chapter
Cellular
Networks

2

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Worldwide the deployment of 5G continues to make progress and in the commercially viable 5G services for consumers, the last 12 months up to June 2021 has seen 90 new commercial enterprise use cases. This includes investment in 5G networks where launched, compared to 69 in the preceding 12 months, this takes the total to date to 169.

Commercial 5G services are now available in every region of the world, making it a truly worldwide technology. By the end of 2021, 5G connections will account for 8% total mobile connections globally, while 5G networks will cover more than a fifth of the world's population.

Network rollout is a first step to realising 5G's potential, with the availability of applications an important next stage. As a result, operators and other stakeholders in early adopter 5G markets are increasingly focussing on the development of 5G labs dedicated to co-creating solutions with partners, including start-ups, academia, cloud providers and enterprises, to address specific needs.

In sub-Saharan Africa, the journey to 5G has begun but it is still at the early stage for network deployment and commercialisation. By the end of June 2021, there were seven commercial 5G networks in five markets across the region. In these markets, 5G coverage remains limited to major cities. Enhanced mobile broadband (eMBB) and fixed wireless access (FWA) services are the main use cases.

The cautious approach to 5G in sub-Saharan Africa reflects the greater urgency to maximise the existing capacity of 4G networks. 4G is now available to more than half the region's population – but the technology accounts for just 15% of connections, on average, compared to 57% globally. Furthermore, 5G networks are capital intensive and come with operational complexities. As such, evidence of sufficient demand for enhanced connectivity services to justify investments in large-scale deployments is a vital indicator of 5G market readiness.

The increase in use of broadband for work, learning, entertainment and other activities, as a consequence of Covid-19 pandemic control and lockdown measures, is indicative of the

5G footprint expands across Sub-Saharan Africa, but mass rollout is still some way off
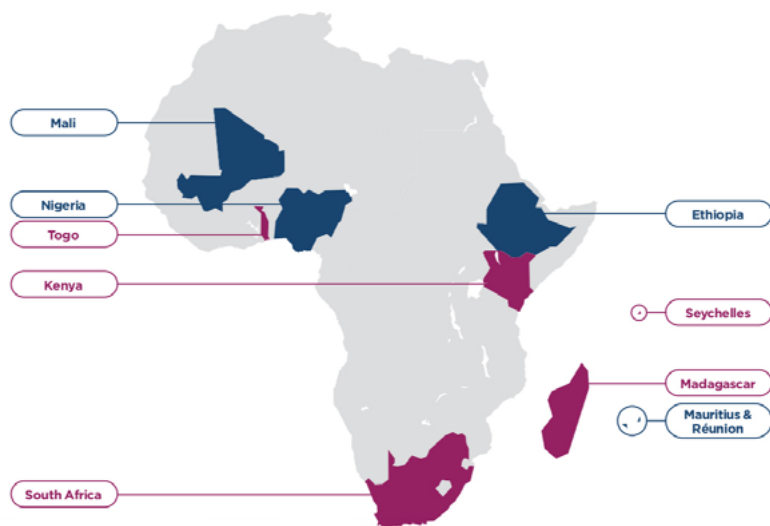
Data as of end of June 2021

potential demand for enhanced connectivity. Given low fixed broadband penetration, particularly in residential locations, most of the increases in data traffic in sub-Saharan Africa were recorded over mobile networks. With digital technologies and online platforms set to become more integral to everyday life post pandemic, 5G networks will be crucial to meeting future demand for enhanced connectivity services by households and businesses.

To this end, operators and other stakeholders in sub-Saharan Africa have begun to prepare for a 5G future, as evidenced by recent developments across the region such as the following:

• **South Africa** – MTN has taken steps to expand its 5G coverage with the deployment of 5G sites in Polokwane in Limpopo and Emalahleni (Witbank) in Mpumalanga. MTN also plans to expand its 5G network in the Eastern Cape province, with deployments in Gqeberha and East London.

• **Nigeria** – The Nigerian Communications Commission (NCC) and Nigerian Communications Satellite (NigComSat) have signed a Memorandum of Understanding (MoU) on the use of C-band spectrum (3.4–3.9 GHz) for 5G services. Most 5G launches globally have so far relied on 3.5 GHz spectrum, which provides a valuable middle ground between capacity and coverage for 5G networks.

• **Mauritius** – MyT Mobile has launched four MyT 5G Experience Zones as part of its transition to commercial 5G services. Customers will be able to register to connect to the 5G network in the cybercity regions of Ebene, Trianon, Bagatelle and Reduit.

• **Mali** – Orange has launched a 5G pilot in Bamako, with customers able to test the network with 5G-capable devices. Orange plans to launch 5G across several markets in the region by 2022.

- **Angola** – New licensee Africell is working with Nokia to deploy the latter's AirScale Single Radio Access Network (S-RAN) across up to 700 sites to concurrently support 2G, 3G and 4G services, and be 5G-ready. Nokia's AirScale platform can be seamlessly upgraded to support 5G networks through a software update.
- **Uganda** – MTN has started the process of automating its network, through a partnership with the Telecom Infra Project (TIP), in preparation for 5G. MTN plans to deploy TIP's Disaggregated Cell Site Gateway technology to build transport products and network capabilities at 2,500 sites across the country to support a smooth transition to 5G.
- **Zambia** – The Zambia Information and Communication Technology Authority (ZICTA) has opened a public consultation inviting stakeholders to provide feedback on its proposals for 5G spectrum bands. The consultation will inform ZICTA's spectrum planning and licensing decisions, including selecting priority bands for 5G; choosing an allocation strategy; identifying bandwidth requirements for operators; creating a planning process to prepare the selected bands for use; setting out a fair and transparent licensing process to suit each available band; gauging market demand; and setting out a 5G roadmap.
- **Cameroon** – MTN Cameroon has disclosed that it has applied for permission to deploy and operate a trial 5G network. Approval from the telecoms regulator Agence de Régulation des Telecommunications (ART) would enable it to test 5G services in the country. ∎

Dario Betti,
CEO, Mobile Ecosystem Forum (MEF)

The World Bank and African Development Bank report there are 650 million mobile phone users in Africa, surpassing the number in the United States or those in Europe. In some African countries more people have access to a phone than to clean water, a bank account or electricity. Africa is largely a mobile first continent, bypassing fixed networks.

The level of advancement in mobile fintech in Kenya or Nigeria rivals the rest of the world. The different markets that make Africa have shown a surprising level of innovation and creativity in content, payments, and utilities. But there the nuances between African countries are significant and as such must be understood and respected to ensure success.

Youths are using mobile phones for everything: communicating, listening to the radio, transferring money, shopping, mingling on social media and more. Furthermore, the industry has transcended divides between urban and rural, rich and poor. As Gregory Brophy, the Chief Executive Officer of iTouch Messaging Services explains, "The mobile market

in Africa, powered by youth, has great potential for investors because of the huge numbers." iTouch Messaging Services is one of the very first wireless service solutions that show the potential of this market, starting in 1995 and growing for over 25 years.

There is a great potential in the African mobile market, and it pays to enter in Mobile Africa early on. Gregory points out: "Generally brands who engage early in Africa become household names - the generic for the sector. In South Africa Colgate is toothpaste, OMO is washing powder, Grandma is for headaches. When you're asked for a Grandma, you're being asked for a headache remedy - it could be a tablet, a liquid or a powder. So, the advice is engage early, pay your school fees, and be handsomely rewarded over and over again. Patience is a virtue. Adages manifest their truths."

Projections from the UN suggest that Africa's population of 1.3 billion will quadruple over the next two decades reaching 4.3 billion by the end of the century. While Asia's share of global working-age population would be declining, Africa's would be ascending eventually overtaking Asia by 2100. By the end of 2100, Africa's population would

most likely surpass Asia with a middle class exceeding 50% of the population. Economic growth is moving towards Africa. An 80-year forecast is a challenging one, and history has not been kind with regards to the African economic revolution. However, the trajectory of this change is noticeable now. To grow in this market is to position for a historical change.

Mobile Data is changing the opportunities

The market is now enjoying a considerable move to digital channels thanks to the progressive adoption of smartphones.

It is not just fintech that is growing. According to Ali Karaosman from Telecoming, content market is enjoying a boost too, and this mobile monetisation firm has seen a dramatic change "The arrival of online consumption of VOD through mobile phones has converted it into an immediate platform for entertainment consumption." The key in African Innovation is adapting technology to the African reality, using airtime as a wallet, insurance, or money transfer, all is possible. So, the mobile has become the new TV center. Anzelle Robertson from SAM Media reports how even virtual reality is working in Africa. VR has not been a straight success across the globe, but their VR services 'Mobio360' has 700,000 African subscribers enjoying international city tours, extreme sports or exotic locations.

Mobile is the market channel for the content. Taha Jiwaji, the CEO of Mobile Messaging solution specialist Beem Africa says, "Telecoms and omni-channel

"Projections from the UN suggest that Africa's population of 1.3 billion will quadruple over the next two decades reaching 4.3 billion by the end of the century"

"Regulators had to allocate additional spectrum to cater for the increase in digital traffic"

communication continue to thrive and grow across African markets. As consumers move to smart phones and digital channels in droves, businesses are having to follow them to continue to serve them and wow them with new mobile experiences." Operating a Communication platform in West Africa, Alchemy Telco sees the huge business potential. However, Malick Dibba, the CEO and founder believes that both regulation and mindsets have a long way to go to embrace the business model and the benefits wireless networks provide. There are still improvements to be made.

The impact of Covid-19 can be seen in the mobile market. Tracy Molete, from Apprentice Valley confirms that "The pandemic drove agile developments and increase in investment and adoption of digital technologies to enable remote working, remote learning, self-assessment apps, e-commerce platforms and digital cash transfers and payments. The wave has come, it is getting bigger, Network Operators are driving towards acquiring more spectrum and scaling infrastructure to meet the imminent demand brought by the fantastic innovations and adoption thereof across the continent."

Teniola Stuffman, Business Development Director, VAS2Nets Group adds that there are issues with the stronger adoption of data: the 3G and 4G networks are starting to suffer. It is too early to imagine a strong 5G roll out for Africa – more investment in fibre networks to support the mobile delivery is needed. More network-building will be necessary, but the infrastructure is growing.

Regulators had to allocate additional spectrum to cater for the increase in digital traffic. We have also seen a lot of IOT and chatbot technologies emerging. These have become even more prominent recently as they are used, in conjunction with drones and robotics, for remote monitoring and war room dashboards which monitor and respond to societal problems just-in-time.

Changing regulations

Regulations within Africa are tightening up dramatically, and Ryan Louw, the CMO of SMS Portal thinks this is a good thing: "Customer Data Protection policies have been implemented and an Opt-in policy has become the staple for mobile communication in Africa. This becomes paramount in keeping the market customer centric and paves the way for a fruitful future for both marketer and customer." South Africa saw the start of consumer activism in 2008 with the Consumer Protection Act 68 of 2008 laid a foundation for subsequent regulations related to the protection of personal information. Network Operators and Wireless Application service providers had to make drastic changes to align with the consumers' expectations and regulations [1] South Africa has paved the way, but many other countries are now busy establishing frameworks and regulation. Overall, the importance of fighting cyber-crime is intensifying. ■

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Joe Barrett,
president at Global mobile Suppliers Association (GSA)

The Covid-19 pandemic once again demonstrated the importance of ICT for African business and society, with people in many markets reaching for their devices during periods of lock down or when forced to work from home. Operators around the continent reported very rapid growth in data traffic as the pandemic spread from country to country and impacted on peoples' lives, with regulators making extra spectrum available on a temporary basis to help mobile operators meet surging demand.

But it is easy to forget that despite all of this, Africa still has significant gaps in its infrastructure and communications coverage. Many people did not have devices to reach for, or networks to connect to. Gaps are being slowly filled, but there is so much more to do to connect all citizens of Africa to the global society and in doing so to help drive the continent's economic growth. Whilst 2G and 3G services are widely available, it is LTE, LTE-Advanced and 5G services that can really open up new opportunities for the people of Africa.

Over 900 operators worldwide are known to have been investing in LTE, including pre-commercial trials, with dozens of others that have previously indicated their intentions to invest. 796 operators in 243 countries have now commercially launched LTE networks. Africa represents a small but growing and increasingly important part of this ecosystem. In North Africa, 19 operators have launched LTE mobile services, and of these, nine have launched LTE-Advanced, and one operator is in a testing phase. Eleven of those operators in North Africa have also launched LTE fixed wireless access (FWA) services. In the larger sub-Saharan Africa region, 164 operators are investing in LTE, with 136 networks launched and a further 12 operators actively deploying LTE. Thirty-six operators in sub-Saharan Africa have deployed LTE-Advanced, and a further five are deploying, plan to deploy, or are testing the technology. Eighty-five operators in sub-Saharan Africa have deployed/launched LTE FWA networks, with three more deploying or planning to deploy LTE FWA.

As a result of these recent launches, the African region as a whole now accounts for just over 20% of the total number of operators investing in LTE and 19.5% of all the commercially deployed networks. While it remains the case that most of the countries/territories globally that are currently without any LTE at all are either on the continent of Africa or islands in the Pacific and Atlantic Oceans, the number of not-spots in Africa has dwindled significantly. The only African countries/territories with no LTE network known to GSA include Central African Republic, Djibouti, Eritrea, and São Tomé and Príncipe.

In terms of LTE and 5G subscribers, the continent is further behind. According to data supplied by Omdia, the number of mobile subscriptions in Africa totalled 1.185 billion by end March 2021. In absolute terms WCDMA was by far the fastest growing mobile technology in Africa in the twelve months to the end of September 2021, gaining 69.6 million subscribers to reach a total of 605.3 million. GSM which continued to decline, fell from 443.7 million to 373.0 million subscribers.

LTE is now gaining a foothold in Africa. LTE was the fastest growing technology in %age terms and a close second to WCDMA in absolute terms. LTE subscriptions reached 205.1 million by the end of March 2021, up more than 49% over twelve months, to account for slightly more than 17% of all mobile subscribers on the continent. By way of comparison, worldwide, LTE represents nearly 64% of all mobile subscribers. As it becomes the preferred technology in the future, eventually delivering a Gigabit service, GSA expects a migration from 3G to 4G/LTE and then eventually, 5G. But for now, Africa represents

only 3.3% of the world's LTE subscribers, and it is important to note that LTE population penetration in Africa was still only around 16% in March 2021.

New generation technologies

Along with the rise of LTE, we are starting to see increased availability in Africa of LTE-based solutions for voice and IoT services. VoLTE is now commercially available in at least fourteen African networks, with three other operators known to be actively deploying the technology and two planning to do so. NB-IoT, meanwhile, has been launched in Kenya, Tunisia and South Africa, with operators also investing in the technology in Liberia and Nigeria. MTN has been involved in trials of LTE-M in South Africa.

5G is on the horizon. Network vendors and operators worldwide are currently testing and are already deploying 5G networks – in fact over 180 commercial 5G networks have now been launched worldwide. 5G evaluation and deployment has been accelerating in Africa too. GSA is aware of thirty-one African operators from 21 countries that have been investing in 5G networks (including pre-commitment evaluation, testing and trialling all the way through to service launch).

Southern African operators are at the vanguard of the region's 5G development efforts, with 5G network launches by MTN, Rain and Vodacom. GSA has also recorded 5G launches in Madagascar, Mauritius and the Seychelles, a soft launch in Lesotho, pre-commercial deployments in Libya and Kenya and further active deployments under way in Angola and South Africa. GSA has identified other operators with plans to deploy in Cabo Verde, Cameroon, Kenta, Mauritius, Republic of Congo, Seychelles and Tunisia.

5G subscribers numbered slightly more than 66,500 in Africa at March 2021. This means there is potential for tremendous growth of both LTE and 5G. ∎

Looking ahead: GSA expects LTE to continue its rise in Africa during 2022. With at least twelve operators known to be deploying new LTE networks as of October 2021 we might expect to reach nearly 170 LTE networks providing either fixed wireless access or full mobile services in Africa by the end of the year.

Whilst it will be a few years before the technology is as widely used as 3G, given the recent increase in the number of commercially launched networks, the anticipated launch of more LTE services during 2022, and the fact that it will be physically available to a larger number of people, and networks will cover wider areas, the technology will attract more and more end users. It would not be unreasonable to expect LTE subscriber numbers in Africa to be well beyond the 300 million mark by the end of 2022.

In addition to the growth in use of LTE, GSA also expects the quality of the LTE infrastructure to improve. We forecast that the number of networks being upgraded from LTE to LTE-Advanced and LTE-Advanced Pro will increase; predominantly through the introduction of carrier aggregation to improve end users speeds, and the launch of 3GPP IoT technologies. At the moment, few networks in Africa can boast maximum (peak theoretical) download speeds of much more than Cat-4. (GSA has identified 20 operators offering Cat-6 or better).

Beyond LTE-Advanced and LTE Advanced Pro services, the launch of 5G networks will help to deliver higher speeds for end users and will additionally open up new opportunities for industry. Although only a few operators have deployed, or are in the process of deploying 5G networks, once governments and regulators make spectrum available - a critical enabler for 5G deployment - we can expect 5G rollout to gather pace over the next few years. At the same time, new technologies designed to improve rural coverage, and ever wider availability of lower cost mobile devices, will bring LTE and 5G within reach of more households.

The biannual Ericsson Mobility Report. Ericsson Mobility Report provides projections and analyses of the latest trends in the mobile industry, including subscription, mobile data traffic and population coverage worldwide. The following is from the June 2021 report.

In 2026, 5G networks will carry more than half of the world's smartphone traffic

The Middle East and North Africa region is expected to have the second highest growth rate during the forecast period, increasing total mobile data traffic by a factor of almost 7 between 2020 and 2026. The average data per smartphone is expected to reach 32GB per month in 2026.

Sub-Saharan Africa also has a very high growth rate, but from a relatively small base, with total mobile data traffic increasing from 0.87EB per month in 2020 to 5.9EB in 2026. Average traffic per smartphone is expected to reach 9GB per month over the forecast period.
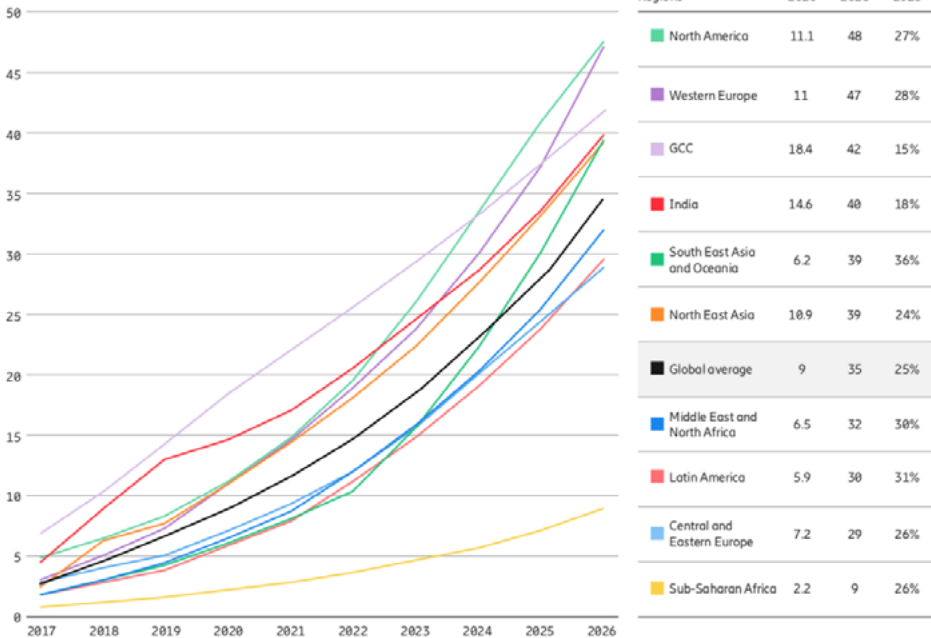
Network sunsets will have no negative impact on global network coverage by technology

Service providers are continuously seeking alternatives to increase coverage and capacity by using newer-generation technologies. One option is to "sunset", or shut down, one legacy technology

– that is, 2G or 3G – which are often deployed in low- to mid-bands that are ideal for creating large network coverage with 4G and 5G.

A further driver of network shutdowns is to reduce network complexity and operational

Figure 14: Mobile data traffic per smartphone (GB per month)

Regions	2020	2026	CAGR 2020– 2026
North America	11.1	48	27%
Western Europe	11	47	28%
GCC	18.4	42	15%
India	14.6	40	18%
South East Asia and Oceania	6.2	39	36%
North East Asia	10.9	39	24%
Global average	9	35	25%
Middle East and North Africa	6.5	32	30%
Latin America	5.9	30	31%
Central and Eastern Europe	7.2	29	26%
Sub-Saharan Africa	2.2	9	26%

expenditure. However, there are several considerations to be made, such as device fleet capability and the IoT installed base. There are also regulatory requirements; for instance, as of March 30, 2018, EU regulations require motor vehicles to be fitted with the ability to make 112-based emergency calls. Many of these are limited to 2G and

3G technologies. Sunsetting plans and trends look very different across regions and countries, with shutdowns already taking place in developed countries. This is enabled by the device mix; for instance, in North America, the 2G/3G share of subscriptions is only 7%, compared to sub Saharan Africa, where the share is currently 70–80%.

Coverage and capacity gains in low- to mid-bands can be achieved without, or with gradual, sunsetting – for example with the use of spectrum sharing. Also, if a legacy technology is shut down, the corresponding spectrum band will be used for a newer 3GPP technology and have no negative impact on network coverage. ■

Karim Yaici,
lead analyst, Analysys Mason Middle East and Africa regional research programme

Stefano Porto Bonacci,
analyst, GSMA

The following data was sourced from the Analysys Mason report Mobile services in Sub-Saharan Africa: trends and forecasts 2020-2025

This report provides commentary and trend analysis to support its five-year forecast for mobile services in sub-Saharan Africa. Our forecasts take into consideration the likely range of economic impacts that the Covid-19 pandemic may have on operators' telecoms service revenue worldwide.

Forecasts are based on Analysys Mason's robust set of historical data and draw on a unique and in-house modelling tool that applies a rigorous methodology (reconciliation of different sources, standard definitions, top-down and bottom-up modelling). ■

GEOGRAPHICAL COVERAGE	KEY METRICS
Region modelled	**Connections**
• Sub-Saharan Africa (SSA)	• Handset, mobile broadband,[2] IoT[3]
	• Prepaid, contract
Countries modelled individually	• 2G, 3G, 4G, 5G
• Cameroon	• Smartphone, non-smartphone
• Côte d'Ivoire	
• Ghana	**Revenue/ARPU/ASPU**
• Kenya	• Service,[4] retail, wholesale
• Nigeria	• Handset, mobile broadband,[2] IoT[3]
• Rwanda	
• South Africa	• Handset voice, messaging, data
• Sudan	• Prepaid, contract
• Tanzania	• 2G, 3G, 4G, 5G
• Uganda	
• Zambia	**Traffic**
	• Outgoing voice minutes, MoU
	• Mobile data traffic

SSA: handset data will be the main contributor to the regional revenue growth thanks to operators' 4G network expansions and the availability of cheap devices

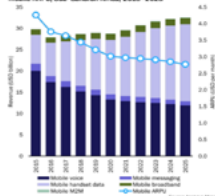Figure 3: Telecoms retail revenue by mobile service type, and mobile ARPU, Sub-Saharan Africa, 2015–2025

Figure 4: Telecoms retail revenue and growth rate by service type, Sub-Saharan Africa, 2015–2025

Service type	Revenue (USD billion)		CAGR	
	2019	2025	2015–2019	2019–2025
Mobile services – handset	27.9	31.9	–0.9%	2.2%
Mobile services – broadband	1.38	1.52	0.8%	1.6%
Mobile services – IoT	0.06	0.18	13.6%	19.6%

Figure 5: Mobile connections by type, Sub-Saharan Africa (million), 2015–2025

Kurt Bagwell,
executive vice president and
president - international, SBA

We chose South Africa as our entry point into the African continent for several reasons. These included our partner's research on the potential for new tower builds and our own research on the country level factors like macroeconomics, real estate rights and law, labour, taxes, population growth, economic maturity and carrier dynamics, amongst others. We felt that the market, at that time, was the ripest for entry and growth, and so far, the number of our multi-tenant sites has supported that decision.

Currently, we have over 1,200 sites in South Africa heading to more than 1,500 by end of year 2022. We have constructed most of our towers rather than purchased towers. Rooftops are part of our numbers, but not to a significant number. Outside of major urban and suburban areas, finding rooftop heights,

> "We work with major broadband carriers in South Africa - Cell C, MTN, Telkom, Vodacom. We also work with many others who are national and/or regional, including data-only providers (fixed wireless) and providers of many other types of utility, public or safety services"

at suitable locations, that can satisfy multiple customer needs is difficult and lower heights can be problematic for optimum coverage required by our customers. We survey each site and build out what is specifically needed. If we locate a rooftop that is a viable solution for our customers, then we will enter a leasing arrangement to use the rooftop and make it ready for our tenant's equipment. If we need to build stealth towers due to zoning requirements, we build stealth towers, although these of course have physical loading limitations and cost issues, so it is not something we want to do at every location, nor do we think it is necessary at every location. Renting ground space from public or private parties and securing all proper permits is also a key part of our expertise. The structure type is one thing, but we need a suitable location to install a tower and associated equipment.

Hence, after searching and negotiating multiple candidates in a ring, we gain approval on the best candidates and begin the lease negotiations with them. Then we secure all the permissions required. That is our aim, not to just build a facility on a spot that is easy for us but to build at the optimum location for our customer's requirements. It is a basic that such aspects add value to a tower project. We set out to engage the most suitable consultants and we employee the best workers we can to ensure that projects are completed quickly, safely, to customer requirements and as cost effectively as we can.

We work with major broadband carriers in South Africa - Cell C, MTN, Telkom, Vodacom. We also work with many others who are national and/or regional, including data-only providers (fixed wireless) and providers of many other types of utility, public or safety services. Our main long-term target is to

have most of our business with major MNOs, but we will provide our skill and expertise to any customer needing a tower or roof top antenna. That's the advantage of the towerco model – spend extra money up front to build a true multi-tenant structure and facility and rent space to multiple customers that may have varying requirements. That's how we create a win-win model for all of us. In addition, the model in South Africa is where the towerco is completely responsible for the land economics – so our pricing is turnkey or also known as "combo rent", where tower and ground space are included in one flat price. If our land cost increases, that is our expense, not a pass-through, or a pro-rata pass-through, as it is in some countries worldwide. So, this is a cost risk for us, and we need to efficiently manage this expense and longevity of these ground lease contracts, providing our customers with price security that they won't have to face these additional costs. There is a high cost to constantly administer ground leases, but it is a core part of our focused multi-tenant towerco offering, this being an area in which we excel.

We are seeing steady demand and it is typical that carriers over time go through

> **"Our main long-term target is to have most of our business with major MNOs, but we will provide our skill and expertise to any customer needing a tower or roof top antenna"**

cycles where some years they are busier than others. In a four-carrier market like South Africa, historically you tend to see two to three of them having busy schedules each year for network growth of all types – capacity sites, performance sites, geographic growth sites. That's been our experience in South Africa, and we don't forsee it changing anytime soon. Spectrum is limited right now with the delay in the auctions, so they need to be very focused on existing site performance, and density of sites is a key to keeping up network capacity. When the new spectrum comes, they will need to deploy allocated spectrum, and we will see many modification requests on our sites to add or swap out equipment to implement the new frequencies. ∎

Looking ahead: 3G is still out there and 4G is out there too, but not everywhere, so the phenomena described above is already happening, and with 5G coming, it will be more of the same. Carriers always tend to focus on the high population areas first with new technologies, due to targeting the areas that offer highest return on investment potential. But they all want to provide ubiquitous service in all areas over time, to differentiate themselves as a high quality, well-rounded carrier with good coverage and performance in all areas. This takes different shapes at different carriers, based on their financial positions, network maturity levels, growth plans, etc. At the end of the day, customers look at the number of signal bars and performance of voice and data on their phones and our customers are all still competing with their networks in addition with marketing (phone sale, service pricing, special features, etc.).

Willem Wentzel,
GM of Wireless Division NEC XON

Connectivity, largely wireless, is enabling more than US$180 billion of commercial and social opportunity in Africa and the continent's leading telcos and service providers have already begun to tap the potential with advanced technologies that lead the global arena.

International Finance Corporation, part of the World bank Group, estimated African Internet penetration to be 40% in 2019. That is an increase from 18% in 2014. While it demonstrates growth, the continent's population is growing and rapidly urbanising, offering significant prospects for digitalised societies as an enabler of growth economies.

A 10% improvement to Internet connectivity can generate a 2.5% GDP increase. In Africa's case, the potential in 2019 was 44 million new jobs for every 10% connectivity improvement.

In reality, the actual numbers behind the emerging scope become even more significant in the context of Africa's population growth, with the population expected to reach 2.5 billion people by 2050 and represent more than 39% of the world's total population by the year 2100.

However, there are many factors that could impact an optimistic view of the future.

While taking advantage of new open radio access technologies to improve core infrastructure, densification, and access, energy is a crucial element that threatens progress.

That said, there's a powerful argument that recent global events demonstrated how many African organisations were much more innovative than their counterparts in more developed economies.

Adapting to new, distributed work models is easier when infrastructure to support it is widely accessible. Speed, adaptability, agility and innovation have been crucial factors that drove African organisations to rapidly improve and deploy world-class networks in the past 24 months while experiencing severe operational, economic, mobility, and supply chain constraints.

We see this major shift over the past two years continuing in the next three to four years as African tier 1, 2 and 3 service providers continue optimising flexible, adaptable, and capable world-class networks.

For example, the adoption of Open Radio Access Network (O-RAN) technologies to bolster core networks and provide new last-mile opportunities with expanded coverage for better qualities of experience (QoE) into previously under-served markets will massively grow potential customer bases and revenue opportunities.

O-RAN enables networks to shape their own destiny. Free from specific vendor technology roadmaps, they can create more economically sustainable networks that offer flexibility, adaptability and agility. The service delivery platforms they are able to create are much

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broader and richer and they are able to overlay services that suit rural and semi-urban customer eco systems.

Many traditional technologies have been adapted to integrate with this emerging environment. Satellite, for example, traditionally had bandwidth costs that exceeded the value proposition. In this new world envisioned and being realised by African service providers, it is cost-effectively repurposed as a backhaul solution in the O-RAN landscape. It also delivers new geographical flexibility to provide economically feasible QoE for people in places that were impossible to serve in the past. Additionally, it has become more affordable and easier to provide peer-to-peer and fibre connectivity.

The capabilities and scale of potential O-RAN solutions is helping to create robust services in Africa. The lessons from global proofs of concept (POC) and deployments, from Japan to Spain and others, are already being put to work in some of Africa's tier 1 networks. They are being used to augment resilience and robustness in existing backbone infrastructures, further develop the network coverage area, and enable new services to meet the evolving needs of end user customers.

The big opportunity that the service provider networks are embracing, is progressively maturing their legacy technologies, from 2G to 3G and 4G. It enables them to provide additional services, grow the coverage umbrella to bring the services to many times more people, and optimise availability and throughput. That enables end user customers to get connectivity that is always on and give them the ability to do the stuff they need, from learning to healthcare, work, ecommerce, entertainment, voice and data communications and more.

O-RAN helps make the service provider's network affordable, accessible everywhere, resilient so that it is always available, and can deliver the bandwidth, latency and throughput required for modern applications in a digitalising world. In non-standalone eco systems, it enables future-proofed 5G options. ∎

Looking ahead: African service providers ahead of the curve are using the technology to optimise densification to eliminate network shadows, provide overlays that enable new services, and improve resilience and economic sustainability. This is not least occurring in East Africa, where new markets richly tap next-generation accessibility, connectivity and services.

Amidst the densification, accessibility, service and resilience optimisations, energy has emerged as a crucial factor. Hybrid energy that harnesses grid, diesel, and solar generation with localised storage and delivery being less reliant on long-distance transmission infrastructure has emerged a clear leader.

Intelligent equipment management where energy is in short supply is a critical element to the success of mobile and fixed wireless services throughout Africa. Coupling active and passive intelligence of both communications and energy equipment enables dynamic energy supply scaling to meet real-time requirements. Coupled with digitalised remote monitoring and management, it enables operationally effective, cost-effective service delivery across much wider geographic coverage.

Advanced service providers are continuing to embrace innovative technologies to build out their value propositions, commercial opportunity, and sustainable social value delivery. The search for solutions that leverage world-class open technologies from partners committed to Africa's sustainability by investing in the continent's organisations with steadfast presence, is fiercely contested.

Zoran Lazarevic,
chief technology officer, Ericsson
Middle East and Africa

The past year has tasked businesses and organizations to plan and strategize beyond existing models to adapt to challenges Covid-19 has brought the world. Africa has had to navigate pandemic challenges, but the continent's people and businesses have shown their resilience.

African businesses and in particular its telecommunications ecosystem, have proved adaptability to pandemic challenges and commenced a journey to a digital future.

Africa remains the world's fastest growing mobile market, while sub-Saharan Africa continues increasing 4G coverage with 5G planning underway. Driving factors behind this shift include a young and growing population, availability of lower priced smart and feature phones and importance of data in the continent's growth.

Africa has emerged as a strong innovation adopter, with rapid rise in usage of technology and smartphones. See how mobile money was initiated in Africa and is now surging over the continent.

Moreover, Africa has come a long way in its digitization journey – from mobile telephony to broadband, and from connecting to digitizing key economic sectors, jobs, education, healthcare, government and society in general. More still needs to be done given higher dependence on ICT because of Covid-19.

For Ericsson regionally, sub-Saharan Africa has been the company's growing footprint as service providers strengthen their networks to meet growing demand.

In 2020 MTN Benin extended its long-term relationship with Ericsson to provide world-class managed services, including a Network Operations Centre, as well as a Field Services in Radio, Core and Transmission in Benin. Under the agreement, the future capabilities of efficiencies, automation and data will enable MTN Benin and Ericsson to jointly create a world of predictive operations with focus on customer experience, network quality, performance, and automation.

Additionally in 2020, Telma Madagascar switched on its 5G commercial network, powered by Ericsson offering subscribers high-speed services enabled by new generation of mobile connectivity.

In October 2020, Airtel Africa expanded its strategic partnership with Ericsson to enable 4G coverage in Kenya. With Ericsson's Radio Access Network (RAN) and packet core products for 4G, Airtel subscribers will experience enhanced quality of voice and data. The network modernization deal, signed in August 2020, is in line with the 'Kenyan Digital Economy Blueprint Vision 2030' which aims to provide robust connectivity in rural areas and facilitate e-commerce platforms.

Announced in October 2020 that Ericsson's IoT Accelerator will power Telenor Connexion's global connectivity to Wayout's sustainable water treatment micro-factories starting in East Africa.

Wayout has engineered plug-and-play micro-factories for local production of clean, filtered water, with minimal environmental footprint. Powered by solar panels, the micro-factories offer an advanced water purification system.

Ericsson has increased its social responsibility to ensure that end-of-life material is treated and recycled in an environmentally responsible manner.

In 2021 African countries via ATU (Africa Telecommunication Union) endorsed ATU spectrum recommendations, focusing on transforming Africa into a knowledge economy through development of technologies that boost connectivity and innovation.

Mobile communications remain the main platform that connects African citizens and

business, a technology highly dependent on spectrum the availability of which depends on spectrum being licensed for use. The spectrum recommendations outline importance of awarding radio spectrum in countries across Africa in a timely, predictable, and cost-effective fashion to support affordable, high-quality delivery of Information and Communications Technology (ICT) services and spur smart technology initiatives.

The 20th edition of the Ericsson Mobility report (EMR) highlights unique trends in individual markets worldwide, including sub-Saharan Africa and states sub-Saharan African markets where around 15% of mobile subscriptions were for 4G at the end of 2020. Mobile broadband subscriptions in sub-Saharan Africa are predicted to reach 76% of mobile subscriptions by 2026. However, 5G volumes aren't expected to grow in 2021 but may reach around 70 million 5G subscriptions in 2026.

The Global Telecom Market Report (GTM) or "The Future of Urban Reality Report" was launched by the Ericsson ConsumerLab, to assess penetration of 5G and the tremendous potential it holds for worldwide markets. Ericsson ConsumerLab report is Ericsson's largest consumer study, revealing key insights about what sub-Saharan African consumers believe will happen post pandemic, up to 2025, through surveying a sample of 1,000 to 2,000 respondents aged between 15–79.

The report found, when entering the "next normal", African consumers will have added an average of 3.4 online services to their daily online activities, also increasing time they spend online by 10 hours weekly by 2025, compared to pre-pandemic habits.

This move is also expected to bridge the gap between moderate and advanced online users, with the more moderate online users having introduced more online services in their daily life over the course of the pandemic.

Due to the pandemic, the implementation of online education at schools and universities as well as remote working has increased to 87% and 63% respectively. Going forward online education and remote working are collectively expected to remain at 51%.

Pre pandemic, amount of online shopping stood at 28% out of the total number of all shopping events, both online and at physical stores. During pandemic, figure increased to 47%. Consumers anticipate their habits around online shopping will remain around 37% after pandemic has passed. ◼

Looking ahead: Ericsson is committed to developing further partnerships with operators and stakeholders to advance infrastructure and technology across Africa. To that end, our partnership with UNICEF's Giga initiative was launched in September 2019 with the aim of connecting every school to the Internet and every young person to information, opportunity, and choice, a prime example of our commitment. Ericsson was founded on the belief that communications is a basic human need, we knew the significance of the initiative and entered a global partnership with UNICEF to help map schools.

There should be much optimism for telecommunications and technology advancements in Africa. However, that requires further partnership and work that fulfils the ambition to bridge the digital divide. 5G is essential to that and while uptake is relatively low, we are committed to demonstrating its importance to the continent's ambitions.

Joachim Wuilmet,
head of customer marketing and communications for Middle East and Africa at Nokia

2020 was a special yet difficult year for all of us across the globe. The global Covid-19 pandemic has rocked nations and negatively impacted economies, forcing organisations to move quickly to enable remote working, and putting pressure on Communications Service Providers (CSPs) to rethink their priorities and ensure that they could deliver on changes in demand, both around peak demand time and the geographical shift of the load of the networks from cities and business centres to residential areas. Here Nokia played a critical role in supporting our customers to keep the networks running, and keep our worldwide communities connected.

The pandemic also highlighted the need to speed up the pace of automation due to limited movement, resulting in a lot of interest in Nokia's network operations automation, such as incident detection, automated troubleshooting, issue resolution, and remote and digital site acceptance.

The other major development is the broader adoption of 5G across the world. As of 31st August 2021, Nokia had 178 commercial 5G

"As of 31st August 2021, Nokia had 178 commercial 5G deals and 68 live CSP 5G references in key markets worldwide, including Vodacom South Africa, Safaricom Kenya and Togocom live 5G networks in Africa"

deals and 68 live CSP 5G references in key markets worldwide, including Vodacom South Africa, Safaricom Kenya and Togocom live 5G networks in Africa. We see a growing interest and trials for 5G technology across the continent.

Nokia has achieved many successes across Africa in different technology domains by securing several key deals from customers to modernize and expand their networks with the latest Nokia technologies from the Nokia radio, IP/Optical and fixed network, software and professional services portfolios. Some of the key highlights in 2020 include:

• Nokia and Togocom deployed the first 5G network in West Africa in a three-year deal to roll out the 5G services across the country. Part of the deal included enhancing 2G, 3G, and 4G networks to strengthen Togocom's market-leading position and future-proof its infrastructure to provide next-generation services to Togolese citizens.

• Nokia and Airtel Kenya laid the foundations for 5G in Nairobi, to modernise the city with high-speed 4G and 5G-ready hardware from its comprehensive AirScale portfolio. The deal included upgrading existing 2G, 3G, and 4G radio access network (RAN) coverage in urban, semi-urban, highways, tourist spots, and central business districts in Nairobi and the rest of Kenya.

• Nokia announced enabling 5G services for Vodacom South Africa customers with 5G radio, core, and Fixed Wireless Access (FWA). At the time, 5G mobile broadband and FWA services were already live in four cities and were being deployed to other areas across South Africa, bringing the Nokia and Vodacom 26-year relationship into the 5G era.

- Nokia provided Tizeti with a LTE FWA solution for high-speed internet services, enabling Tizeti to introduce new services, provide better customer service to subscribers and pave the way for easier migration to 5G FWA in the future.

- In South Africa, Nokia joined hands with Forge Academy to provide theoretical, laboratory and on-the-job training to seize opportunities in the Fourth Industrial Revolution (IR 4.0) economy.

Mobile penetration remains a challenge on the African continent, with the current penetration rate sitting at 50%. This means that hundreds of millions of people remain unconnected in Africa. That said, according to the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker, the continent's smartphone market posted a strong recovery in the first quarter of 2021, growing by 16.8%. IDC expects this growth trajectory to continue and forecasts a 5.6% year-on-year growth for the rest of 2021. ◼

Looking ahead: Spectrum availability and pricing remain two key challenges in Africa. According to the GSM, governments across the continent must put spectrum roadmaps in place to ensure there is enough spectrum available to meet demand and reconsider their approach to spectrum pricing. Access to the mid-band spectrum will also be critical to the future of 5G. For policymakers, this means that they need to plan to meet short, medium and long-term demand, while also speeding up the digital switchover to free up spectrum in the sub-1 GHz band.

Connecting the unconnected remains a key priority on the continent to deliver on the promise of the impact of ubiquitous connectivity to stimulate economic growth as countries in Africa look to drive growth that was impeded by the Covid-19 pandemic. Nokia continues to work with and support its partners to overcome the challenges facing the continent and identify the best solutions to meet their requirements.

At Nokia, we create the technology that helps the world act together. Our focus during 2021 and beyond has been to continue to work with our partners across Africa to connect people and communities using the most appropriate technologies, giving them access to valuable critical services.

As more 5G spectrum gets allocated, we will see an increase in 5G networks going live, and new use cases will emerge exploiting the 5G end-to-end architecture.

5G goes beyond data connectivity for handsets and enables real-time machine-to-machine communications. Going forward, 5G is going to revolutionize various industries, such as manufacturing, and paves the way for the 4th Industrial Revolution (4IR). We also expect an increase in 5G networks utilising 5G Standalone (5G SA) architecture, bringing more enterprise use cases.

Africa refuses to be left behind when it comes to adopting new technologies and exploring new 5G use cases. We have already seen the progress achieved in South Africa, Kenya as well as Togo, and we expect more to come in 2021 and beyond. The most important aspect is to proceed with the discussions to reach answers for those vital questions such as how to benefit from 5G, what the right time to market is, which spectrum should be used and, most importantly, what the use cases are.

Segun Ogunsanya,
CEO, Airtel Africa

A irtel Africa is a leading provider of telecommunications and mobile money services, with a presence in 14 countries across the continent, primarily in east Africa and central and west Africa.

Airtel Africa offers an integrated suite of telecommunications solutions to its subscribers, including mobile voice and data services as well as mobile money services both nationally and internationally.

It aims to continue providing a simple and intuitive customer experience through streamlined customer journeys.

In October, Airtel Africa launched a comprehensive sustainability strategy, which sets out its detailed plans to improve the lives of millions of people across Africa through digital and financial inclusion and access to education. The strategy includes specific goals around environmental protection and the ongoing development of a rewarding, diverse and inclusive workplace.

The strategy is delivered through four sustainability pillars: 'Our business' which reflects the firm's operations and the expansion of its network, 'Our people' which sets commitments around employee engagement, development, diversity and inclusion, 'Our community' which details our dedication to improving access to education, and 'Our environment' which is focused on reducing the environmental impact of our operations. We have identified six of the United Nations Sustainable Development Goals to which we believe our work will make a genuine and tangible contribution- they are SDG 4: Quality education, SDG 5: Gender equality, SDG 8: Decent work and economic growth, SDG 9: Industry, innovation and infrastructure, SDG 10: Reduced inequalities, and SDG 12: Responsible consumption and production.

Segun Ogunsanya, CEO, Airtel Africa, explains how the move is a significant milestone in the firm's journey. "Our new strategy provides a solid foundation for us to accelerate change for the communities we serve and the environment in which we operate," he says. "We have worked closely with our stakeholders to ensure that this strategy is ambitious, robust and credible. This partnership approach underpins all the work we will deliver through our strategy. We will look to collaborate across the industry, recognising that by working together, we will be able to drive a more significant impact for the people who need it most. We are more committed than ever to ensuring open and honest communication on our progress as Airtel Africa embarks on its long journey towards a more sustainable future. ∎

Looking ahead: Airtel Africa has set itself a major challenge, made up of a sustainability strategy. It includes nine goals and commitments, with corresponding programmes that address the business' material topics (identified through an extensive consultation at the beginning of the year) and enable the group to continue delivering sustainable growth and uphold the best governance standards. They include data security, service, supply chain goals and "commitments to our people".

Other goals include digital inclusion, financial inclusion goal, access to education, greenhouse gas emissions reduction and environmental stewardship. The latter, it is hoped, will eliminate hazardous waste from Airtel Africa's operations, significantly reduce its non-hazardous waste and minimise its water consumption with programmes to replace damaging materials, expand recycling schemes and build employees' awareness around the protection of natural resources.

Ashish J. Thakkar,
CEO, Mara

Worldwide the Covid-19 pandemic has disrupted economies to an extent not previously experienced in recent times. Restrictions such as Lockdowns have impacted businesses and this impact is ongoing to a greater or lesser extent depending on country. Regardless of the size or history of the organisation concerned, changes have had to be implemented to cope with the pandemic. Despite the pandemic, Africa has true digital acceleration potential that is yet to be realised. The statement that "Africa is the next big growth market", a description that has persisted for some time, remains valid. In recent years, the accelerated growth experienced within Africa's technology ecosystems has been a great motivator for Mara Phones to open two state-of-the-art smartphone manufacturing facilities in Kigali, Rwanda and Durban, South Africa – the first of their kind anywhere in Africa. A proudly African company and brand, Mara Phones is a subsidiary of Mara Corporation, a trusted company that has been working on the continent for over two decades.

Local manufacturing of smartphones and other tech products is critical for the African economy, especially in the backdrop of Covid-19, to reactivate economies and stimulate the job markets. There is a heightened need for African countries to invest in their own capacity to supply critical goods and services, including smartphones. Covid-19 and the Suez Canal blockage have perfectly demonstrated the fragility of international trade and the overreliance on a few global suppliers. We have seen how global manufacturing powerhouses have threatened local manufacturing in most countries and how supply chain interruptions can affect local economies and cause catastrophic losses.

The global supply chains have also learnt that dependency on any one geography is unsustainable. That is why governments are now encouraging businesses to diversify their industrial bases from China, making Africa a more relevant and perfect alternative destination. The sentiment across Africa, is now to support and buy more African brands, which are proudly "Made in Africa". And we hope that other parts of the world will also come to favour Made in Africa products as reliable and cost competitive. More government support is needed and will result in local companies being enabled to assert dominance in the smartphone and tech sector, further driving innovation and creating local supplier networks, which will increase the number of players within the value chain. ∎

Looking ahead: As Africa becomes mobile phone enabled, the development of the digital infrastructure will be an enabler to Africa being self-sufficient, as the continent increasingly becomes a major consumption market. With the focus on improving smartphone growth in Africa, Mara Phones is a firm believer that Africa should not only be a consumer but also a value-added producer of high-tech goods.

The digital ecosystem is crucial for economic growth because access to smartphones puts transformational tools and services in the hands of Africans. Mara Phones is a digital enabler for financial inclusion, agricultural efficiencies, business tools and services, digital health and education. Our devices enhance consumer access to information, networking, job creation and critical tech skills transfer to the continent. Mara Phones is proactively committed to working towards the United Nations' Sustainable Development Goals (SDGs), providing digital inclusiveness to all and creating opportunities, particularly for Africa's women, youth and unemployed. The production of smartphones on the continent offers value added solutions, which will enable a thriving and digitally inclusive Africa.

John Baker,
SVP business development, Mavenir

Wireless communications networks are vital to future prosperity and security of African countries. 4G/5G will support numerous new applications, including critical services provision, benefiting African economies. Data increase on 5G networks will further interconnect economies throughout the world, facilitating cross-border services and commerce. Protecting communications networks from disruption or manipulation will ensure privacy and liberties.

latest Open RAN technology, built on Cloud platforms which leverage industry standard compute and storage infrastructure, the power and scalability of rapid software innovation, offers a means to improve supply and deployment of multi-generation virtualised wireless networks.

Open RAN can simplify 2G/3G migration to 4G and 5G making upgrading as straightforward as software updates. The technology also brings significant opportunity for Africa: it will be a catalyst for new eco-system creation of innovative suppliers in which indigenous African companies compete. In doing so, Open RAN can help Africa diversify its mobile network supply chain, speed deployments, generating significant economic benefits.

Mavenir as an end-to-end cloud-native network software provider, is committed to reducing entry barriers for new hardware suppliers. In 2021, Mavenir was named a group member of disruptive network vendors working with MTN helping the operator group test and deploy 4G and 5G Open RAN across its multi-country footprint. MTN's initiative has ambition and scale needed to boost the supply, support, training and employment of local staff replacing traditional network suppliers.

Traditionally, mobile networks have been built with closed, proprietary software and purpose-built hardware. Although the 3GPP standards underpinning Africa's current mobile networks were supposed to be open, in reality key interfaces are proprietary. This has led to vendor lock-in stifling innovation, inhibited competition and, most critically, slowing deployment in Africa.

While 5G has been specified as a more modular, disaggregated, virtualised architecture, critical network elements from incumbent vendors still incorporate proprietary interfaces. Through tighter, more explicit, publicly accessible specifications for these critical interfaces, Open RAN seeks to rectify this and offer fully programmable software-defined radio access network running on commercial, off-the-shelf (COTS) hardware. As well as offering increased flexibility, Open RAN is more efficient technically and operationally.

GSMA has illustrated that mobile networks deliver immense economic benefits. Providing 4G or 5G mobile broadband to communities currently lacking internet access will deliver further significant benefits by bridging the digital divide and supporting governmental "levelling-up" ambitions.

Through standardized open interfaces, Open RAN ensures interoperability between different suppliers, lowering barriers for new innovators entry: new entrants can compete at the level of discrete network elements rather than having to develop complete end-to-end solutions supporting multiple mobile generations.

Entrants prospering from Open RAN adoption could create skilled African jobs. Increased local R&D and manufacturing of Open RAN solutions would also support productivity growth.

Before Open RAN, there were three cellular radio vendors. Today, there are 15 and increasing. Vendor competition is delivering increasingly diverse high quality Open RAN radio offerings to meet specific coverage requirements or customer needs.

Diversification of the supply chain will also drive network capex and opex costs down. These lower costs will allow faster rollout over larger coverage footprints. Furthermore, diversification minimizes the risk of delays if an incumbent vendor can't cope with a spike in global demand from operators.

Diversification in the supply chain can contribute to enhancing security according to the US National Cyber Security Centre, NCSC. The ability to have a more modular design, with different suppliers providing different network components via open interfaces, can improve · not diminish · security and vendor accountability.

Open interfaces allow multiple independent operators to continuously security test network elements and the whole system, giving quicker detection, reaction to replace or address suspect vulnerabilities. Operator exposure can be limited if one of their vendor's solutions is compromised. Open RAN encourages suppliers to compete on their security credentials.

Open architecture allows operators to apply up-to-date security patches available for the COTS components in their networks · operating systems, Network Function Virtualization infrastructure, BIOS, firmware, etc. Security vulnerabilities can be addressed pro-actively: operators don't become dependent on their incumbent vendor(s) to keep their networks secure.

The shift to cloud-based solutions enabled by virtualisation of network elements also allows new security controls such as sandboxing, containerization and network slicing. These controls make networks more resilient and stable even at large scale, as proved by the experience of Rakuten in Japan and other operators using virtualised elements such as Deutsche Telecoms and T-Mobile.

Open RAN facilitates the opportunity for Africa as an incubator for next generation wireless communications and associated current and emerging downstream markets if government's regulatory regimes are right.

Through strategic partnerships with industry, governments can facilitate development of vibrant innovative technology eco-system in the mobile space. ∎

Looking ahead: Governments can play a key role by signalling support for market-based, open, interoperable standards; funding industry and academic R&D and its commercialisation; and supporting deployment through Memoranda of Understanding with regional neighbours to promote interoperable open standards for 5G, while avoiding technology mandates or overly prescriptive solutions. They can also set strategic objectives to secure access speeds to a large%age of their populations within defined timescales and introduce spectrum policies supporting innovation and trials while providing sufficient bandwidth for both local-area use-cases and national coverage.

Taking all these issues together, Open RAN can bring much-needed competition and product innovation to mobile services while accelerating 4G and 5G roll-out, lowering costs to operators and making services more affordable for consumers.

When announcing its Open RAN roll-out, MTN was working towards starting deployment by end of 2021. MTN acknowledged diversifying the vendor landscape, disrupting the cost base and removing dependencies on proprietary suppliers as important benefits. By modernising networks, MTN also saw opportunities for power consumption and emissions reduction, important elements of its Project Zero sustainability programme. As 4G and 5G Open RAN deployments progress in 2022, MTN will start to realise these benefits.

Open RAN will be a catalyst for Africa's involvement in this mobile telecommunication eco-system facilitating investment and jobs and boosting the high-tech sector with benefits it can bring for wider economy.

Shanks Kulam,
co-founder, x-Mobility

The era of mass cloud communications seems to have finally dawned. While the word 'Zoom' no longer just means to rush about but has become known as a communications brand – and even a verb – at x-Mobility the Digital MVNO has seen similar growth over the last twelve months. The natural maturing of the market was speeded up by the global pandemic and we saw a lot more interest for our AppVNO solution.

One of the key trends we witnessed was that of large, established African MNOs looking to try something new and doing that through a sub-brand. Sometimes these sub-brands were wholly owned, sometimes joint ventures and at other times they were kept at arms' length. But they were all developed to explore new opportunities quickly and nimbly in the market.

For MNOs, quick and nimble sub-brands also required quick and nimble solutions – so they turned to a Digital MVNO. There are almost as many different use cases for a new Digital MVNO as there are solutions on the market, but some of the ones x-Mobility has helped launch or prepared for imminent launch, or just discussed at an enquiry level include:

• an immediate gap in the market that can be filled quickly – possibly a demographic or user group that is being underserved elsewhere;

• a defensive move against a competitor targeting a particular user group

• launching into a new market or country without the need to build expensive infrastructure

• reaching out across multiple markets to a global diaspora

Despite financial pressures the pandemic has put on many businesses, we've witnessed the fact that many businesses have seen it as an opportunity for their future planning and investment.

There are other trends that have developed over the last twelve months. One of which is like existing MNOs creating sub-brands and that is existing, African fixed line players looking to create a mobile solution.

Fixed line operators have client bases that can easily be targeted for a mobile solution. However, traditionally extending into mobile was too expensive as it would be necessary to buy or build a network. The Digital MVNO model changes that and we've seen growth in that sector.

Another example of extending a brands initial offering into mobile has been the rise of technology or media companies exploring the Digital MVNO model.

With a well-engaged consumer audience that has bought into the brand, brand extension seems like an obvious business tactic. Mobile is an exciting area for any brand to be involved in, it can benefit from existing loyalty and also creates further loyalty.

African brands were often locked out of the mobile world. In many territories the traditional MVNO model isn't well developed, but also not appropriate for reaching their audience. If you are, for example, a radio

> ## "Beyond the return to the old normal, we also see a new normal developing for the Digital MVNO market"

brand or an online news brand, then trying to send out a physical SIM card to your audience to get them to engage in your mobile network is a non-starter.

Digital businesses need a digital solution for their extension into mobile. A Digital MVNO provides that, and we have seen dramatically increased interest from this sector over the last twelve months.

One new business model we've seen recently in Africa, is from utility companies. For many utility companies in Africa, they are targeting a rural community, which relies on both power and communications to stay connected. In fact, the two are often linked as one of the biggest uses of power is keeping mobile devices recharged. Being able to connect the two business concepts and tie the audience in is a great business model. And one only possible through a Digital MVNO.

Finally, tying all these different trends together, has been a huge surge is usage over the last twelve months.

The increase is partly due to the pandemic and people confined to homes and unable to communicate face-to-face as pre Covid-19. Phones have become even more important tools for users during the pandemic. We are seeing that the phone has become more important again for traditional communications, calls and messages.

This increase in consumer usage has spurred some of the MNOs, fixed line operators and brands to reconsider mobile and realise that the Digital MVNO option is now available to them.

Over the next twelve months we expect the Digital MVNO market to mature further and become a mainstream business tactic that most consumer brands will need to be aware of in business planning.

> **"Despite financial pressures the pandemic has put on many businesses, we've witnessed the fact that many businesses have seen it as an opportunity for their future planning and investment"**

Some of that will be due to new services that we will announce as a business. We are looking forward to expanding on our AppVNO solution and creating more opportunities for African MNOs, fixed line operators and brands.

However, beyond what we are doing we think that the next twelve months will see two other interesting trends.

Firstly a return of international travel. Although there are a few people still travelling, level of mass travel still has a long way to go to reach pre-pandemic days, but we are expecting it to increase gradually over the next year.

Travel has always been one of the driving use cases for Digital MVNOs – the ability to have a calling app on your device that offers a 'local' number and eliminates the fear of roaming charges is a very powerful tool for holiday makers, business travellers or even emigrants.

Beyond the return to the old normal, we also see a new normal developing for the Digital MVNO market. A trend we have seen start this year, we expect to grow and grow next year – hybrid business models that incorporate mobile to make something brand new.

Some brands we are speaking to are seeing mobile not as an add-on to their core business model, but as an integral part of their business. In ways we can't yet foresee, mobile and Digital MVNOs - will become an integral business tool to new businesses of the future. And that future starts now. ■

Justin Head,
CEO, PowerX

With only 46% of sub-Saharan Africa connected to mobile services, tower operators in Africa are under pressure to deliver more reliable, faster and greener mobile connectivity. PowerX is a critical player helping tower teams deliver reliable, faster and greener widespread mobile coverage Africa needs.

Widespread tower networks provide the backbone of mobile connectivity. Throughout Africa, MNOs and TowerCos must meet the increased demand for smartphone connectivity. They need low cost, efficient hybrid solutions to connect the unconnected across remote, rural or ultra-rural areas despite bad or no-grid conditions. They need resilient solutions to expand 4G, and 5G rollouts in growing urban areas with high demand for fin tech and digital services. Tower teams are under pressure to make decisions faster for CAPEX and OPEX to be spent with clear returns.

Agile, highly skilled regional tower management teams have successfully managed large-scale complex networks, most often reliant on manual processes. PowerX's regional work over the year is proof that the best human-optimised towers can be enhanced with AI-driven technology and innovation.

Over the last 12 months, PowerX successfully showed that robust AI solutions at the heart of tower operations delivers efficiencies and optimisations at scale remotely for customers throughout Africa. We proved that with AI, tower teams can harness data intelligence to build infrastructure resilience, optimise tower operations and maintenance efficiency, whilst reducing costs and carbon emissions across networks in a sustainable and scalable way.

Bringing AI to the tower industry in Africa has had challenges. Tower teams have often suffered from poor access to granular, site-level data and a lack of large-scale or automated analytics. Customers need more granular visibility over their entire network in real-time. Africa's vast geographical span and poor infrastructure such as roads, utilities and access, providing and maintaining tower uptime and reaching rural and ultra-rural areas are major challenges.

Tower management teams recognise they can't keep doing more with fewer resources. Yet new ways of working can be unsettling for an industry requiring resilience and measures its success in high network uptime. Therefore, building trust in AI-driven technologies with tangible financial results at scale is a pre-condition to region wide adoption.

Automation's importance has increased due to pandemic. Remote, AI-driven insights have allowed tower teams to deploy much-needed hybrid solutions with lower operational costs, optimise inefficient infrastructure, reduce reliance on diesel and better manage site assets remotely. Last year proves our AI can work remotely and deliver solutions in harsh operating conditions without downtime.

GSMA, State of the Industry Report, indicates 1.2 million mobile money accounts exist in sub-Saharan Africa. In coming years, many African countries will look to mobile infrastructure for GDP growth. Big operators across Africa are implementing mobile payment and financial services, delivering financial inclusion to millions, and enhancing government services and tracking. Mobile connectivity will be vital to deliver growth for Africa.

Mobile infrastructure underpinning new mobile banking services across Africa must be reliable, secure and fundamentally supported by

high availability, low latency mobile connectivity.

New 4G and 5G services continue to drive increase in data traffic putting tower teams under pressure to stay ahead of the curve. This drives the need for high availability SLAs, better power solutions, fast infrastructure upgrade and back-up options in a dynamically changing environment.

With our customers, we have proven how critical AI-driven insights are to proactively detect incremental tower upgrade requirements and act much faster on SLA risks, at scale, in real-time across thousands of sites.

Africa's mobile connectivity heavily relies on diesel, giving the opportunity for energy optimisation and wastage reduction. When PowerX exhibited at TowerXchange Meetup Africa every agenda centred around plans to drive efficiency and meet sustainability targets.

Our customers are clear: industry growth is a must but cannot be done at the expense of the environment. The industry needs solutions today to enable significant headway towards net zero by 2050.

With our customers, we have outlined ways to support subscriber base growth, increased mobile connectivity and data usage with significant diesel reduction enabled by AI solutions giving greener networks. Customers can further optimise power assets and deliver incremental savings from additional capacity sitting idly in their infrastructure. We even see this with the best manually optimised tower networks. With AI, our customers optimise CAPEX already invested, future CAPEX and OPEX while delivering significant results on ESG agendas.

The changes seen this year will continue to accelerate mobile connectivity as the pandemic acts as a catalyst for change. AI solutions provide tower teams with dynamic remote controls to analyse and optimise infrastructure, across networks in real-time, all the time. With AI support, African TowerCos and MNOs can rapidly increase Africa's mobile connectivity for future demand. ■

Looking ahead: GSMA predicts 120 million more people will subscribe to mobile services in Africa by 2025, adding US$155 billion of economic value added. Africa has the opportunity to meet this demand with next-generation infrastructure for faster, greener connectivity, leapfrogging old technologies as it builds new super-fast sites from scratch or upgrades from 2G straight to 4G and beyond.

Innovations for hybrid tower solutions will continue to be deployed across Africa, including more lithium-ion battery storage, solar sites, fuel cells and wind turbines. With remote smart alerts, tower teams will get the best out of each asset, so that innovations are deployed with the highest efficiency levels possible. Exciting trials are taking place with drone site surveys, which will reduce the need for site visits or better inform scheduled site visits.

We believe that AI-driven real-time data analytics and automation at the heart of tower operations will significantly enhance growth. Without real time intelligence, tower teams risk downtime, disruption to service and unexpected costs when undetected increases in consumer use or more data services lead to increased power load or reduced backup availability. Instead, tower management teams across Africa can leverage AI to make better use of their network assets, provide solutions for greener networks, and help consumers connect to the digital world, driving progress across Africa.

Greater connectivity in Africa will have a positive impact on telehealth, e-learning, education, work and industry across the continent. This offers the population the chance to strengthen career prospects and improve their position on the global stage.

Jerome Perret,
CEO, ITD

IT-Development (ITD), the editor of the "ClickOnSite" telecom infrastructure management software, has always had a strong commitment to the African continent and its peoples. The continent was the core territory for the company's founders.

From its two offices, one located in the Ivory Coast and the other in South Africa, the company works with established and trusted major telecommunications organisations, for example Orange and MTN and has a well founded and long-standing understanding of the challenges that this geographical area poses for telecommunications and IT organisations.

The past year cannot be talked about without mentioning the worldwide and more specifically the African continent and the devastating impact and consequences of the Covid-19 pandemic.

"These operators are now faced with the new reality of home working because of the pandemic. As a consequence of this new reality, homeworking has taken inventory databases and document management systems (DMS) from a 'nice to have' status to 'a must have' one status"

"Worldwide, businesses have had to change and adapt to the new way of doing things and have had to cope with the barriers the pandemic has thrown up to doing business in the old way"

Worldwide businesses have had to change and adapt to the new way of doing things and have had to cope with the barriers the pandemic has thrown up to doing business in the old way. This has been felt no more acutely than on the continent of Africa. The devastating loss of life is acknowledged by all. On a business and company perspective, IT-Development has had to rise to the reality of numerous postponed orders during 2020. Post pandemic we have worked to re-engage with those postponed orders and to the increased demand for IT-Development's ClickOnSite software.

We are seeing in the market numerous telecom operators coming to our solution, as the best way to support their digital transformation.

In previous years African operators have prioritized investments and have not looked favorably on the need to have systems supporting remote and home-based working. These operators are now faced with the new reality of home working because of the pandemic. As a consequence of this new reality, homeworking has taken inventory databases and document management systems (DMS) from a "nice to have" status to "a must have" one status.

Remote working due to the pandemic has had to overcome challenges and these challenges are numerous:

- The collection of information that is complete
- Storage of Data and its associated maintenance to ensure its integrity and reliability
- Data sharing within teams
- Work organization and business processes

Beyond the strategic and data management dimension, adaptation to the situation we are in has occurred. Operationally, now more than ever, dematerialization solutions for work orders and technical inspection reports are now becoming an essential part of the maintenance operation landscape. This is combined

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with a renewed business interest in the various types of preventative maintenance. This has also been boosted by the emergence of Industry 4.0. Predictive maintenance, for example, is becoming essential to generator management, which in many countries remains the source of electrification for mobile sites.

This type of maintenance enables the optimisation of the number of interventions on site but also to reinforce their relevance. The same type of calculation allows operators and tower companies to control the fuel consumption of their generators but more importantly to warn when it's time to refill fuel storage at the sites before it is too late (and before they break down). ■

Looking ahead: We also hear in various quarters about data collection by drone. But the costs remain very high for such a relatively low gain. Fortunately, solutions are in the making based on artificial intelligence that will have the potential to offer a total cost of ownership (TCO) more aligned with the African market. That is to say, a large territory with a low ARPU.

There is no doubt that the number of use cases will multiply thanks to the deployment of 5G, which is entering a new era with operators such as Orea in the Ivory Coast, which is expected to be the first very high-speed data operator on the African continent. Orea already benefits from the support of numerous partners in the sector such as Huawei, Inetum, and ITD.

Kyle Whitehill,
CEO, Avanti

Connectivity is increasingly more important in achieving a healthy, safe and productive life, yet 3.7 billion people are not connected. Most of those people live in developing countries and half of the 3.7 billion are female.

Over the past two decades, digital technologies have advanced more rapidly than any innovation in history, reaching around 50% of the developing world's population, and helping to transform societies. We are incredibly proud of the part we have played in enhancing connectivity in some of the world's hardest-to-reach communities. In a post-pandemic world, where reliance on connectivity is evolving, the unconnected become even further removed from the digital world and its socio-economic benefits.

Avanti believes everyone has potential to 'Be More', and connectivity empowers people to achieve their full potential. By helping

> "Avanti believes everyone has potential to 'Be More', and connectivity empowers people to achieve their full potential. By helping communities across Africa to become better connected, we have been able to create better access to education, medicine and help provide a safer environment in which to live and work"

communities across Africa to become better connected, we have been able to create better access to education, medicine and help provide a safer environment in which to live and work.

Covid-19 has challenged everyone, but for those living in unconnected communities the challenge has been great. At the peak of the pandemic, we realised how much the digital divide was growing. Instead of watching it grow, we proactively identified opportunities to connect even more individuals, businesses, and communities.

This is even more acute in sub-Saharan Africa where the population is growing 2.7% per year. As terrestrial networks here are limited, rural expansion is desperately needed. Partnership is key to helping bring affordable coverage to these remote areas of the world. Over the past year, we have launched several new partnerships to help operators and other partners to expand their networks.

For example, our partnership with Clear Blue Technologies will accelerate the rural rollout of low-cost connectivity solutions in areas where network coverage and broadband services have been limited or non-existent. Everyone is entitled to a more connected life and the benefits that come with it, and this partnership is expected to deliver coverage to 400 million people living in remote areas within 3·5 years.

We have also launched our own service, Avanti EXTEND, a new managed service for rural connectivity, to support partners in their efforts to connect rural Africa. Avanti EXTEND provides high-performance and cost-effective 2G, 3G and 4G solutions to remote and hard-to-reach areas across sub-Saharan Africa. It enables MNOs and other partners to provide reliable cellular service to the 100 million people living in these challenging locations that would otherwise be impossible to reach using traditional terrestrial infrastructure.

Avanti EXTEND's built-in and fully operational

CAPEX solution integrates seamlessly into MNO's terrestrial networks to reduce network complexity and increase efficiency. It offers the opportunity for partners to undertake large deployments quickly and effectively, and scale operations to support long-term rural expansion at no additional CAPEX. This removes the need for them to manage satellite configurations, hub infrastructure or terrestrial networks to deploy a successful satellite cellular backhaul topology.

We are committed to enabling people, countries, and continents to 'Be More'. By helping communities across Africa to become better connected, we have been able to create better access to education, medicine and help provide a safer environment for them to live in. We believe in the power of education, and the transformative impact it can have on individuals and communities. We know connectivity has a key role to play in improving access to quality learning and are determined to use satellite technology to help even more people gain access to this.

We are a Business Avenger – committed to supporting the UN Global Goals for Quality Education in reflection of our wider commitment to improve access to education across Africa. For example, we recently partnered with the Global Partnership for Education (GPE) to help address barriers to girl's education in Kenya through targeted, context-specific awareness and information campaigns. The program aims to enhance and add value to girl's education which will in turn strengthen efforts to support the achievement of SDG 4. We are proud to be working with the GPE to help break down some of the social barriers preventing girls from reaching their full potential.

Continuing our work supporting the UN, this year we also started working with the UNHCR, the UN Refugee Agency, as a corporate partner to donate solar powered satellite broadband connectivity and laptops to seven UNHCR sites in remote and off grid refugee settlements in Uganda. By giving access to technology and helping refugees and the communities that host them to be part of a connected society, we are helping them build a better future for themselves and their families.

We already know the global demand for data outstrips supply, leaving many excluded. In Africa this is even more exaggerated, offering huge scope for future growth in the coming years. Rural network expansion is desperately needed. As a high throughput satellite company in Africa, Avanti is poised to unlock this.

Across our HYLAS fleet, more than 70% of our coverage is over Africa, where we have been providing connectivity services for more than a decade. To help power growth, we have also committed 75% of our total investment to help connect the continent. By continuing to use our strong business model, and partnering with providers across Africa, governments, and charitable entities, we believe we will continue to make significant progress towards worldwide connectivity. ∎

Looking ahead: Collective action has the power to ignite real change, and we believe there is a real opportunity for the industry to play a key part in the global economic recovery. Since 2020, 90% of children living in sub-Saharan Africa did not have access to a computer and around 80% did not enjoy a basic internet connection. This emerging digital divide has had huge implications across the continent, which has been highlighted further by the pandemic. The digital inequalities across the globe need levelling out, and the time has come for connectivity to take centre stage. To spearhead an 'accelerated transition' towards a more a connected world and close the digital divide.

RSCC

Russian Satellite
Communications Company

TV
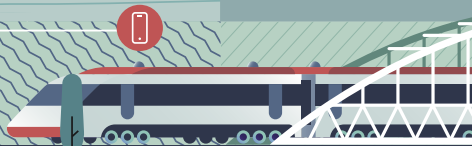
SATELLITES
FOR DIGITAL
ECONOMY

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Mobile Solutions

SAT&BC

IoT

Voice

A1 Telekom Austria Group, listed on the Vienna Stock Exchange, is a leading provider of digital services and communications solutions in Central and Eastern Europe with around 25 million customers, currently operating in seven countries: Austria, Bulgaria, Croatia, Belarus, Slovenia, the Republic of North Macedonia and the Republic of Serbia.

Offering communications, payment, broadcasting and entertainment services as well as integrated solutions for mobile operators, A1 Telekom Austria Group achieved revenues of 4.55 billion Euros by year end 2020. Around 18,000 employees and state of the art broadband infrastructure make digital business and lifestyle possible and enable people, companies and things to connect everywhere anytime. As European unit of América Móvil, one of the largest wireless services provider in the world, A1 Telekom Austria Group is headquartered in Vienna and gives access to global solutions.

Avanti Communications

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Managed service for rural connectivity

Carriers expertise

Satellite backhaul

Avanti Communications

Avanti Communications is the leading KA-band high throughput satellite capacity partner to the communications industry across EMEA focused on driving connectivity across Africa.

Our mission is to work in partnership with the people of Africa to empower growth, protect communities and unlock opportunities for individuals, businesses and governments, by creating better connections across the continent.

Avanti recently launched Avanti EXTEND, a new managed service for rural connectivity. Avanti EXTEND provides high-performance and cost-effective 2G, 3G and 4G solutions to remote and hard-to-reach areas across sub-Saharan Africa. This enables MNOs and Tower Companies to provide reliable cellular service to the 100 million people living in these challenging locations that would otherwise be impossible to reach using traditional terrestrial infrastructure.

BICS

Get In Touch - BICS

Roaming

Global IoT

Business Analytics

Fraud & Security

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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Enterprise BSS/OSS Suite

Case Studies

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Blog

Cerillion is a leading provider of billing, charging and customer management systems with more than 20 years' experience delivering its solutions to mobile, fixed, cable and multi-service communications providers worldwide. These are used to price and bill subscriptions and variable usage for wholesale, retail and white label services; B2B and B2C offerings and multi-country service provider portfolios.

With more than 90 customer installations, Cerillion has a proven track record of delivering cost-effective solutions to the billing, charging and CRM challenges of today and tomorrow. We combine leading edge products with highly skilled and experienced staff, to provide long-term solutions to your business challenges. From fully integrated systems to managed services and SaaS, we offer a range of approaches and business models to suit your needs now and in the future.

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Mobile Operators

Digital Merchants

Showcase

Blog

Enkudo is a master aggregator that provides mobile operators a rich global portfolio of premium digital services including games, education, video, music services, and many more on Telenity's telco-grade Digital Services Platform (DSP). We ensure a top-notch mobile experience with a service mix crafted specifically for each market.

Over-the-Top (OTT) players and App Stores have become the main provider of digital services to mobile consumers. With the deployments of 5G networks globally, telcos now have a fresh opportunity to offer a broad variety of digital services that will leverage the high-speed mobile connectivity and better quality of service on a next generation of devices.

Our team will take your digital services business to the next level by providing technical, legal, marketing, reconciliation & settlement support, in the new world of digital services domain. Contact us via info@enkudo.com to learn more about how we can help you grow your business.

enkudo

IDEMIA

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Subscriber digital identification

Eco Friendly Sim Card Product Range

Smart Connect Subscription Management

IOT Sim

According to GSMA estimates, there will be >600 million mobile subscribers in Africa by 2025. To meet this demand, IDEMIA delivers innovative SIM and associated technology to mobile operators to ensure that consumers get secure mobile access across the continent. With a sub-region headquarters in South Africa, where we achieved BBEEE Level 1, IDEMIA is also present across Africa, including countries such as Ghana, Senegal and Nigeria.

As a testament of their trust in IDEMIA, customers, such as MTN, has awarded us with various honours including Supplier of the Year and Outstanding Quality & Delivery Performance.

IDEMIA, the global leader in Augmented Identity, provides a trusted environment enabling citizens and consumers alike to perform their daily critical activities (such as pay, connect and travel), in the physical as well as digital space. With close to 15,000 employees around the world, IDEMIA serves clients in 180 countries.

〈()〉 IDEMIA

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Towers

Rooftops

Indoor DAS

Green Power

Expertise, Resources and a Proven Track Record

At Minara Tanzania, our robust wireless communications infrastructure portfolio, combined with our multi-tenant leasing model, allows us to provide mobile network operators with an array of towers and other assets that help meet their coverage and capacity needs.

We are leading the way in providing wireless communications infrastructure, with wireless service solutions that help carriers meet current and future network demands including:

- Towers – A portfolio of 1,400+ towers with locations and heights to fit your coverage needs
- Rooftops – Our extensive rooftop portfolio at premium sites in major urban areas help you increase network coverage and capacity
- Indoor DAS – Our system enables property owners to install one wireless infrastructure solution supporting all service providers and frequencies
- Green Power – Renewable energy solutions to power telecom towers as an alternative to diesel generators

As a preferred communications infrastructure provider, we are continuously setting the standard for customer satisfaction by "Building Better Wireless."®

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Services

**Maintenance &
Support**

**Professional
Services**

**Project
Management Office**

The organisation delivers integrated Solutions for Society that are aligned with customers' priorities to create new value for people, businesses, and society, with a special focus on safety, security, and efficiency. Our portfolio addresses Africa's modern challenges via solutions for Infrastructure, Safety, Communications, and Digital via managed and professional services, maintenance and support, and our project management office (PMO).

We deliver one of the industry's strongest and most innovative portfolios of communications, analytics, cyber security, biometrics, and technologies that unleash customers' productivity potential. Through these solutions, NEC XON combines its best-in-class portfolio of technologies, leveraging a robust partner ecosystem to solve today's most complex business problems.

NEC XON combines the best people, skills, solutions, and services of XON and NEC Africa. The two organisations partnered in 2015 to ensure that customers get the maximum value from their technology investments. This close association provides deep integration skills and experience with global technology leadership. It also continues a proud association with African businesses that reaches back to 1963.

That rich heritage extends the benefits of longstanding global best practice, African expertise, and regional partnerships and delivery to our customers. In South Africa, they also benefit from our Level 1 B-BBEE certification via Kapela Capital.

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Who we are

Site Leasing

Site Development

Tower Acquisitions

Put Our Capabilities to Work for You

SBA South Africa is a preferred provider for mobile network operators. Our experience, capabilities and resources assist carriers to meet their network coverage, capacity and performance requirements. Working with our experienced team ensures speed to market while helping carriers provide high quality, feature-rich voice and data service.

SBA South Africa is a leader in providing wireless communications infrastructure including towers, buildings and rooftops, with more than 1,000 communications sites throughout the country. We offer wireless service solutions that help carriers meet current and future network demand while remaining flexible with build times and design including:

- Site Leasing – leasing antenna space on our multi-tenant towers under long-term lease contracts.

- Site Development – Constructing towers in strategically chosen locations or at the request of wireless carriers under a build-to-suit arrangement.

As a preferred provider for mobile network operators, we are continuously setting the standard for customer satisfaction by "Building Better Wireless."®

Seamless Distribution Systems
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Phone: +46 8 58 63 34 69
Web: www.seamless.se

Guide to Retail Value Management

Digitizing Telecoms with Seamless

Why Customers Trust Us

Smart Sales & Distribution - SDS Analytics

As pioneers of digital reform, Seamless Distribution Systems (SDS) has consistently delivered high-performance solutions to telecom operators and retail distributors for over 30 years and counting. Our solutions enable digitalization of the entire distribution chain, for multiple products and through multiple channels, customized according to a business's unique needs.

Our core expertise lies in helping our customers grow revenue through the power of digitalization. We combine years of experience in understanding our customers' needs, pain points and business goals around sales and distribution and leveraging automation and advanced analytics to help them achieve sales growth and OpEx optimization. We are driven to synergize distribution management for telecoms as we solve a variety of problems that impact different stages of the user journey.

Throughout this time, we have been obsessed with bringing unmatched efficiency across the value chain and helping converge all critical processes around sales and distribution in one integrated solution. Our end-to-end offerings facilitate the launch and growth of both direct and indirect channels while unifying customer experience across the board to ensure that telecoms never fail to deliver.

Sparkle
sparkle.communication@
tisparkle.com

IP&Data

Mobile

Voice

Enterprise

Sparkle is a leading global service provider offering a full range of ICT solutions, global connectivity, services and capabilities designed to meet the fast-changing needs of Enterprises, Internet Service Providers, OTTs, Media and Content Players, Application Service Providers as well as of Fixed and Mobile operators.

Thanks to a state-of-the-art global backbone of over 600,000 kms of fibre and through an extensive worldwide commercial presence distributed over 32 countries, Sparkle ranks #5 for IP globally and is among the top players for international voice traffic. Through a rich portfolio of services, a cutting edge network based on the latest technologies, a globally distributed sales force and advanced customer care capabilities, Sparkle is able to fulfil its mission of providing customers with top-performing and tailored solutions worldwide.

Enriched by its cultural variety and diversity, Sparkle is always committed to excellent relationships with all its stakeholders and operates with constant attention to maintain a safe environment where Partners, Customers, Suppliers and Employees can live and work better.

Sparkle. The world's communication platform.

Find out more about Sparkle at **tisparkle.com**

≡≡ SPARKLE
THE WORLD'S COMMUNICATION PLATFORM

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Customized Software Solutions

Digital Services for Telecom Operators

Operator Billing Solutions for Digital Services

Consolidate VAS World with Telco standards

Telenity is an industry-leading provider of cutting-edge services and solutions for worldwide communications service providers. We help our customers leverage the power of their networks with our NFV-enabled, 5G-ready VAS Consolidation Platform and Digital Service Platform.

Our VCP solution helps operators reduce opex and improve service quality. Our DSP solution provides telcos the ultimate platform to thrive in the digital world with its product capabilities, partner ecosystem and managed services capabilities. With our Service Subscription Management and Partner Management platforms, we provide a smooth migration to the Digital BSS ecosystem. Both solutions are offered to operators via revenue sharing and SaaS business models.

Our sister company www.enkudo.com brings together the operator and the 3rd-party digital content & service providers on our DSP platform to provide a first-rate digital experience to subscribers, to the benefit of all parties involved.

telenity

Webb Industries

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Webb Industries was established in 1973. Through the years, the company has earned trust through integrity, inspired innovation through technology and instilled confidence through leadership.

Webb Industries is a leading value-add distributor and manufacturer of products and solutions to enhance connectivity and improve communications. These include telecom masts and structures, site-build kits, in-building coverage and signal enhancement, data cabling infrastructure and a wide range of radio frequency components.

Webb has over forty years' experience in the manufacture of antennas, radio frequency combiners, splitters and multiplexers, as well as cable and connector assemblies. Our work meets the high operating specifications that customers require when deploying demanding communications solutions.

Webb's outstanding relationships with international trading partners were forged over many years. Our partners are world leaders in their fields. These include Telegärtner, Times Microwave Systems, Eupen, Polyphaser, Dehn, SMC Hilomasts, mWave, Laird and Comba.

Webb's Radio Comms Warehouse supplies radio communications accessories and security-related equipment. RCW is the sole African representative for several leading brands including NOVA.

Website

Jasco

RCW

LinkedIn

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Inteto Connect offers products that will improve your 3G, 4G/LTE and 5G signal and speed. These include Poynting antennas, Teltonika and HUAWEI routers and Wilsonpro and weBoost cell phone signal boosters.

More from Inteto Connect

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Intracom Telecom is a global telecommunication systems and solutions vendor. The company is the benchmark in fixed wireless access and innovates in the 5G/4G wireless RAN transport and small-cell SON backhaul.

Home & Business Ultra Broadband FWA

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ST Group is a distributor of VertiGIS and Precisely products in Africa. ConnectMaster™ is a software solution for the design, engineering, documentation and operation of tele-communication network infrastructure.

More from ST Group