivity, Mobility (CoTM & CoTP),
- Managed Services,
- Tailor-made Communication Network Solution Design, Project Management,
- Satellite Equipment Supply & Distribution and Implementation & Management of Large Astronomy Projects (SKA / MeerKAT).

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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