- **Bringing broadband to Africa**
- **Maintaining remote VSAT systems**
- **Safeguarding against SIM swap fraud**

For operators to thrive in this competitive landscape, they need to ensure their networks are sustainable and deliver value

Roque Lozano, Senior Vice President Network Infrastructure for Middle East & Africa at Nokia

NOKIA

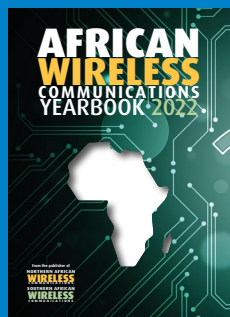# NORTHERN AFRICAN WIRELESS COMMUNICATIONS

Welcome to the April/May 2023 issue of Northern African Wireless Communications.

In this issue, we answer the question: how can African nations move towards continent-wide broadband availability? Check out page 18 for the thoughts of those in the know.

We also have some fabulous columns from industry veterans, including Martin Jarrold with his final Talking Satellite column with the GVF – we've been working with Martin for a long time now and wish him luck with his plans.

Looking ahead, we have some great features coming up on topics of personal interest to me - eSIMs and IoT – as well as insightful thought leaderships on smart cities.

As always, we're looking to widen our interaction with the industry and our readers, so please drop me a line if you have thoughts to share, a story to tell, or want to get involved.

And let's not forget that the African Wireless Communications Yearbook 2023-2024 is just round the corner...

Enjoy the issue!

Amy Saunders
Editor

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KADIUM

Tunisia to see commercial 5G launch in 2024

The commercial launch of 5G in Tunisia is planned for 2024.

The advent of 5G in Tunisia is part of the country's national digital strategy. This strategy aims to accelerate the digitalization of the administration, secure the national cyberspace, ensure digital sovereignty, and establish a climate of digital trust essential to the implementation of digitalization projects.

Tunisie Telecom and Orange have already tested 5G and are only awaiting regulatory authorization from the National Telecommunications Authority (INT).

"The fifth generation of mobile networks will guarantee a very significant increase in speed. It promises ultra-fast connectivity, reduced latency and increased capacity, thus opening the way to new possibilities and applications, especially those related to the Internet of Things and connected objects in general. It will inspire us to redefine the boundaries of technological development and will be a key catalyst for innovation and technological progress in all fields," said Nizar Ben Neji, minister of communication technologies.


Djibouti aims for 100% internet coverage by 2027

The Djiboutian government aims to bring mobile phone and broadband internet coverage to 100% of the population by 2027, according to communication minister Radwan Abdillahi Bahdon.

The generalisation of internet coverage and mobile telephone services is part of the 'Djibouti Digital Foundation' project, supported by the World Bank. It aims to make Djibouti a technological hub by 2035, through the promotion of digital services and the establishment of an enabling environment for private sector investment in information and communication technologies.

The project also provides for the development of national broadband infrastructure; the digital transformation of administration and businesses; e-learning; improving the quality of telecommunications services with affordable prices; and experimentation with 5G mobile technology.
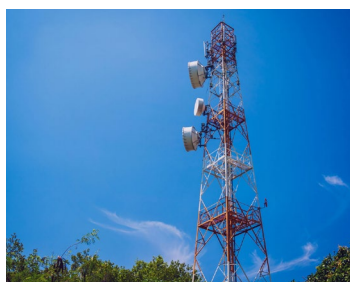
GPX to expand GPX Cairo 2 data centre

Carrier-neutral data centre services provider GPX Global Systems, in collaboration with Redcon Group, has announced a new data centre investment in Egypt.

The EGP2.7 billion investment is to expand the GPX Cairo 2 data centre. The expansion will add an additional 12MW of power, 1,800 racks and 9,000 square metres of space, bringing GPX's total equipped space in the Cairo market to 12,600 square metres.

The GPX Cairo 2 expansion will be a Rated-4 certified purpose-built facility with 12MW of power

and support for high power density applications and 52U cabinets, along with rich interconnectivity. Phase one of the expansion will be customer-ready early in the first quarter of 2025.

GPX builds and operates next-generation Tier 4, private, carrier-neutral data centres in emerging commercial markets and has a strong presence in Africa. The company provides colocation to the largest enterprise customers in Egypt and the region.

"Egypt's geographical location, coupled with its extensive global submarine cable partnerships, and resilient local infrastructure are all conducive to its prominence in this industry, and we're working to further build upon these advantages," said Egyptian minister of communications and information technology, Amr Talaat.

Angola Cables and Orange team up on infrastructure sharing on Djoliba network

Angola Cables and Orange have agreed to an infrastructure sharing agreement on the West African Djoliba Network.

The arrangement gives customers direct access to the Francophone markets of West Africa and gives both companies the option to extend their respective global connectivity by sharing inland networks and the subsea cable network and backbone infrastructure of Angola Cables.

"Getting access to efficient and secure digital and cloud services is an essential requirement for any business in today's gigabyte economy," said global commercial director of Angola Cables Rui Faria. "Access to the West Africa Djoliba network and our robust submarine infrastructure broadens the capability of businesses in accessing international markets and offers expanded traffic destinations across West Africa and other parts of the world."

Djoliba is the first network to offer complete security in West Africa with more than 10,000km of terrestrial fibre optic network offering, superfast broadband provision (up to 100 Gbps) at a 99.99% availability rate.

The expansion of infrastructure combining the Djoliba terrestrial end-to-end fibre optic network and Angola Cables' already established global network of WACS, SACS and MONET cables will offer clients secure, low latency connectivity - and additional redundancy options to multiple destinations in South America, the USA and Europe.

Ethiopia seeks second private MNO

Ethiopia will launch an international tender to award the country's second private telecommunications license (License B), according to the Ethiopian Communication Authority (ECA).

Balcha Reba, managing director of ECA, said that the license will be awarded through a competitive bidding process with the same transparency as Safaricom's license award process Ethiopia.

It was in November 2022 that the Ethiopian government relaunched the process of introducing a third telecommunications operator in Ethiopia at the same time as that of the partial privatisation of Ethio Telecom. This initiative is part of the process of liberalisation of the Ethiopian telecom market initiated in 2020. The first stage of liberalisation saw the consortium Global Partnership for Ethiopia (Safaricom Ethiopia) acquire the country's first private telecom license.

The entry of a second private telecommunications operator should introduce more competition into the Ethiopian telecoms market, which has long been the preserve of Ethio Telecom. Since October 2022, the incumbent operator shares the market with Safaricom. The latter has recorded about 3 million subscribers after 7 months of activity. Its competitor had 68.9 million mobile subscribers as of 31 March.

ADC to begin construction of largest data centre in West Africa outside of Nigeria

Africa Data Centres (ADC) will shortly start construction on its newly acquired land in the Central Business District of Accra, Ghana.

The new facility has been designed for an initial 10MW, which can expand to 30MW depending on demand. It will be the largest facility in West Africa outside of Nigeria.

The new facility will be built within the scheme of the Ghana Trade Fair Redevelopment Project at La in Accra, one of the key central locations in the city. The first phase is scheduled to be completed within 12 months.

This new facility is part of Africa Data Centres' continental expansion plans spanning 10 of Africa's major economic hubs, including South Africa, Zambia, Kenya, Rwanda, Egypt, Morocco, Senegal, Ivory Coast, and Angola. This unrivalled expansion, partly funded by the United States government's U.S. International Development Finance Corporation (DFC), is a significant initiative to accelerate private sector-led digital infrastructure and services in Africa.

"We continue to bring internationally recognised services and products through Liquid Intelligent Technologies and Africa Data Centres. Liquid already has the largest cross-border fibre network in Africa, and our data centres footprint expansion compliments this, enabling faster digital transformation on the continent," said Hardy Pemhiwa, Group CEO for Liquid Intelligent Technologies.

"DFC is proud to support African Data Centres. This new facility in Accra will be an investment in critical infrastructure helping to better link the rapidly growing African population and market to global opportunities," said Scott Nathan, CEO of the U.S. International Development Finance Corporation (DFC). "DFC's commitment to strengthen ICT Infrastructure in West Africa is in keeping with the commitments President Biden made to mobilize private capital for the kind of high quality global infrastructure investments that improve peoples' lives. This new data centre will help accomplish that in Ghana and for the region, creating jobs by improving existing business conditions while at the same time attracting data-dependent companies looking to invest and expand their operations."

"The establishment of Africa Data Centre's new 10MW data centre, in the heart of Accra, is a significant step towards bridging the infrastructure gap, and developing further our digital economy," said His Excellency Nana Addo Dankwa Akufo-Addo, president of Ghana. "This investment and the Government's drive at digitising all sectors of the economy will enable us increase our capacity to access digital services and help even more to attract foreign direct investment into our economy."

"Our new data centre in Ghana is a significant step towards Africa Data Centres' goal of narrowing the digital divide in the West Africa region. Hyper-scale data centres, preferred by major US tech companies, multinational corporations, banks and other local enterprises, are the speciality of Africa Data Centres. Additionally, our data centres are supported with independent solar and battery storage power, enabling us to bring digital technologies whilst mitigating our environmental impact," said Tesh Durvasula, CEO of Africa Data Centres.

Microsoft, Mawingu and Tizeti to connect 20 million people by 2025

Microsoft has signed new agreements with internet service providers Mawingu and Tizeti with the goal to connect 20 million people to the internet in Africa by 2025.

Mawingu, which is mainly active in East Africa, will bring broadband connectivity to an additional 16 million people in Kenya, Tanzania, and Uganda. Tizeti, a Nigerian start-up specialising in providing solar-powered network wireless internet connectivity, is expected to connect nearly 5 million people in Nigeria and Côte d'Ivoire.

This initiative is part of Microsoft's 'Airband' program. Launched in 2017, it aims to advance access to affordable internet and essential digital skills worldwide through partnerships with industry players. Through this initiative, the company intends to extend high-speed internet connectivity to 250 million people worldwide, including 100 million on the African continent by 2025.

"Through the partnership with Microsoft's Airband initiative, organizations gain additional support to build the infrastructure necessary to deliver connectivity support across many different ecosystems that ultimately enable the empowerment and sustainable development and growth. These partnerships are key to providing the local expertise and experience to achieve a bigger goal related to what can be leveraged with the support of connectivity," said Vickie Robinson, CEO of Airband Initiative.
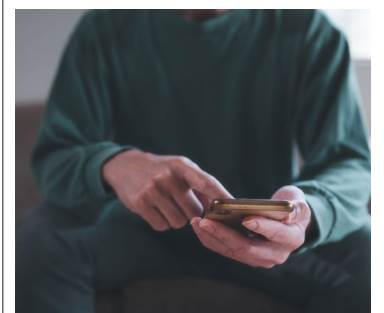
Avanti completes second phase of satellite gateway in Dakar

Avanti Communications has completed the second phase of its project to build a new HYLAS 4 satellite gateway station, in Dakar, Senegal.

The arrival of a new Ka-band antenna, which is 9.2m in diameter, stands 14m and weighs 17,000kg, marks an exciting new milestone. It has taken over 12 months to build in a state-of-the-art facility in the USA, before being shipped to Dakar.

The new antenna system offers exceptional broadband support to deliver backhaul and large-scale connectivity for telecoms and government. The investment provides further support to the Digital 2025 initiative by providing investment, development of skills and delivery of connectivity for Senegal and its surrounding regions.

Avanti's local gateway partner, Free in Senegal, will host and support the operations of the new gateway from its Tier III data centre facility in Diamniadio.

"Completing phase two of this project is a huge achievement for everyone involved. To date, Avanti has connected more than 1,000 villages and schools across Africa and we have ambitious plans to connect a further 10,000 sites over the next 5 years," said Kyle Whitehill, CEO at Avanti. "This gateway is crucial to help us achieve that goal. I want to extend a special thank you to our strategic partner Free in Senegal, who have been instrumental in the project's success to date."

The new gateway will extend the coverage of Avanti's HYLAS 4 satellite to Senegal and the surrounding West African countries of Guinea, Sierra Leone, Guinea Bissau, Gambia, Liberia, and Ivory Coast. This will significantly increase access to high-speed satellite internet for the countries' schools, hospitals and communities.

Chad begins work on trans-Saharan fibre backbone

The Chadian government has launched work on the Chadian component of the trans-Saharan fibre optic backbone (DTS).

The realisation of the project is entrusted to the CGPS/LORYNE Group, made up of two Burkinabè companies specialising in telecommunications, construction, and energy. The latter will install to install 559km of optical fibre within ten months.

Once complete, the fibre will cross the towns of Massaguet, Massakory, Mao, Rig-Rig, Daboua to the border with Niger. In addition, a 50km metropolitan network will be installed in N'Djamena. The realisation of the project should cost 20.5 billion CFA francs. It is financed by the European Union and the African Development Bank (ADB). The Chadian State will contribute 1.6 billion FCFA.

The DTS project aims to strengthen the high-speed telecom infrastructure in Africa by interconnecting several countries, including Algeria, Mali, Niger, Nigeria, Chad, and Tunisia.

MTN and Orange to up their game in Cameroon in light of complaints

Orange and MTN have each announced a series of measures aimed at improving the customer experience in Cameroon.

In the absence of a reduction in the price of internet packages, the mobile telephone operators have opted for various educational actions to allow the nearly 21 million subscribers they share to consume better.

Thus, an awareness campaign has started at Orange to further highlight the tips and options that optimise the use of lossless voice and data services. Emphasis will also be placed on the specificities of the offers and their use. Consumer information on the progress of network improvement and 2G, 3G and 4G coverage, which will help customers to avoid paying for services they will not be able to access.

Orange and MTN have also committed to reimbursing unused or lost internet package volumes due to network unavailability, as well as the acceleration of the execution of their 2023 investment plan. focused on modernising and extending network coverage.

These initiatives stem from a consultation meeting on improving the quality of service and consumer protection, held late in April with the Ministry of Posts and Telecommunications.

World Bank: mobile learning found to be strongly beneficial in Nigeria

According to the World Bank, the use of information and communication technologies in children's learning is beneficial in more ways than one.

The international institution cites the data from the experiment carried out with its consent between 2018 and 2020 in the states of Kano and Jigawa, in the northwestern region of Nigeria, as proof of this. The operation focused on 9,393 rural households, including children aged 6-9 and their parents, were subjected to two digital education approaches. It revealed a 42% decline in non-enrolment at the end of its term.

The baseline sample selected by the World Bank included 2,335 households living in 32 communities who received only aspirational videos aimed at parents to change their mindset and wish for the best for their children; 2,345 households living in 32 communities received aspirational videos and 40% of them additionally received a smartphone containing educational content. 4,713 households living in 64 communities served as a control group.

The study demonstrated that aspirational videos alone reduced girls' aspirations to marry at age 15-18. These videos especially had an impact on the parents of the girls. In the households that received the aspirational videos and the smartphone, children's reading and numeracy skills improved by 0.46 points and 0.63 points, respectively, compared to the control group.

According to the World Bank, no evidence of heterogeneous effects by sex of child was found in general, "highlighting the potential of information and communication technologies to effectively reach girls in conservative settings, where the seclusion of girls or a strong bias in favour of boys' education can prevent girls from accessing formal education."

"Our heterogeneous analysis by gender shows that the interventions worked equally well for girls and boys and that the magnitude of treatment effects by gender was generally similar for the main outcomes (school enrolment and reading skills, writing and calculation)," said the World Bank.

Because videos and smartphones could be used by multiple household members in these low-resource settings, the study also found that these resources improved the reading and numeracy skills of older siblings.

TPAY launches DCB for 30 million subscribers in META

TPAY, the leading payment provider for the Middle East, Türkiye, and Africa (META), has announced that, through its partnership with Bango and Etisalat Egypt, the launch of Direct Carrier Billing (DCB) with Google for over 30 million subscribers.

The collaboration will create an easier experience for Android users to purchase apps, games, and digital content on their devices on Google Play.

This partnership provides Etisalat customers the ability to pay for in-app purchases and services subscriptions through their mobile number (Direct Carrier Billing), bringing Google Play Store's content within reach of more than 60% of Egypt's population who do not have access to traditional payment methods (e.g. credit/debit cards).

With the introduction of DCB with Google, customers can now perform any online purchase transaction through the Google Play Store by paying for their purchases via their mobile phone balance without the need of using their credit cards.

"This is an important launch for carrier billing, providing phone users in Egypt with an easy payment opportunity in the world's biggest app store. Our partnership with TPAY brings Bango Payment technology together with TPAY's operational expertise, enabling developers to monetize their apps more successfully," said Paul Larbey, Bango CEO.

"We are delighted to enable DCB for our customers – the fastest, easiest, and most convenient way to pay for the vast range of content and services available on the Google Play store. Customer satisfaction is our key focus and DCB adds even more value for our customers," said Ahmed Yehia, Etisalat Egypt chief consumer officer.

Liquid and Viasat partner for broadband

Liquid Dataport has partnered with Viasat to improve connectivity services in West Africa.

The two companies signed a Memorandum of Understanding (MoU), which will enable Liquid Dataport to offer Viasat's connectivity services, working through local partners.
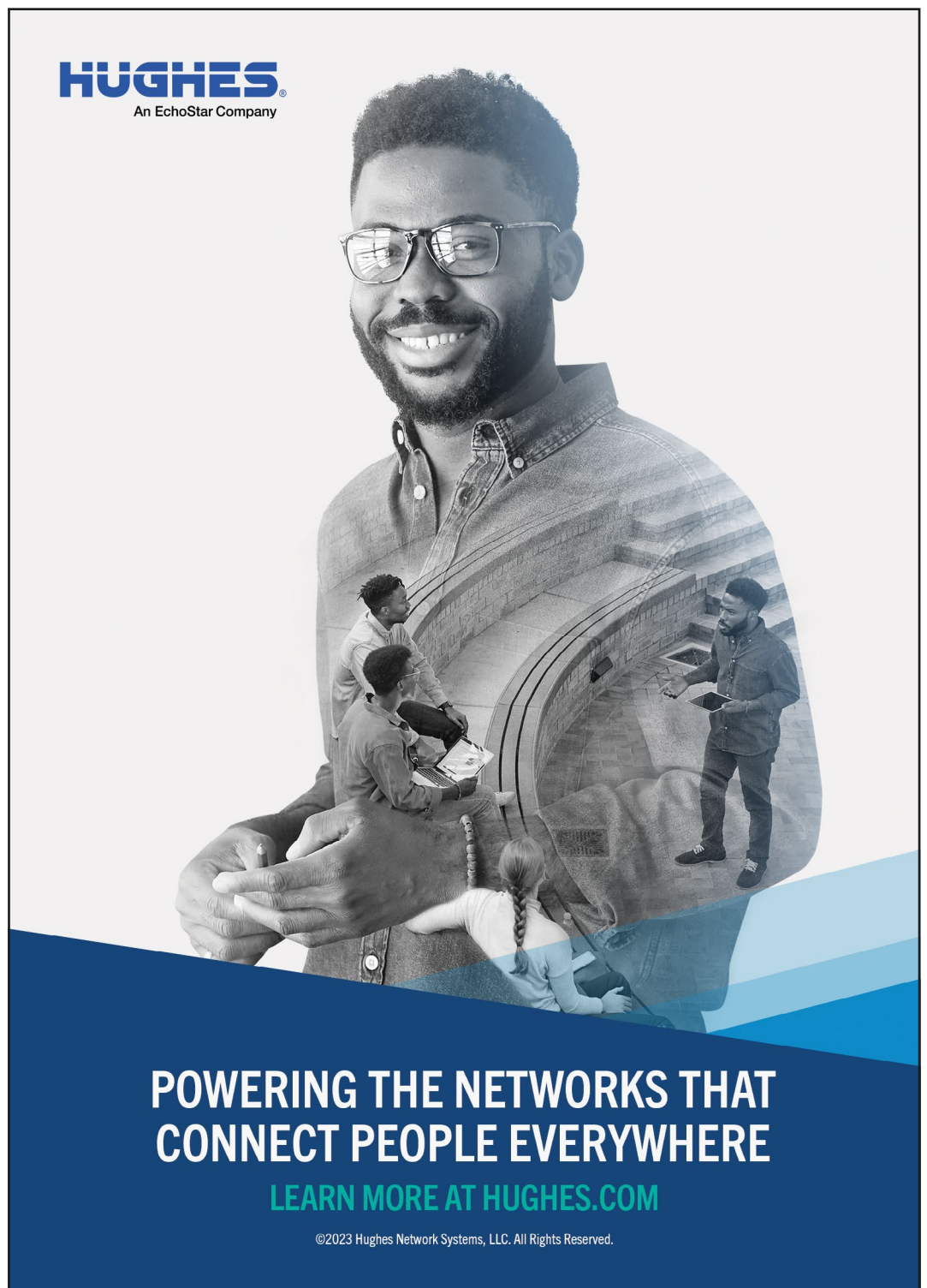
Liquid and Viasat intend to focus on the potential commercialisation and distribution of satellite broadband to reduce internet connectivity costs and improve data connections across the region.

"The MOU we have signed with Viasat will increase the data connectivity options that businesses and consumers in West Africa can have at their disposal. The reduced costs for connectivity is good news for our enterprise customers businesses," said Hardy Pemhiwa, president and Group CEO, Cassava Technologies.

As a part of Viasat's expansion into Africa, the company's next-generation ViaSat-3 satellite constellation is expected to deliver connectivity services to the EMEA region.

"Viasat's ability to deliver affordable and high-quality connectivity where it is needed most, even in the hardest-to-reach regions, continues to expand as we launch our next-generation ViaSat-3 global satellite constellation," said Peter Langkilde, general manager: EMEA, Viasat. "We're thrilled to work with Liquid Dataport to help reduce Africa's digital gap and create new opportunities through digital inclusion."

Nokia: Africa behind Middle East on broadband, many using 2G and 3G

The latest Nokia MEA Mobile Broadband Index report highlights the steady growth of 5G in the Middle East and Africa region (MEA) as well as its impact on digital transformation.

It confirms that the Middle East is far ahead of Africa in terms of 5G adoption, while many operators in Africa are still developing their business models around 4G. Voice traffic still relies on 2G and 3G networks in many parts of the region.

5G is forecast to increase steadily and will contribute to the growth of the mobile broadband subscriber base, which is expected to grow with a compound annual growth rate (CAGR) of 6% in MEA. According to the report, 4G networks in MEA account for 79% of overall data traffic today, and by 2027, 4G and 5G will together account for 90% of data traffic. In the same year, 4G subscribers will reach 1,214 million (53% of total

subscribers) whereas 5G adoption is estimated to reach 380 million subscribers (17% of total). Yearly ARPU is estimated to increase at USD$3.4 in 2027, and total data traffic is expected to increase at a CAGR of 32% from 2022 to 2027.

The report shows that in the Gulf Cooperation Council (GCC) region, 5G adoption is the fastest, and 5G subscribers are expected to reach 75% by 2027, mainly driven by Saudi Arabia. In non-GCC Middle Eastern countries and in Africa, 4G will continue to expand and remain dominant until 2027, while 5G deployment is at nascent stage today and poised to gain more and more momentum over the next years.

5G fixed wireless access (FWA) in the GCC countries and 4G FWA in the rest of the MEA region are one of the most attractive use cases, with a significant opportunity for operators to drive

incremental revenues. Furthermore, 5G networks are more energy efficient than previous radio network generations, helping operators reach their sustainability targets.

"MEA is a diverse region with many countries at different stages of development and that is reflected in our report," said Mikko Lavanti, head of mobile networks at Nokia MEA. "Data consumption with high-speed networks is increasing exponentially across the MEA market in both urban and rural areas. Reliable 4G and 5G networks are critical for bridging the digital divide in the region, in addition to supporting data-intensive applications for communities and businesses. Nokia is helping both operators and enterprises unlock new opportunities with 5G, building the evolution towards future technologies that will enable enhanced experiences such as the metaverse."

Ethio Telecom targets OTT entertainment services

Ethio Telecom is establishing customer-driven digital solutions and inclusive platforms to empower the Ethiopian entertainment industry and ensure the availability, quality, and reliability of telecom services. The MNO aims to create a conducive and enabling environment for the content industry to encourage creativity and directly distribute content

to the audience.

The company has launched new digital entertainment applications that will play a key role in digitalizing and revolutionizing the nation's entertainment industry. These applications will bridge the digital engagement gap, provide data-driven value additions to empower the creative industry, offer easy payment and access channels, ensure a single subscription with attractive data bundles, and make supporting technology and marketing resources available. This will empower users' creativity, expand their mental horizons, acquire new knowledge, and heal their souls with the contents provided with partners.

Four value-added services were

launched, including IPTV/OTT video streaming service, which provides customers with a variety of content ranging from live TV programs, drama, series movies to various premium videos.

Sewasew Music Streaming is another value-added service that brings music fans a unique digital experience. It allows them to connect with local and international modern and classical music artists in one place.

Two new mobile games, Telegames Appland, and Telewin, have also been launched. These games offer a wide variety of options for both adults and children to download and play unlimited games at an affordable price, with no ads, in-app purchases, or viruses.

Senegal to allocate 5G licenses by end of July

Senegal's telecommunications regulator (L'Autorite de Regulation des Telecommunications et des Postes, or ARTP) has announced that it will allocate 5G licenses to telecom operators by the end of July.

ARTP director general Abdou Karim Sall made the announcement

as part of the Authority's ten priorities for 2023 and said that there will not be new 5G licenses in the country, rather there will be an extension of existing 4G licenses for operators who wish to switch to 5G.

Sonatel first tested 5G in Senegal in November 2020 and

ran a second 5G trial in December 2021. Free Senegal also launched an experimental phase of 5G technology in June 2022. In March 2023, ARTP instructed Sonatel and Free to halt their network trials and submit a progress report to the regulator.

Bayobab signs $320 million deal to develop Project East2West fibre

Bayobab – formerly MTN GlobalConnect - has penned a $320 million agreement with Africa50 to develop Project East2West, a terrestrial fibre optic cable network that should connect 10 African countries by 2025.

"The partnership will offer substantial improvements in data traffic for internet service providers, mobile network operators, and hyper scalers operating in these countries," said Bayobab in a statement. "It will also bridge the bottlenecks in global internet traffic landing in and going out of Africa. It is expected to cut latency by up to 65% on the east-to-west route."

This investment will contribute to Bayobab reaching the group's target of having 135,000km of proprietary fibre over the next three years. Currently, Bayobab has 107,000km of proprietary fibre of which 2,000 km was rolled out in the first quarter of this year.

"The alliance is more than cables and connections; it is about building bridges of connectivity that span nations and bring people closer together," said MTN group president and CEO Ralph Mupita. "For landlocked African countries, Project East2West will improve latency by almost two-thirds and increase capacity to support high-quality broadband access. In this way, it will level the playing field and ensure that everyone has a fair chance to succeed in the digital world."

"Project East2West is a remarkable and transformative project that will step-change Africa's internet capacity expansion drive by supporting the growth and development of 4G and 5G," said Africa50 CEO Alain Ebobissé. "This is an important project that will have a significant impact on Africa's quest to make the internet accessible to most of its growing population. Partnering with a large pan-African company like Bayobab and MTN is important to roll out such an impactful cross-border project."

Starlink targets Somalia from LEO

Starlink wants to launch commercial services in Somalia and has started discussions with the National Communications Authority (NCA)

with a view to obtaining the license.

"We are happy to explain how our system works, what we can bring to Somalia if we get permission from the agency, and we will also cooperate with telecommunications companies and service providers that operate in Somalia," said a SpaceX spokesperson.

Mustafa Yasin Sheikh, managing director of NCA, welcomed Starlink's interest in Somalia. He, however, pointed out that the company must first meet the necessary licensing requirements and go through the licensing process of the authority. The NCA will be responsible for evaluating Starlink's offer and the service plan it wishes to implement in the country.

SpaceX aims to bring broadband everywhere on the planet, including remote and landlocked areas, which are therefore difficult to access for the terrestrial networks of mobile operators. In Africa, the company has already launched its commercial services in Nigeria and Rwanda. According to the established launch schedule, 21 more countries should receive these services this year.

Orange and Medusa to deploy submarine cables linking Tunisia to France by end of 2025

Orange Tunisia and Medusa Submarine Cable System, a neutral and independent operator of submarine infrastructure in the Mediterranean, have signed an agreement to deploy a submarine cable linking Tunisia (Bizerte) to Europe, through France (Marseilles).

This cable will be built in compliance with the latest international standards and rules and will benefit all socio-economic actors in Tunisia.

Designed using the latest submarine optical fibre technologies, it will also offer a new very high-speed connectivity solution and will also improve the security of existing internet connectivity.

Medusa will be the first and longest submarine cable to connect all countries in the Mediterranean. The system will connect the two shores of the Mediterranean and will leave from Lisbon to end its journey in the Egyptian city of Port Said, passing through various Mediterranean countries. It will have 16 landing points in different countries including Portugal, Morocco, Spain, Algeria, France, Tunisia, Italy, Greece, Cyprus, and Egypt.

More than 8,000km long, this new infrastructure will provide diversity and an additional route of several pairs of fibres with a capacity of 20Tb each, in order to meet Tunisia's growing connectivity needs. Commissioning is scheduled for the end of 2025.

"We are particularly pleased that Bizerte is hosting this new submarine cable, a strategic and ambitious project for Orange Tunisia, carried out with our partner Medusa. It will eventually allow better accessibility to the world of the internet, for a digital that is more inclusive and focused on the fundamental needs of the Tunisian population and economy," said Thierry Millet, CEO of Orange Tunisia.

"We are very proud to conclude this agreement with Orange Tunisia which will link the Medusa submarine cable to Bizerte and transform the northernmost region of the African continent into a new gateway to Africa. From the start of this great project, we committed to making Bizerte a major landfall, convinced that Orange Tunisia will develop this new infrastructure and promote its strategic location for the interconnection of Tunisia and, beyond, from the continent. This new step demonstrates our commitment at Medusa to drive and encourage the long-term development of essential infrastructure in this region of the continent," said Norman Albi, managing director of Medusa.

Kenya to unveil home-grown smartphones at $40

A Kenyan government official has promised that the country will unveil its first locally made, affordable smartphones in the next two months in an attempt to increase the penetration of internet-enabled mobile phones in the country.

While little has been revealed about the devices, they are expected to be priced at US$40 per handset.

In November 2022 Kenyan president William Ruto stated his administration's intention to manufacture Africa's cheapest smartphone within the next 12 months. He said that a low-cost device will ensure that all Kenyans have digital access to government services and business platforms.

AFR-IX and Catchpoint to enhance internet reliability

Catchpoint, the internet resilience company, and AFR-IX Telecom have embarked on a journey to improve the quality and reliability of internet connectivity in the continent.

By using Catchpoint's internet performance monitoring platform (IPM), organisations will have the operational visibility required to ensure resilience – from applications to cloud services to internet protocols.

The goal of the project is to improve internet resilience by increasing the number of vantage points across geographies and within infrastructure vantage points from which organisations can monitor their services and applications to ensure high-performing, reliable internet connectivity.

"In today's world, the internet is your new local network," said Mehdi Daoudi, CEO, Catchpoint. "Our deep, global observability coverage plus advanced analytics help the world's leading organisations identify and resolve issues before they impact their customers, their workforce, or their applications.

This pilot project will operate two backbone nodes in Accra and two in Lagos, allowing Catchpoint's customers to have visibility over the performance and resilience of their products or services within these regions. The four new nodes supplement Catchpoint's existing observability network footprint of 22 nodes distributed across Africa, spanning Morocco, Tunisia, Libya, Egypt, Uganda, Kenya, Tanzania, and South Africa.

"Using AFR-IX cloud infrastructure and connectivity to build backbone nodes in Accra and Lagos has allowed us to deploy rapidly and cost-effectively within budget," said Gael Hernandez, director of ISP Strategy, Catchpoint. "Our customers are driving the demand for additional vantage points in the continent, so they can measure performance and increase the resilience of their services across Africa."

If project outcomes are successful, Catchpoint will expand the number of synthetic nodes deployed in AFR-IX Telecom.

Talking critical

TCCA's TETRA Applications Group
– led by Hannu Aronsson

TETRA – the benefits of both voice and data

TETRA is recognised as a leading mobile communications technology that is delivering mission-critical voice services to public safety organisations and mobile workers worldwide. However, TETRA data capabilities are often under-utilised. There are many automation-related examples of TETRA data applications that are available from a wide ecosystem of innovative developers.

TETRA can be used for automation, control including Internet of Things (IoT) and Internet of Life Saving Things (IoLST), machine to machine (M2M) and supervisory control and data acquisition (SCADA) solutions as TETRA is a mission critical network.

IoT in a narrowband radio network context means using the radio network for data communications for control, reports, alarms, etc. and leveraging the features of the narrowband radio network for control, i.e., security, encryption, private network, and quick reliable small data delivery. TETRA is very efficient in delivering small pieces of data with a very fast round-trip time, and provides high security and encryption options, which enable its use to control and automate critical systems.

Public safety, fire and ambulance operators can securely deliver alarm and task information to field units over the public safety TETRA network. For example, task information, destination address and priority information can be sent as data over TETRA and shown to the users using their in-vehicle device. The users can provide progress updates from this device which can be updated in the emergency call centre via TETRA.

In some countries, millions of TETRA Packet Data IP transmissions, data SDS and status messages are used every day to deliver key information to and from the field units, providing exceptional situational awareness for both the field units and the control room.

For automation and control, bandwidth is not the most important feature. Often having a guaranteed data rate and response time is most important. Reliability and quick delivery of small pieces of data enables most automation and SCADA applications with TETRA.

Today's IP based SCADA protocols like IEC60870-5-104 or DNP3 are optimised for small bandwidth technologies like TETRA. A short heartbeat packet over TETRA to each field unit every few minutes is enough; in case something changes in a field unit it will be reported automatically to the server in the control room. With these protocols and Packet Data Channel Sharing active on the infrastructure, up to 800 field units can be handled per base station and traffic slot using a 15 minute heartbeat.

TETRA with its quick round-trip times is especially suitable for alarms and alerting systems, such as public siren systems which are used to alert the public about potentially dangerous situations, as well as for monitoring, IoT sensors, and environmental sensors. For example, a water utility can monitor measurements from numerous points in its water treatment facility using TETRA-enabled RTUs with alarm functionality. By monitoring the whole process in real time, the utility can provide safe drinking water

SCADA-enabled terminals can be part of a standard SCADA solution.

Some of these TETRA terminals designed for automation also include programmable business logic functionality, allowing a portion of the automation to be handled locally on the device itself. TETRA can provide information updates to public transport station displays while also providing a high-quality voice audio channel for audio notifications in special situations.

TETRA data communications capability is also relatively simple to integrate in the back-end office IT system world. Using a TETRA data gateway, TETRA's efficient narrowband radio optimised data communications can be connected with standard IT protocols and IT systems. TETRA packet data is standard IP networking, but the SDS and status messages and group-addressed data delivery allow for even more efficient communications over the network.

TETRA can be used as a private

> **"TETRA network enables the owner to control coverage, capacity, availability, resilience, and security to fit specific requirements."**

efficiently. TETRA solutions can also work along broadband solutions for those applications that require high data bandwidth, such as surveillance cameras, video and high-speed data streaming.

There is a wide variety of handheld TETRA radios available, but there is also a wide variety of other kinds of TETRA terminals and devices. Industrial TETRA terminals can include automation RTU (Remote Terminal Unit) functionality in the same device. These terminals often have I/O (input/ output) and local networking ports for easy integration with SCADA and other devices. This means that a single device can solve both the automation, SCADA and communications needs in a remote location.

Industrial processes can be monitored using SCADA running over TETRA packet data. This is a suitable solution for outstations and remote locations from which SCADA information is needed for the operational processes. TETRA

network totally under the owner's control. As a private narrowband radio network, frequencies can be available even in most built-up areas. A private TETRA network enables the owner to control coverage, capacity, availability, resilience, and security to fit specific requirements. Network coverage can be optimised to cover an oil or gas pipeline with low number of base stations and enable pipeline monitoring and control using a secure wireless network in addition to providing secure and reliable voice communications along the length of the pipeline. The lower number of base stations also makes it easier to provide battery or generator backup power for a business or mission critical network.

When buying a TETRA network, consider both voice and data benefits, which can improve the ROI. An existing private or shared TETRA network can also be used to deploy data and automation, extending its value and lifetime.

Airtel reports higher profit in Q4

Bharti Airtel's MD Gopal Vittal has credited a focus on subscriber additions for gains in its fiscal fourth quarter 2023 (ending 31 March), with profit up despite high domestic capex as its Africa and mobile businesses fared well.

Vittal highlighted the net addition of 7.4 million 4G customers during the period and reiterated a goal of covering all major towns and villages with 5G by the end of calendar 2023.

"We are also pleased to see the increased velocity of our digital deliveries across all parts of our business," said Vittal, pointing to a focus on related platforms and "talent."

Net profit attributable to owners of the parent company grew 50% year-on-year to INR30.1 billion, with revenue up 14% to INR360.1 billion.

In Africa, revenue in fiscal Q4 grew 19% to $1.4 billion on voice and data gains. Mobile subscribers grew 9% to just over 140 million, with data users up 17% to 54.6 million. Average monthly data consumption rose 26.6% to 4.7Gb. Mobile money revenue grew 28.9%

to $187 million.

Active money customers increased 20.4% to 31.5 million. Capex increased 14% to $748 million, with close to 15,400 broadband base stations added for a total of 107,700 sites.

Tanzania invests 400 billion shillings in ICT in 2 years, says Kundo Mathew, deputy minister of ICT

The Tanzanian government has invested 400 billion shillings over the past two years to improve and strengthen communications infrastructure in the country, according to Kundo Mathew, deputy minister of information, communication and information technology.

This investment reflects the efforts made by the government to accelerate digital transformation and make it an engine of socio-economic development in Tanzania. In May 2021, the executive secured $150 million in funding from the World Bank for the implementation of the Digital Tanzania Project (DTP). The project focused on strengthening the legal, regulatory, and institutional environment of the digital economy; the generalization of high-speed connectivity; the implementation of e-government.

Over the past two years, a wide range of government projects have included the extension of the national fibre optic infrastructure, the construction of centres for the promotion of ICT, the construction of telecom towers, interconnection to neighbouring countries, and the launch of 5G mobile technology. These extensive initiatives have contributed to accelerating the use of mobile services in Tanzania.
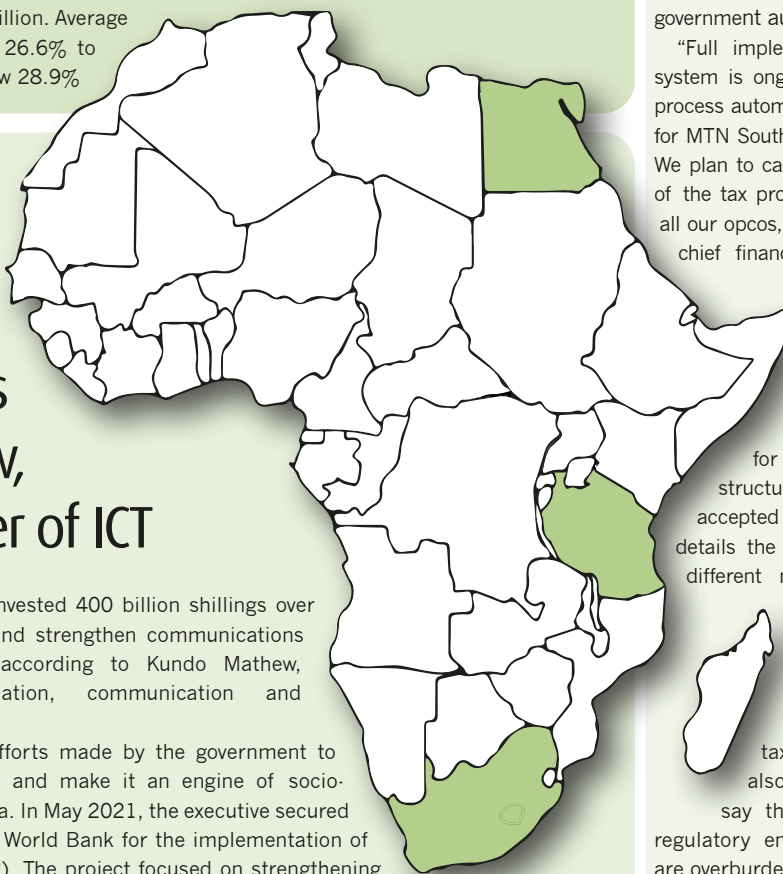
MTN Group adopts tax technology for transparency and compliance

MTN Group is rolling out tax technology across all its operating companies to increase compliance. The technology will assist it in reaching regulatory conformity, as well as increase transparency.

The MNO recently released its 2022 tax transparency report and has begun an exercise of configuring a tax risk register system for the whole company. The report shows MTN's total tax contribution in 2022 amounted to $3 billion, up from $2.4 billion in 2021. The tax contribution included corporate, taxes, withholding and payroll taxes, operating license fees and other payments to government authorities.

"Full implementation of the tax provisioning system is ongoing. We completed the end-to-end process automation of the tax provisioning system for MTN South Africa's operating company (opco). We plan to carry out a similar end-to-end process of the tax provisioning system automation across all our opcos," said Tsholofelo Molefe, MTN Group chief financial officer. "We began an exercise of configuring a tax risk register system for the whole group. We also began with a configuration process of a total tax contribution system for the group."

The GSMA recently called for governments to rationalise tax structures, based on internationally accepted principles. In its report, MTN details the uncertain tax positions it faces in different markets, saying its interpretation and application of the various tax rules applied in direct and indirect tax filings may result in disputes between it and local tax authorities.

The need for a harmonised tax regime on the continent is also supported by analysts who say there is a need to spruce up the regulatory environment as some governments are overburdening telcos with special taxes.

9.5% stake in Telecom Egypt sold for EGP3.747 billion by government

The Egyptian government has sold a 9.5% holding in Telecom Egypt for EGP3.747 billion.

The Ministry of Finance (MoF) confirmed that the government retains a 70.5% stake in Telecom Egypt, although it has opened talks over the sale of a further 0.5% stake to TE employees.

The majority of the 9.5% stake was bought by domestic investors, although overseas investors did obtain a small amount of the available shares.

The MoF reported that the stake sale was part of a broader push by the government to diversify the ownership structure of state-owned enterprises so as to increase "the contributions of the private sector in economic activity."

MTN GC - now Bayobab - delivers 2,000km of new fibre in Q1

MTN GlobalConnect (MTN GC) - now known as Bayobab since a recent rebranding exercise - rolled out over 2,000km of new fibre in the first quarter of this year, bringing its total inventory of proprietary fibre to over 107,000km.

MTN GC has reported that in its first quarter 2023, it grew external revenue by 17% year-on-year to US$83.6 million, with mobility revenue up by 15.5%. According MTN Group CEO Ralph Mupita, during the period, MTN GC signed fixed connectivity infrastructure deals valued at US$2.8 million.

"The performance of the fixed connectivity segment was driven by the introduction of Internet Protocol Transit (IPT) international gateways in South Africa and Nigeria, as well as the launch of the IPT product, Looking Glass Portal," said Mupita.

"To meet the growing demand for international connectivity in our markets, in line with our plans, MTN GC Kenya and Zambia made noteworthy progress through digital connectivity initiatives," added Mupita. "External wholesale mobility revenues grew by 15.5% year-on-year in Q1, backed by a five-year messaging deal with a global hyperscaler, increased missioncritical SMSes processed on the platform to authenticate mobile

users and resilient performance from international voice, delivered against a negative global trend."

In the period, MTN GC also partnered with key global mobile networks and opened 1.200 new services to make international roaming 'more affordable for MTN's subscribers' across Africa.

In addition, MTN GC attained MEF 3.0 Carrier Ethernet services certification, which Mupita said ensures that "our digital connectivity solutions adhere to the highest industry standards and deliver best-in-class connectivity solutions to drive network transformation to power the African digital economy."
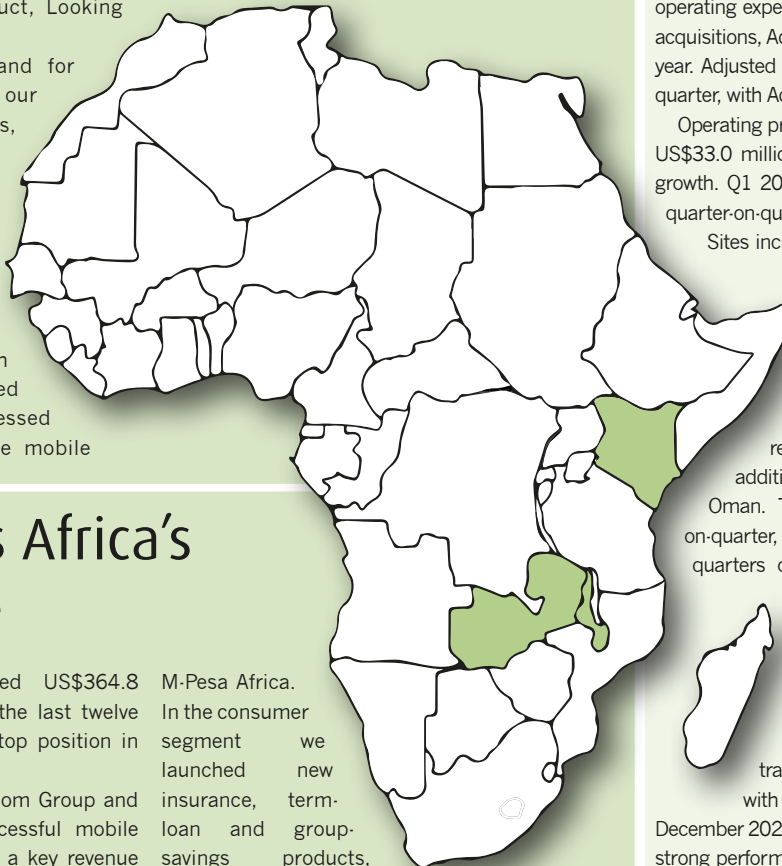
M-Pesa leads Africa's fintech space

The M-Pesa platform processed US$364.8 billion of transaction value over the last twelve months, up 13%, cementing its top position in the African fintech space.

M-Pesa, jointly owned by Vodacom Group and Safaricom, is Africa's most successful mobile money platform and has become a key revenue stream for both telcos.

Vodacom Group reported in its annual performance for the year that, in the 12 months ending March 2023, international M-Pesa revenue was up 31.1% to R6.5 billion, contributing 24.6% of service revenue.

Shameel Joosub, Vodacom Group CEO, said that the growth was supported by a strong performance in the DRC, with Tanzania's performance recovering as levies on mobile money were reduced during the year.

"The underlying momentum of M-Pesa reflects our ongoing product enhancements in both the consumer and merchant segments, supported by

M-Pesa Africa. In the consumer segment we launched new insurance, term-loan and group-savings products, scaled international money transfer and enhanced our M-Pesa app during the year," said Joosub. In Tanzania, "loans granted via our lending product 'Songesha' more than doubled to R8.2 billion in the year. To grow and diversify the M-Pesa ecosystem, we also accelerated our merchant strategy more than doubling the number of active merchants to 196,000."

M-Pesa also recently won an operating licence for Ethiopia, which, according to Joosub, is an important milestone for the group as it accelerates its "ambition to transform lives in the country as we seek to connect every Ethiopian to the global digital economy."

Helios Towers achieves one of 'best ever' quarters

Helios Towers plc has announced its results for the three months of the year which ended on 31 March.

Revenue increased 34% year-on-year to US$170.8 million, driven by strong organic revenue growth and acquisitions in Malawi and Oman. Excluding acquisitions, revenue increased 17% year-on-year driven by strong organic tenancy additions and CPI and power price escalations. Revenue increased by 12% quarter-on-quarter.

Adjusted EBITDA increased by 27% year-on-year to US$84.7 million, driven by tenancy growth, with Adjusted EBITDA margin decreasing to 50% year-on-year, reflecting the impact of higher power prices that resulted in power-linked revenues and related operating expenses increasing comparably. Excluding acquisitions, Adjusted EBITDA increased 11% year-on-year. Adjusted EBITDA increased by 11% quarter-on-quarter, with Adjusted EBITDA margin remaining flat.

Operating profit increased by 129% year-on-year to US$33.0 million, largely driven by Adjusted EBITDA growth. Q1 2023 operating profit increased by 90% quarter-on-quarter to US$33.0 million.

Sites increased by 3,173 (30%) year-on-year to 13,684 sites, reflecting 654 organic site additions and the acquisition of 2,519 sites in Oman. Sites increased by 131 quarter-on-quarter. Tenancies increased by 4,887 year-on-year to 25,120 tenants, reflecting 1,870 organic tenancy additions and 3,017 acquired tenancies in Oman. Tenancies increased by 628 quarter-on-quarter, reflecting one of the strongest ever quarters of organic tenancy additions for the Group. Tenancy ratio decreased by 0.08x year-on-year to 1.84x, reflecting the dilutive impact of the acquired assets in Oman. Tenancy ratio expanded 0.03x quarter-on-quarter.

"Following two years of transformational expansion, concluding with the Oman acquisition closing in December 2022, we have started our next chapter with strong performance that demonstrates the quality of our enlarged platform. Our leading positions in high-growth markets has supported one of our best ever quarters of organic tenancy additions, which combined with our robust business model, that features CPI and power price protections, has supported double-digit organic Adjusted EBITDA growth year-on-year," said Tom Greenwood, chief executive officer. "Looking forward, we have maintained our guidance for the full-year, that reflects strong growth, disciplined capital allocation and a clear pathway to deleveraging. We remain laser focused on operational execution and continuing to drive sustainable value for all our stakeholders – our customers, partners, people, environment, communities and investors."

OneWeb and iSat Africa partner for African satellite connectivity

OneWeb has signed a distribution deal with iSat Africa covering connectivity from its low Earth orbit (LEO) satellite constellation, as part of a service targeting enterprises and operator rural deployments.

iSat Africa will add the LEO connectivity to its offering targeting markets in central, western, and eastern Africa with reliable high speed, low-latency communications services.

Use cases identified by the iSat Africa include enterprise connectivity, remote access and rural networks with target customers including the continent's mobile operators. It also supplies the broadcast industry.

The pair claim the partnership will aid efforts to bridge the digital divide in Africa.

OneWeb CCO Stephen Beynon said the partnership "presents us with the opportunity to bring connectivity to people, businesses and governments across Africa."

CEO of iSAT Africa Rakesh Kukreja added it was "a big step towards closing the digital divide and giving people and businesses all over Africa more power."
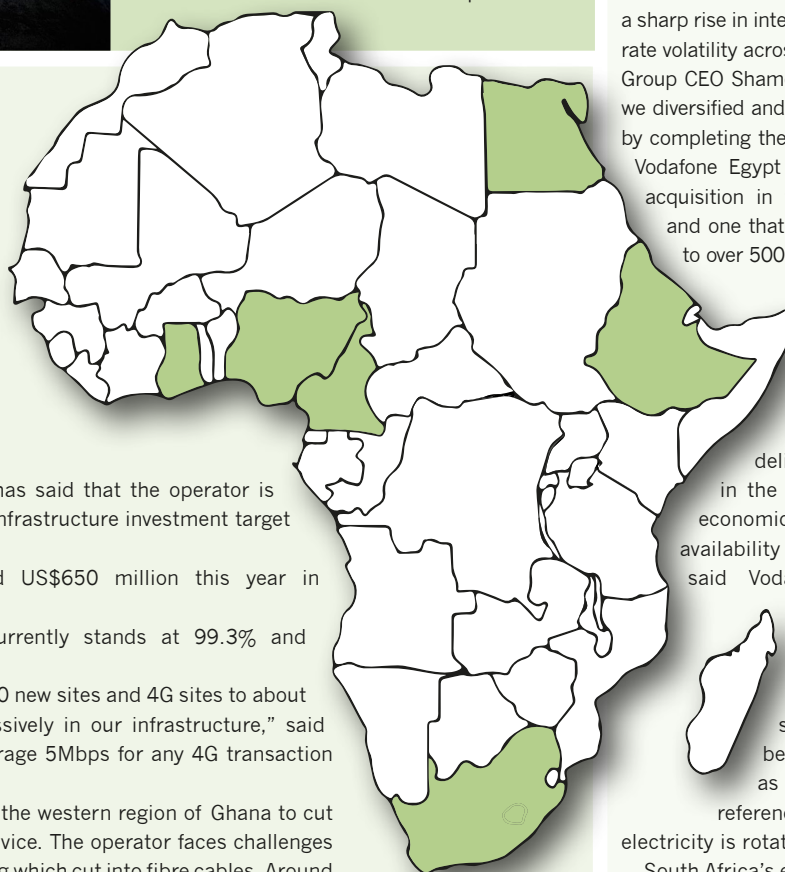
MTN Ghana to exceed US$1 billion in investment by 2026

MTN Ghana CEO Selorm Adadevoh has said that the operator is expected to exceed the US$1 billion infrastructure investment target it set out in 2021 by 2026.

The company will spend around US$650 million this year in boosting connectivity.

MTN's 4G coverage in Ghana currently stands at 99.3% and 2G/3G is 99.5%.

"This year, we hope to expand to 350 new sites and 4G sites to about 1,000. We also intend to invest massively in our infrastructure," said Adadevoh. "We should deliver on average 5Mbps for any 4G transaction at the minimum."

The company is aiming to invest in the western region of Ghana to cut down fibre downtime and improve service. The operator faces challenges from 'illegal' and 'irresponsible' mining which cut into fibre cables. Around 35km of cables have been laid in the west of the country this year.

Airtel Nigeria appoints Carl Cruz as MD

Carl Cruz has been appointed Managing Director of Airtel Networks Limited (Airtel Nigeria). He replaces Surendran Chemmenkotil who held this position since May 2021.

In his new role, Cruz will leverage his 31 years of business and corporate experience to help Airtel Nigeria pursue its growth strategy in Nigeria's highly competitive telecommunications market.

"Mr Cruz brings extensive business experience, exceptional results and strong values to Airtel Africa. He has a strong track record as a strategic and transformational business leader who thrives on problem solving and building strong teams to drive business growth," said Segun Ogunsanya, chief executive officer of Airtel Africa.

Vodacom reports 16% revenue increase YoY

Vodacom Group reported strong financial growth for the year ended 31 March 2023, despite facing headwinds from power supply issues in South Africa, startup costs of a new operation in Ethiopia, supply chain challenges, higher interest and inflation rates, and foreign exchange volatility.

Vodacom Group revenue grew 16% year-on-year (YoY) to 119.2 billion South African rand, positively impacted by the acquisition of Vodafone Egypt and rand depreciation against its basket of international currencies.

"The war in Ukraine, which followed hard on the heels of a global health crisis, resulted in supply-chain disruption and inflationary pressures. These factors have contributed to a higher cost of living, a sharp rise in interest rates and foreign exchange rate volatility across our markets," said Vodacom Group CEO Shameel Joosub. "At the same time, we diversified and accelerated our growth profile by completing the acquisition of a 55% stake in Vodafone Egypt for R43.6 billion, the largest acquisition in the Vodacom Group's history and one that expands our population reach to over 500 million people across Africa."

Since consolidating Vodafone Egypt on 8 December 2022, it has contributed R8 billion to group service revenues.

"We are pleased to have delivered improved profitability in the second half despite ongoing economic headwinds, including power availability challenges in South Africa," said Vodacom Group CFO Raisibe Morathi. "South Africa's energy crisis has proven an important factor in shaping the financial year. Load shedding is a term that has become top of mind with us as management team and is a reference to the way available electricity is rotated in South Africa."

South Africa's energy crisis continued to cost the operator a significant sum. The company spent an incremental R300 million in operating costs in the year mostly on diesel. Vodacom has also spent R4 billion 'on energy resilience capex' over the last four years.

Group earnings before interest, tax, depreciation and amortization (EBITDA) grew 13.2% YoY, reflecting an improvement in second-half profitability. Group service revenue grew 17.2% YoY, or 7.2% excluding Vodafone Egypt, supported by data and financial services revenue growth. Financial services revenue increased 29.2% to R9.9 billion, contributing 10.5% to group service revenue.

Nexttel Cameroon seeks new investor

Nexttel Cameroon is searching for new 'strategic partners' after its international investor Viettel exited the business.

The MNO was launched in 2014 as a joint venture between Viettel Global Investment Joint Stock Company and Bestcam, a local shareholder. The partnership collapsed after shareholders disagreed over the running of the business. Bestcam also reportedly accused Viettel of employing Vietnam nationals ahead of Cameroonians. The impasse severely impacted Nexttel Cameroon, as new investments in infrastructure were stalled, affecting the rollout of key projects such as Nexttel's mobile money solution Possa.

Nexttel is now looking for new partners and will soon be dispatching teams abroad to search for potential investors. The company said that it is keen on repositioning itself, and with new partners, intends to expedite network buildout to compete with peers MTN, Orange and Camtel.

Nigeria and Gambia sign MoU on digital economy

Nigeria's minister of communications and digital economy Isa Ali Pantami, and his Gambian counterpart Ousman Bah, have signed a memorandum of understanding to strengthen their cooperation in the field of digital economy.

Collaboration will include broadband development, spectrum management, research, capacity building, cybersecurity, internet governance, infrastructure, legal frameworks, and e-government.

The signing of this MoU comes about seven months after the Gambian government sought the support and collaboration of the Nigeria Communications Commission (NCC) to accelerate the development of the telecommunications sector. Bah then said that Nigeria had achieved the objectives of digitising its economy in view of the statistics of the sector.

Talking satellite

Martin Jarrold, vice president international programme development, GVF

An African journey: sustainable decision-making with space

In my previous column looking at the space ambitions of the nations of Africa I noted that even though most Africa-owned satellites – used for applications across meteorology, natural resource management, navigation, surveillance, as well as telecommunications – are currently being designed and built beyond the continent, there has been incremental change underway for a while.

Change began with Ghana, and the indigenous development of GhanaSat-1 by three students at All Nations University, Ghana. Designed and built over a two-year period – in conjunction with the Kyushu Institute of Technology Birds-1 programme and subsequently assessed and found fit for orbiting by both Japan Aerospace Exploration Agency and the National Aeronautics and Space Administration – GhanaSat-1's mission was to take images to monitor environmental activities along Ghana's coastline, collect atmospheric data, measure space radiation, and transmit uploaded audio. Launched from the International Space Station in July 2017, the satellite had a programmed life of two months. It was deorbited in May 2019.

This was an early demonstration that across Africa the (new) 'space race' is not being experienced only at second hand but is achieving its own traction. This is not because space assets are primarily symbols – exercises in national vanity and cross-border rivalry – but because of widespread realisation that economic and social development can be tangibly accelerated by a range of applications coming under the umbrella of telecommunications, and tangibly facilitated by the processing and transformation of Earth observation-derived remotely sensed data streams into knowledge 'dashboards' providing 'actionable intelligence.'

Of course, GhanaSat-1 was (primarily) an example of a remote sensing, or Earth observation, satellite, not a telecommunications satellite. As I noted last time, of the currently 15 African nations with a total of about 40 satellites in orbit, only eight are for telecoms, but 24 are for Earth observation, with the remaining eight devoted to technology demonstration.

At a global level, the boundary between satellite communications and satellite remote sensing is becoming increasingly blurred, and with the application of AI and machine learning (ML) techniques the gathering of data and its dissemination as actionable intelligence – concerning natural resources, water and food security, population demographics, health, etc. – is central to economic and social development, and it points to the fact that having, or not having access to the data resources from which to develop actionable intelligence is another facet of the digital divide.

In September 2020, as part of the webinar series produced as a response to the travel and meetings restrictions necessiated by the COVID-19 pandemic, GVF held an event entitled Global Transitions: Digital Economy, Digital Infrastructure, Connected Communities, Digital Planet, which include a contribution from David Jensen, Coordinator of the Digital Transformation Task Force of the United Nations Environment Programme.

The webinar provided significant insights and perspectives into the progressive emergence of an advanced digital infrastructure, the fuel for which is – data.

Data – gathered via all available technologies (particularly, though not only, by satellite, which of course has the characteristic of global ubiquity), and then manipulated by all available tools – can (when refined beyond its raw state into information, and knowledge, and beyond to dashboard supported sustainable decision-making) support many processes. These include maintaining financial liquidity in markets, improving creativity in maintaining and evolving supply chains, making production of 'things' more efficient using latest technologies, and contributing to mitigation of the impact of climate change, environmental degradation and flora and fauna ecosystem collapse – most vitally important for nations that are showing the signs of being the most affected by, for example, rising sea levels, drought, flooding, wildfires, etc.

The global transition to a 'digital planet' extends and leads to the emerging concept of a 'global digital ecosystem,' the enabling platform for more than only formulating 'actionable intelligence,' but the fostering of a culture of strategic and sustainable decision-making. Achieving greater digitised connectivity will enable gathering of data for the World Economic Forum Stakeholder Capitalism Metrics which are designed to show how companies are doing on climate change action, biodiversity, etc., and track contributions towards the United Nations Sustainable Development Goals (SDGs). Meeting the SDGs, and trying to stem climate change, will be the indispensable currency of the future 'Digital Planet.'

The African Telecommunications Union (ATU) – comprising 51 member states and 56 associate members, together with other stakeholders – is a specialised agency of the African Union responsible for promoting the development of telecommunications and ICT in Africa. The ATU mission is to provide the necessary platform for cooperation and collaboration – developing policies, regulations and standards – among African countries in the development and use of telecommunications and ICTs, and in this it recognises that achieving digital transformation is crucial for Africa's development, that there is a need for Africa to enhance its investment in cutting-edge ICT infrastructure, and that investment to support human capacity-building and elevate the level of digital skill levels among the population is equally imperative.

Satellite is among several technologies for accelerating digital transformation in Africa. These technologies include 5G, cloud computing, AI and the Internet of Things (IoT). These technologies have the potential to transform industries, improve service delivery and enhance the quality of life for the people of Africa. By enabling faster data transfer rates and reduced latency, 5G networks – particularly supported by satellite – can help facilitate the growth of other emerging technologies. Cloud computing can help organisations in Africa manage data and applications more efficiently. AI can help organisations across Africa improve their efficiency, productivity and decision-making capabilities because, with the use of machine learning algorithms, AI can analyse vast quantities of data and identify patterns that can lead to improved business processes and new revenue streams. IoT enables automation of many processes and services across a variety of sectors.

Into the future: Premium connectivity takes centre stage

Networks have been providing customers and consumers with multiple variations of connectivity for decades. The 3G and 4G revolutions shaping the market alongside LTE and fibre and now, 5G capabilities. The latter is easily defined as a step up from standard connectivity to premium - a network revolution that redefines what connectivity can do, how it can do it, and where it can take the business. However, premium connectivity goes beyond just the technology - it shifts the telecom company opportunity and the potential for revenue generation by up to 20%.

Premium connectivity is a technology evolution, but it is also an enabler of how other technologies and systems will evolve themselves. It forms the foundation for the realistic application of the Internet of Things (IoT), Wi-Fi 6, mobile applications and ecosystems, virtual reality (VR), augmented reality (AR), and edge to cloud compute. Today it is the most advanced connectivity solution available, and it is one that pulls the hype and potential of connectivity together to deliver truly enhanced ecosystems, solutions, and digital transformation.

Another area where premium connectivity is critical is, of course, data. This, the so-called lifeblood of the business and new black gold of the enterprise, needs connectivity to really work as promised. Connectivity is the only way that the enterprise and the network can leverage the level of information needed to make clear-cut, real-time decisions that truly are a competitive differentiator. Without it – the data simply sits, and takes up space.

With connectivity that taps into the extraordinary potential of 5G, services are transformed. Here, connectivity enhances communications, information sharing, service delivery and collaboration. This digital-hybrid-remote world demands that this connectivity be premium and capable to ensure the business remains productive and disruptive.

Perhaps the best way to explain it would be as the plumbing. It's not the most exciting part of a building, and it's definitely not the most gripping to talk about, but without it there's no water, hygiene and wellbeing. You can have all the water in the world, but without the plumbing you cannot get it to where it needs to be. Plumbing is essential to the smooth running of any establishment, and connectivity is critical to the smooth operations of any enterprise.

The real business value of premium connectivity can be seen in the private and public sectors. Connectivity is often the same when it hits the last mile to the business. The offerings are the same, the service is the same, and this is about to change. Premium implies more than just the technology and capability behind the connectivity, but the service provided to the enterprises that use it and how it empowers them to truly leverage their applications and their own customer services. Many customer applications need multi-point access across mobile devices, laptops, computers, televisions and multiple interconnections and premium connectivity allows for the enterprise and service provider to bring all the pieces together.

If you think of networks and data exchanges as a tree with billions of branches, each one a slice of connectivity connecting companies, services, applications, devices, people, and touchpoints, it is easy to see how there is no single point of connectivity. There is, however, a need to pull all these points together to ensure that the service is sustainable, reliable and secure. That it works when it needs to across different environments and sectors.

Implementing this connectivity asks that network operators take both a long- and short-term view. Historically, networks have been built from the bottom-up from across access to network to aggregation to edge to the core. Now more networks are

"For operators to thrive in this competitive landscape, they need to ensure their networks are sustainable and deliver value."

taking a top-down approach to meet the needs of cloud service providers. Replicas of the models introduced by these companies are appearing all over Africa, the world and that means that operators need to understand how their services align with expectations and what it means to premium in each situation.

Essentially, every operator needs to have the most agile network possible to support a multitude of requirements and this requires investment into infrastructure. It isn't possible to have an infrastructure for every type of service - that is not sustainable, but you need to have an agile and secure network that can carry multi-service demands. For operators to thrive in this competitive landscape, they need to ensure their networks are sustainable and deliver value.

Tapping into the potential of premium connectivity allows for the networks to differentiate their offerings and create an infrastructure that can evolve with markets and demands. ∎
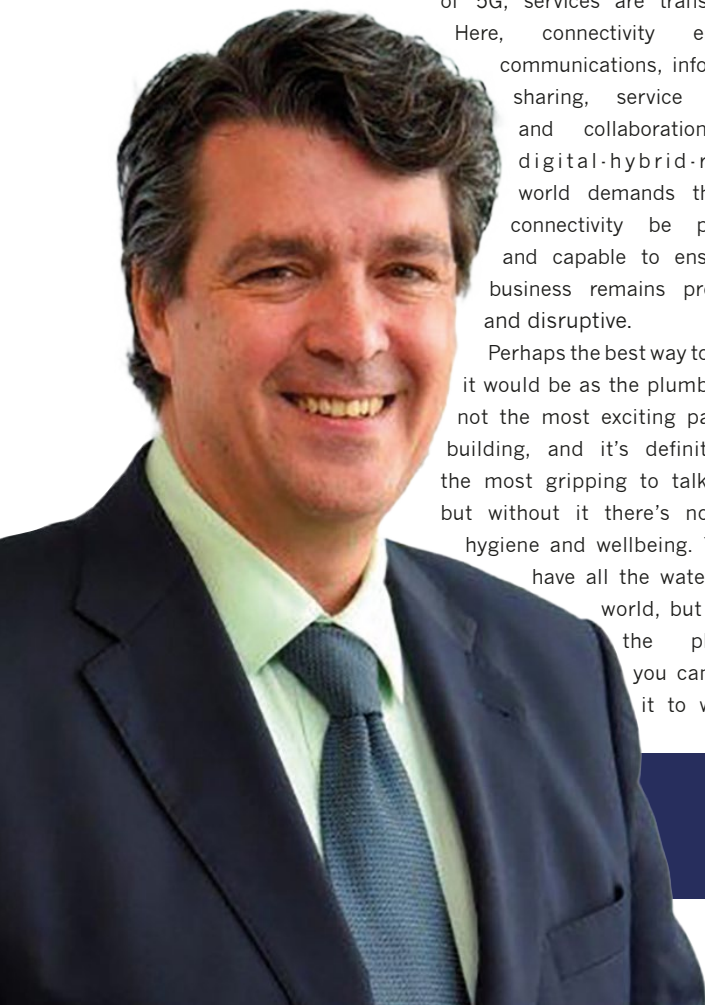
Roque Lozano, Senior Vice President Network Infrastructure, Middle East & Africa, Nokia talks premium connectivity and its impact on the network

Click here to register

Safeguarding your business and customers from digital threats and the rise of SIM swap fraud

Mirza Bukva, head of telecom partnerships: Africa, Infobip

The last few years have seen a sharp rise in SIM swap fraud, placing the mobile and digital sectors at risk of disrepute. This can have great implications for all participants in the value chain, including mobile users, mobile operators, digital services, and financial services providers.

This type of fraud involves an account takeover scam that exploits a mobile operator's ability to port a phone number to another SIM card. While this is typically a convenient feature in legitimate cases where a user has lost their mobile device and wants to keep their mobile number, it can also be abused.

SIM swap fraud: how it happens and how to protect yourself

SIM swap fraud takes place when cyber criminals contact mobile network operators (MNOs) pretending to be a customer, deceiving them into activating a new SIM card with the customer's phone number. Once this is done, the scammer gains full access to the end-user's phone and information, and subsequently, every one-time-pin (OTP) message sent to that specific number is then received by the fraudster. By finding loopholes in a completely legitimate process, cybercriminals can now gain access to all a user's personal accounts and applications that are linked to that phone number.

The South African Banking Risk Information Centre (SABRIC) reported that the number of SIM card fraud incidents rose from 2,686 incidents in 2020 to 4,386 reported in 2021 – an increase of 63%. The average

financial loss per incident jumped from R12,315 in 2020 to R17,775 reported in 2021 - a rise of 44%.

Some emerging trends related to SIM swap takeover in South Africa as well as many other countries include the usage of social tactics to convince victims to provide their personal information. This can include phishing emails or messages that appear to be from a legitimate source. On a larger scale, use of advanced technology and machine learning can automate the fraud process allowing fraudsters to conduct SIM swaps much faster and quickly identify vulnerable targets.

Telecom companies (as owners of the SIM and the technology behind it) should consider implementing various strategies to mitigate SIM swap fraud and protect their customers. This can be done by adding additional layers of security to good old 2-factor authentication (2FA), such as mobile identity and biometrics. However, it is important for all of us as individuals to be vigilant and remember to keep our personal information private, be cautious of unsolicited calls and messages, and to regularly monitor our financial accounts for any suspicious activity.

Implications of SIM swap fraud on telcos

The aim of digital fraud is to target an individual's identity to extract financial gain. While this in itself is a significant threat, there is also the risk of identity theft, which can lead to greater cases of fraud whereby imposters pose as the victim, potentially wreaking havoc in their life.

The stakes for telcos are perhaps even higher, as SIM

swap fraud negatively impacts the trust between mobile users and their mobile provider due to the substantial volume of data in their possession. This is even more important in cases of post-paid users, or jurisdictions with mandatory prepaid SIM card registration.

Losing the trust of customers is bad for business, however, adding a readily available anti-fraud solution is the easiest and most direct way

> "The South African Banking Risk Information Centre (SABRIC) reported that the number of SIM card fraud incidents rose from 2,686 incidents in 2020 to 4,386 reported in 2021 – an increase of 63%."

of preventing loss of trust and reputational or legal damages to enterprises, and this rings true for telco operators too. A business that holds individuals' data, or handles their financials, has a vested interest in preventing any damages, and that means implementing all the feasible means of protecting their customers. As a result, mobile operators need to implement reliable and efficient anti-fraud tools. An example of such a tool is mobile identity – an authentication system that allows MNOs to perform a real-time check on the new SIM card and determine when it was activated. If a financial transaction was attempted within 24 or 48 hours from the time of activation, it is then flagged to the bank and can be blocked.

How MNOs can strengthen SIM swap fraud prevention

Working with trusted technology vendors can result in a stronger defence against fraud committed through SIM swaps and add to the

operators' anti-fraud offering as part of their wider digital services and digital transformation-focused enterprise portfolio.

Mobile identity solutions are very effective, with sign-up processes that are quicker, cheaper, and ultimately much more secure. It's a huge opportunity for the telecoms industry, particularly those that are working with financial service providers or providing financial services themselves,

demonstrating that they are listening to consumer concerns and introducing anti-fraud measures to help alleviate these fears.

Protecting your customers and your business from the impacts of digital fraud, including SIM swap fraud, should be a high priority for all businesses. Constant and consistent efforts to educate employees and clients should also be implemented along with strong security measures such as 2FA.

Furthermore, working with MNOs better positions businesses to greatly reduce the risk of falling victim to digital fraud. By taking these steps, businesses can ensure that they are secure and trusted, while providing peace of mind to their customers. ■

The next steps in bringing broadband to Africa

Broadband utilisation rates are on the rise across Africa, affording a significant positive impact on standards of living and nationwide economies. But how can rollouts be accelerated, and are MNOs doing enough? Amy Saunders asked the experts

Approximately 43% of Africa's current population of around 1.4 billion people have access to the internet. While sub-Saharan Africa has shown the highest growth rate in internet penetration over the past couple of years, greater investment must be made in connecting the unconnected.

"Broadband is expanding very fast in Africa, thanks to the deployment of multiple technology networks in almost all countries," says Jocelyn Karakula, CTIO, Orange Middle East & Africa. "In Africa, the expansion of broadband typically goes together with that of mobile technology. The massive deployment of 4G over the past few years has enabled a real boost for broadband services. 5G will reinforce this capability to offer very high-speed services, specifically in dense areas."

However, "while increasing internet access and related infrastructure can have a profound impact across the continent, Africa still remains far behind the rest of the world in terms of fibre network and broadband connectivity, spectrum, and data centre processing resources," says Angélo Gama, CEO of Angola Cables.

Indeed, there are several factors limiting wider availability of broadband in Africa today, identified by Gama and Karakula:

Lack of infrastructure: Many parts of the continent lack the necessary physical infrastructure, such as fibre optic cables and cell towers.

Limited investment: Limited investments are being made in broadband infrastructure - especially 'last mile' network connectivity. While there have been considerable investments by hyperscalers and others into increasing international bandwidth through new cables, too few investments are being made into localised networks.

Rising costs: Broadband infrastructure development and deployment can be expensive, especially in remote or rural areas. The costs are often carried over to the consumer. In Africa, some of the prices for internet connectivity make it unaffordable for many people or businesses, especially in areas with low population density.

Poor power supply: Loadshedding has reached alarming proportions which is having a negative effect on business and on consumers. The long periods of loadshedding are also impacting the ability of MNOs to keep their cell towers operational and the networks connected.

"Electricity, especially in South Africa; or rather, the lack thereof, is stopping wireless rollouts in its tracks," states Danny Ben-Simhon, regional sales director, ME & Africa, Siklu. "It becomes difficult to utilise street light furniture or any other site acquisition, and make sure you've got power available always, especially during loadshedding – sometimes up to a total of 10-12 hours a day. On top of this, theft of the batteries, amongst other things, is hindering this further."

Regulatory barriers: Some African countries have regulatory barriers that make it difficult for private companies to invest in broadband infrastructure. This can include strict licensing requirements or restrictions on foreign ownership.

Spectrum allocation and costs: Gaining access to sufficient radio spectrum, in the appropriate bands, and at the right cost, is proving challenging. In many countries, access to affordable spectrum remains a problem, bringing complexity in addressing both users and usage growth, especially in dense areas.

Device costs: The cost of devices is still too high on the continent, leading, in most countries, to a penetration

of 4G smartphones below 50%. Similarly, the affordability of 5G devices for fixed and mobile users represents a challenge.

"Africa is enormous and therefore the prime factor limiting broadband is the cost of backhaul being a function of distance from the core network PoPs," adds Justin Farnell, business development manager, FibrePoynt. "There is a significant national backhaul limitation, especially outside of the metros. Agility in the regulatory environment will play a huge role in removing barriers to entry for new innovative entrants to offer competition in a market where only few companies are offering backhaul services."

Balancing the books

Ensuring continent-wide broadband availability is no mean feat, especially given the low spending power typical of some of the more remote and rural populations.

Orange Middle East & Africa has made digital and financial inclusion a key priority - "for rural areas, this means adapting our models and our network configurations to the specificities of each country, partner with players who are very familiar with local ecosystems, and benefit from the latest progress in technology (low-power equipment, pure solar power generation, etc.)," explains Karakula. "On top of this, internet and broadband adoption will be facilitated with an adapted support to local populations, to help them benefit from these new services, adapted to their expectations."

FibrePoynt, meanwhile, is exploring the use of pre-existing networks to reach a wider audience throughout the rural African regions. "One key (fixed wireless) strategy is to unlock the latent capacity of many of the government owned networks across Africa," outlines Farnell. Tanzania has spent hundreds of millions of dollars rolling out a national fibre network that is chronically underutilised, due to the lack of a cost-effective last mile solution. "FibrePoynt see a major opportunity here in rural areas where the residential household density is high. Likewise in South Africa, Sentech is looking to leverage the national network of Broadband Infraco and bring affordable connectivity to the rural areas of the country."

Indeed, there are several strategies which are expected to help increase connectivity in less profitable regions of Africa. Service providers can partner with governments or NGOs to secure funding and support for broadband infrastructure development in remote and rural regions, while PPPs can help service providers to share the cost and risk of deploying infrastructure in areas with low population density.

"Another approach is to work with local communities to establish community networks," says Gama. "This involves setting up small-scale infrastructure, such as wireless hotspots or mesh networks, that can provide connectivity to the local community. These networks can be more cost-effective and sustainable than traditional network infrastructure, and they can be managed and maintained by residents."

Service providers can also explore innovative business models to make broadband more affordable and accessible to users in remote and rural areas. This can include pay-as-you-go models, or shared infrastructure models, where multiple service providers

share the same network infrastructure, explains Gama.

Moreover, as well as utilising standard mobile spectrum, "there are a number of specialised wireless providers that are commercialising TV white space spectrum, to deliver high speed connectivity into remote areas," adds Farnell.

"A combination of technologies, and a combined effort, especially with efforts and involvement from local and overseas governments in terms of investment are required to make a real change," concludes Ben-Simhon.

Fibre vs satellite

Both fibre and satellite technology have a role to play in delivering broadband to the African continent, although each technology has its own advantages and limitations.

"In Africa, we can expect to see both fibre and satellite technology being used to improve internet penetration across the continent," says Gama. "Fibre will be the preferred option for densely populated areas, while satellite technology will provide connectivity to remote or hard-to-reach areas."

There are two purposes to fibre, asserts Karakula: backhauling of mobile sites, which becomes a 'must-have' in dense areas, covered with 4G and soon 5G technologies; and fibre-to-the home/office, which provides the very high broadband (VHBB) experience (large bandwidth, low latency) for customers and enterprises.

Fibre will play a big role in metro areas, "even in rural areas, if you can get the community to buy into the concept, and involve them as well," asserts Ben-Simhon. "Otherwise, the cables and other infrastructure will just be vandalised and/or stolen, whilst thieves are looking for copper. You need the community to protect the infrastructure, by making them part of the roll-out, as salespeople, local community reps, and skills transfer."

Farnell agrees that fibre is having a massive impact on delivering broadband in Africa's cities and towns. "Trenching over long distances is uneconomic, but the introduction of aerial fibre in urban areas has significantly cut deployment costs," he explains. "Wireless solution providers are now taking the fixed fibre capacity from a shopping centre on main street, and connecting lower income surrounding neighbourhoods, with high gain directional WiFi antennas to provide coverage in the last mile. Uncapped home router offerings of R200 per month are now possible, addressing a significant segment of the residential market that would otherwise not be feasible to cover with fibre."

Satellite has had limited applications for delivering internet services in Africa to date, being up to 100 times more expensive than fibre. However, with the emerging low Earth orbit (LEO) constellations, the usage of satellite could evolve drastically.

"Depending on the cost of the technology and its operational cost, this new generation of satellites should be used to address multiple models (mobile backhauling, WiFi spots, direct to the home/office) and expand broadband coverage in Africa," says Karakula.

Ben-Simhon, meanwhile, says that LEO satellites will play a major role for smaller areas that are far away from major metros or the nearest fibre PoP, where it is not worth deploying long distance backhaul into.

Gama believes that Starlink remains 'hugely unaffordable' for most people in Africa. "Starlink has already connected several African countries, including Mozambique, Rwanda, and Mauritius, with 19 more African countries scheduled for 2023 and 2024," he says. "However, South Africa, the continent's largest internet-consuming nation, is not one of them. This is a result of South Africa's current prohibitive procurement policies which dictates that locals should have a majority shareholding in companies."

Farnell, however, says that "the Starlink service at $110 a month, whilst still out of the reach of most African consumers, should be a game changer. African WISPs are now rapidly deploying and reselling these 100Mbps links across Nigeria, Rwanda, and most recently Zambia."

The role of MNOs

Given the costs involved in fibre and satellite coverage, are MNOs key to driving broadband availability? The jury is divided…

Mobile networks will remain the main factor for broadband expansion in Africa, asserts Karakula. "5G will not only offer broadband, but also a full set of advanced services. As such, MNOs are key for driving this broadband challenge. At the same time, fibre is already a real factor of acceleration in some specific areas (such as places with high density), and satellite will complement this expansion even more."

MNOs will continue to lead the expansion of broadband across Africa given their network footprint and marketing reach, says Farnell. "Whilst fixed wireless LTE/WiFi routers are the preferred delivery method in homes and small businesses, the smartphone is, and will remain the connectivity device of choice, for most people in Africa."

Indeed, Huawei projects that central and southern Africa will see the fastest growth of smartphones in the world this decade; "MNOs are ideally positioned to bundle compelling fixed mobile broadband packages, boosted by the roll out of 5G and a plethora of fintech applications to drive digital adoption," asserts Farnell.

"MNOs are playing an increasing role as they expand their own networks, which in turn assists in providing more connectivity to more citizens," says Gama. "With this being said, MNOs will only make investments where they are guaranteed to make a return or provide a benefit to their existing networks. It is more a case of business economics and costs rather than just increasing capacity in areas that are sparsely populated in parts of Africa."

Ben-Simhon, however, believes that MNOs could stand to do more: "I think MNOs are key in the sense of pushing the latest technology, but it is not to say that they will, or will for everyone, or even will past what is a mere marketing campaign," he explains. "They are in a way, 'trying,' but more trying to look good with so-called dropped data prices and community projects. They are not really interested in the lower LSM areas, as far as I know. They are expanding, ever so slowly, and even moving into 5GHz for home internet, but it is still too costly for most households to afford."

Do you have boots on the ground in Africa? Are MNOs doing enough to bridge the digital divide and bring 5G to the masses? Get in touch today to share your experiences…

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Mind the gap – bridging the digital divide

In an increasingly connected world, those regions with connectivity gaps are missing out on significant socioeconomic benefits. Amy Saunders asks, what are the key challenges in bridging the divide?

The digital divide remains a pressing concern across the globe. The chasm between those who are connected and those who are not is staggering, with more than 2.7 billion people - many residing in developing and least developed countries (LDCs) - still offline today. As per the UN, some 60% of the African population is unconnected.

This is a problem because "digital connectivity is not just the glue holding together the economy; it's crucial to social cohesion too. And that is why commercial viability alone can no longer be the gating criterion for broadband rollout," explains Jan Liebenberg, customer chief technology officer for Southern Africa, Nokia.

Usage gap tops priorities

Most connected Africans utilise mobile ahead of all other access technologies, primarily due to ease of access, affordability, and electricity requirements. Accordingly, MNOs play a vital role in bridging the digital divide.

"South African MNOs have done a fair bit of work on this, investing in new mobile network infrastructure in underserved and rural areas," says Keoikantse Marungwana, senior research and consulting manager, telco & IoT lead, sub-Saharan Africa, International Data Corporation (IDC). "They are also offering low-cost data plans and mobile devices to make internet access more affordable for lower-income individuals and households, and introducing different bonus structures on their data plans, and zero-rating access to various online material for education, health, and other multimedia services."

It seems that solving the usage gap, rather than coverage, is the key to connecting Africa. As per GSMA, 40% of adults in sub-Saharan Africa are connected to the internet via mobile; however, a further 44% reside in areas with mobile broadband network coverage, but do not utilise that coverage – the usage gap. This gap is greatest in eastern Africa at 55%, followed by sub-Saharan Africa at 44%, southern Africa at 41%, western Africa at 41% and central Africa at 33%.

"Mobile data is like bottled water," states Mark Goosen, sales director sub-Saharan Africa, Cambium Networks. "Great to have wherever you go but expensive if your only option at home is to use it for cooking, bathing, and irrigating your garden. A significant source of digital divide gaps is where mobile service is available but not affordable due to the high cost of the data plans, with no other low-cost options. The cost of prepaid mobile data is around 30 times more than fixed broadband. The result is only 10% of the homes in South Africa have WiFi which also lines up with the wealthiest 10%."

"A range of issues determine whether you can access, understand, and use the available services," confirms Liebenberg, referencing the 'seven fault lines of the digital divide. "These include, but are not limited to, level of income, literacy, gender, ethnicity, age, and physical abilities. It's worth noting that groups experiencing these issues often face multiple barriers, more than one divide; for example, indigenous communities are more likely to live in remote areas and have lower than average incomes."

Jordan Cox, GSA research executive, agrees: "barriers still exist and will need to be overcome. Some of these challenges include the high investment in infrastructure to bridge the divide combined with

the low ARPU making it not commercially viable, low current coverage, lack of education and skills in the remote areas to implement new technologies," he says. "Even if new technologies such as satellite and FWA are deployed, many people lack the digital skills to make the most of these networks, resulting in a lack of ROI to providers or a reduction of positive benefits for the end-consumer as just some of the potential outcomes."

MNOs remain key in addressing the usage gap: "MNOs are partnering with non-profit organizations, government agencies and other ICT stakeholders and ecosystem players to improve digital literacy and skills training to help people in under-served communities access digital services," explains Marungwana. "Each of the operators have programmes and initiatives across the country on digital skills development."

We have the technology

A range of technologies are being implemented to increase connectivity since "there is almost no fixed telephony network, so today most Africans in cities are using FWA, or cellular, although fibre-to-the-home is developing very quickly. For rural areas with no access to 3G, TV White Space frequencies could be cost effective versus the connection's low density," says Paul-Francois Cattier, managing director, Africa Data Centres Association. "The real question would be the cost for the user and the business model for the operators to cover rural communities."

FWA, particularly the unlicensed version, can provide cost-effective high-speed internet as an alternative to fibre in suburban or rural areas, shares Marungwana, and can also be used to provide last-mile connectivity to households and businesses in areas where fibre is not yet available.

Goosen asserts that there is no real connectivity gap: "with all the various technologies available today you can get internet access nearly everywhere in Africa. It is really an affordability gap. Fibre, fixed wireless, and WiFi are all helping drive the price down of uncapped data access. WiFi only phones cost less than 10% of mobile enabled devices due to vast economies of scale."

Liebenberg agrees: "sufficient technologies exist to address the digital divide; however the key is in how to combine the different technologies to allow a viable business case and deliver a sustainable solution. Technologies for consideration include mobile radio and fixed-wireless access technologies (5G, 4G, WiFi), satellite broadband, high altitude platforms (HAPS) and low Earth orbit satellites (LEOs) or Non-Terrestrial Networks (NTN). New HAPS and NTN developments are bringing new concepts and business models in bridging the digital divide. The HAPS and NTN allow infrastructure reuse by default, as these assets move around the globe, they are re-assigned to provide access to the country in view, therefore bringing economy of scale."

Meanwhile, Marungwana is a strong proponent of satellite for connecting remote and rural regions: "LEO satellites will be gaining momentum soon in South Africa and will also provide a much higher speed [up to 100Mbps] and affordable [less than R1,000 per month] satellite connectivity alternative

in remote and hard-to-reach areas compared to the traditional satellite internet currently available."

"The affordability gap can be closed, and the total addressable market can be expanded by deploying a range of technology to provide internet service," says Goosen. "With the deployment of low-cost technology on their existing tower infrastructure, operators would be able to profitably serve extremely price sensitive customers, thus growing their market. The result would be a sustainable business today that leads to more internet connectivity, more education, more small business, and a more robust economy tomorrow."

Looking ahead, Cox asserts that "FWA will emerge as a strong player within the African market. According to CCS Insight data, only 1 million consumers are currently subscribed to 5G FWA services across Africa and the Middle East - this is predicted to rise to 6 million by 2026, as more rural areas gain access to the service."

It starts at the top

Mobile technologies and services contributed 8% of GDP, US$140 billion, across sub-Saharan Africa in 2021. This is expected to grow to US$155 billion by 2025, says the GSMA.

"Since 2010 sub-Saharan African countries are showing fast growing GDP performance. What has been the main driver for this? DFI investment? Governments' new economy policy? No - it has been private investment by MNOs to establish mobile networks in Africa that had almost no fixed telephony network and offer a first step to solve the digital divide," says Cattier.

"Some countries are creating rules on pricing and encouraging sharing of infrastructure. A Nokia Bell Labs study shows that a cost benefit of 20-25% can be obtained when towers, backhaul and other ancillary items are shared," says Liebenberg.

"The continued auctioning of spectrum will allow more MNOs to set up multiple networks across Africa. Four spectrum auctions took place across the continent in 2022 in Nigeria, Tanzania, Zambia and South Africa, with Auctions in Namibia and Zambia already planned for 2023 and beyond, according to GSA data. This is the first step into allowing new networks," said Cox. "Alongside this, an increase or continued investment into connectivity infrastructure will both encourage MNOs into the market and give them the vital investment needed to successfully set up networks."

"A new mindset will be required," opines Goosen. "Licensed spectrum which is used to deliver mobile service is a valuable service but is not affordable for most people. Unlicensed spectrum is already being used in Africa to deliver reliable WiFi service at a tiny fraction of the cost of mobile. Regulators can quickly increase available unlicensed, low-cost spectrum by allocating all of 6GHz to WiFi as the USA and Brazil have done. In addition, making 60GHz PtMP available across Africa will allow local fibre and small fixed wireless operators to quickly and economically expand their networks."

Governments should also reduce private-investment risks to attract more capital in digital

infrastructure investments that serve a public need, says Liebenberg, "and where conditions are not commercially viable, they can provide growth capital on those projects to attract private investors."

A connected future

The GSMA reports that this year, mobile connections in sub-Saharan Africa are forecast to reach 1 billion, and by 2025, mobile subscriber penetration should reach 50%. MNOs are expected to continue to invest heavily in sub-Saharan Africa for the foreseeable, with more than US$30 billion network capex over 2022-2025.

Cox expects the current rate of spectrum auctions to continue or even increase, encouraging more MNOs into African markets, "however the current economic uncertainty does not help with investment as well as equipment shortages, alongside the strong geopolitical factors that are currently taking place globally, which itself may cause the slowing of decisions or restriction of investment."

The continued development of rural areas is a key priority. "The digital divide between Africa and the rest of the world will be history in five years," asserts Cattier, "but the digital divide within Africa will remain until the governments understand the need to develop rural economies."

Marungwana reports that South Africa's efforts to expand broadband infrastructure, particularly in rural areas, will continue and accelerate: "I expect us to have at least 90% 4G population coverage, and significant fibre broadband availability in rural areas at affordable rates. Fibre pricing as low as R500 per month for 50Mbps has been available for a couple of years in some villages like in the Northwest and Limpopo, and it is growing."

"Most African countries have difficulties bringing infrastructure to rural areas, mainly due to the cost to power the infrastructure when there is no access to electricity," says Cattier. Linking the digital divide and the electricity access divide would help, but it is not the path most governments are following, he says. Developing rural areas economically is necessary to enable entire countries to develop, rather than just the main cities: "to do this you need to develop electricity access, grid expansion, mini grids etc…"

However, Africa's fixed wireless operators are incredibly innovative and dedicated to sustainably delivering low-cost WiFi to homes and small businesses across the continent, says Goosen. "Multiple pay as you go fibre/WiFi deployments are operating across lower income urban Africa. PayGoZo is a prime example of this type of deployment. Ikeja is another operator that profitably delivers pay-as-you-go service in areas where no one else wants to operate. If regulators free up more spectrum, such as allocation of 6GHz to WiFi, this will offer welcome relief to the congested 5GHz fixed wireless. Any network operator could take advantage of the new spectrum to profitably deliver low-cost broadband and WiFi to millions more people across the continent."

The future for connectivity in Africa looks bright, even amongst rural areas, however, progress may be gradual. Ultimately, we might envisage within our lifetimes a future where every African has access to connectivity, even in the most remote regions. ∎
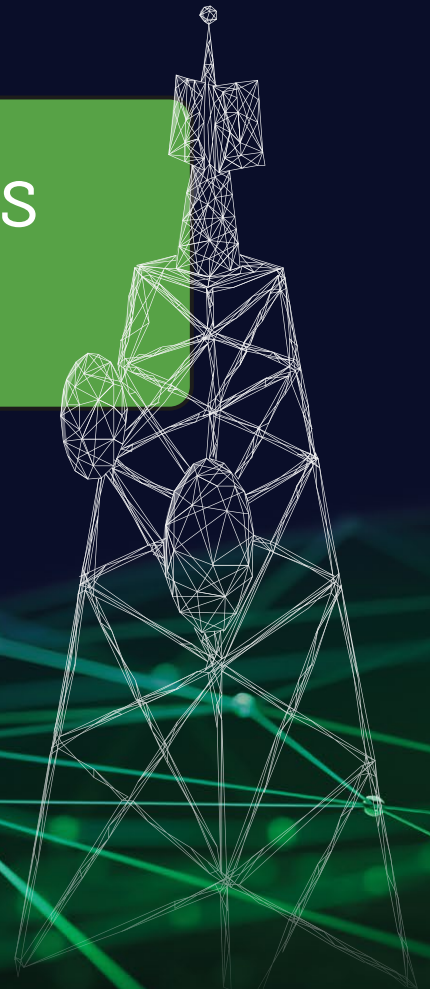
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Challenges of maintaining remote VSAT systems

Nimrod Kapon, founder and CEO, Oasis Networks

We live in a world where connectivity is an essential part of our everyday existence. Very small aperture terminals (VSAT) play a key role in connecting people and organizations and are vital in remote or rural areas where terrestrial communications infrastructure is scarce or non-existent. One of the benefits of VSAT is that it is independent to local networks so is not affected by blackouts or other shutdowns. The lack of any other kind of reliable communications networks can mean that VSAT systems are literally a lifeline for those people relying on them. It is therefore critical that VSAT sites are well-maintained and functioning properly.

However, installing, maintaining, and trouble-shooting these sites can prove extremely challenging, precisely because of their location in remote and often hard-to-reach areas. Difficulties arise because of a variety of factors such as limited infrastructure and access to resources, technical issues, cultural and local considerations, limited communication networks, and weather-related issues. These challenges can have a significant impact on a VSAT operator's ability to maintain a reliable and well performing network. What can operators do to overcome these difficulties so that vital connectivity is maintained, and any downtime minimised?

Limited infrastructure and access to resources

One of the main challenges of maintaining VSAT sites is the physical location of the terminal. With VSAT systems installed in isolated or difficult to access locations, it can be difficult for engineers and technicians to access the site to perform necessary maintenance tasks and carry out repairs. Equally, it can also be problematic to transport supplies and resources to the site when a problem is identified. This is especially complex in areas with poor transportation infrastructure.

It's not unusual to have to transport equipment by motorbike, all-terrain vehicle, or to trek through waterways and even swamps to reach extremely remote sites. This was certainly the case with

one project that we completed in the Democratic Republic of Congo. To get to the site involved crossing the border from Bangui, Central African Republic, then travelling some distance by pickup before carrying equipment by hand over a bridge. We then had to make the last part of the journey to the site by canoe through a waterway. As extreme as this sounds, this sort of journey is fairly typical. This sort of thing obviously results in delays in getting technicians and equipment to the site to carry out installations, testing, and to make repairs.

Technical challenges

VSAT sites can also be impacted by a variety of technical issues, in part because the equipment can be complex and requires specialised knowledge and expertise. Issues encountered can include antenna misalignment or failure of the modem or other components. These issues tend to be difficult to diagnose and repair remotely, so technicians need to be on-site to troubleshoot and fix the problem. If the equipment fails, it can be difficult to identify the issue.

Technicians need the necessary skills and experience to perform maintenance, testing and repairs. Otherwise, the result is longer downtimes and a reduced level of service for the users of the VSAT network.

Cultural and local considerations

There are obviously huge cultural differences between one region or country, and another. Recognising and appreciating these differences is an important aspect of effectively maintaining VSAT sites. Regulations can differ from region to region, and although less formal, codes of conduct and communication can also differ significantly, and are equally important. Engineers need to adapt how they work, depending on local needs. Local people have inside knowledge and know the best channels to get things done.

When we were working on a project installing a

repeater in South Angola, we used a map to identify a mountain location that looked to be a good place for the installation. That mountain also happened to be a holy place for the Mocabashi community, so we had to seek their approval before progressing with the installation. We also had to rely on the Mocabashi community to help us hike up to the summit of the mountain so that we could test coverage. What's more, to ascend the mountain, we had to work with the Mocabashi people and use machetes to cut our way through the spined trees.

Working with local people is what makes things happen quickly. This is true whether the site is remote, or easier to access such as when situated in a bustling city, as some VSAT sites are. Having strong local connections makes it easier to locate necessary resources such as materials, tools, workers and even specialists like welders. Failure to go through the right local channels can at best, create significant barriers and delays, and at worst, cause animosity and tension, which can prevent a project from being completed.

Limited communication

It's common for there to be limited or unreliable communication at the remote VSAT sites, as well as when on route to the sites. This can make it difficult to get updates to or from the main office. There have been times when engineers have had to travel across difficult terrain by four-wheel drive vehicles or motorbikes and lines of communication have gone down for days on end because there has been no GSM signal. If vehicles break down or other crisis happens, without GSM signal, there is often no other way to communicate the problem back to base, so engineers are reliant on local people to help them resolve the issue.

Weather-related issues

Weather can be problematic for satellite services, with rain fade and weather attenuation both impacting on service delivery and quality. Weather-

related issues don't stop there. For VSAT sites in areas with extreme temperatures or severe weather conditions such as high winds, lightening, and heavy rain, there are additional challenges to overcome. VSAT systems are often installed in areas where they are exposed to the elements, such as on rooftops or in open areas. This can make them vulnerable to damage from wind, rain, and other extreme weather. These conditions can not only damage the terminal and associated equipment causing disruption to service, but in the event of weather-related damage, can also make it more difficult for engineers to reach the site to carry out tests and repairs.

Many regions have a wet season and during that time, travelling can be very complicated. Roads that are drivable by vehicle for much of the year can quickly turn impassable after a deluge of rain. These kinds of issues need to be taken into consideration when planning deployment because what might look like a reasonable straight deployment when planning on paper, can become significantly more complicated when weather is factored in. In Angola, we helped a customer to plan its deployment better, to consider local knowledge about how the rainy season would advance. It made sense to start in the north and then rush to the south, in a race against the rain, before roads turned impassable.

Boots on the ground

To overcome many of the challenges associated with accessing and maintaining the equipment at these hard-to-reach sites, service providers often rely on a network of local technicians who are familiar with the local environment and can access the site more easily. Having boots on the ground in this way rather than relying on engineers travelling from another part of the world really makes a huge difference. Not only are you saving on travel time and costs, but you are also able to take advantage of local knowledge which gets things done quicker and more smoothly.

Local teams can be trained to perform all aspects of installation and maintenance tasks, such as cleaning the antenna, checking and replacing cables, and troubleshooting and repairing issues with the terminal. Using local teams in this way doesn't mean that quality is compromised. Providing local engineers are fully supported, trained well and an effective QA system is in place that facilitates continuous improvement, high standards can be maintained across all locations and regions. Using local teams also has a positive impact on their communities because by empowering them to improve community wide access to information and communication technologies, they are also helping to close the so-called digital gap.

VSATs play a vital role in connecting people and are an essential part of our modern communication infrastructure. By making use of local teams, and engaging closely with local people, VSAT operators can keep networks connected and ensure maintenance and troubleshooting of those hard-to-reach areas is done efficiently. ■

Remote learning and smart teaching delivered for Anton Lembede MST Academy

The Anton Lembede Mathematics, Sciences & Technology (MST) Academy is a public education institute located in KwaZulu-Natal (KZN) province in South Africa. The province covers an area of around 92,100 km² with a population of 11 million. In terms of education, KZN is home to over 6000 primary and secondary schools and 38 teacher development centres. However, many schools lack digital devices and rely on traditional teaching methods.

Conventional teaching methods have become insufficient in recent years. Traditional classrooms are not equipped with modern, digital technology, which prevents teachers from displaying multimedia teaching materials. It is difficult to quantify and analyse the effect of classroom activities, as there is no real-time evaluation or feedback on student interaction, or performance analysis of teachers and students for the school management personnel. The shift to online teaching was fast-tracked following the global pandemic, and schools around the world were in urgent need of remote teaching facilities.

Realising full-process digital education

To bring the Anton Lembede MST Academy into the forefront of digital education, the school adopted the HUAWEI IdeaHub. With it, Anton Lembede MST Academy gained smart teaching capabilities, and opened up options for remote learning.

HUAWEI IdeaHub provides an intelligent digital education solution that integrates whiteboard, screen projection, and remote collaboration. For Anton Lembede MST Academy, the most impressive feature of IdeaHub is the 35ms ultra-low writing latency for smooth writing, which allows classrooms to retain writing habits. The digitized teaching materials mean teachers can reuse materials, and students can review the materials easily after class.

The Academy adopts a hybrid teaching mode that combines online and offline teaching. With IdeaHub, teachers can use multimedia teaching materials in the classroom, and even use teaching software to conduct virtual experiments to transform normal lectures into virtual labs in seconds.

IdeaHub not only improves the in-class experience of teachers and students, but also provides a full-process teaching platform for learning before, during, and after class. Before class, IdeaHub supports omnimedia courseware editing tools to streamline teaching courseware. After class, the comprehensive data analytics of teaching activities is provided to facilitate refined teaching management.

Promoting inclusive education

Breakthroughs in technology are driving the evolution of traditional education. In recent years, smart education has gained significant attention globally, and the successful deployment of HUAWEI IdeaHub in Anton Lembede MST Academy signals the start of a digital journey in KZN province.

Feedback from school principals was overwhelmingly positive, signalling the beginning of a more inclusive way of learning in KZN.

"The pandemic made us realise the importance of remote teaching," said Xolani Maduna, a teacher at Anton Lembede MST Academy. "We wanted to make e-learning a possibility, and the IdeaHub solution makes this into a reality. What's really impressive is that we can choose between normal in-class teaching or online teaching, or a mix of the two, making it very convenient for us, as well as an excellent learning experience for the students."

"The integrated design of IdeaHub does not have high requirements on cabling and network environments, and can adapt to various environments without overhauling the classrooms," said Dumisani Sibaya, principal of Anton Lembede MST Academy. "In terms of basic education, the IdeaHub helps to easily share high-quality teaching resources and solve the problem of unbalanced resources across the region." ∎
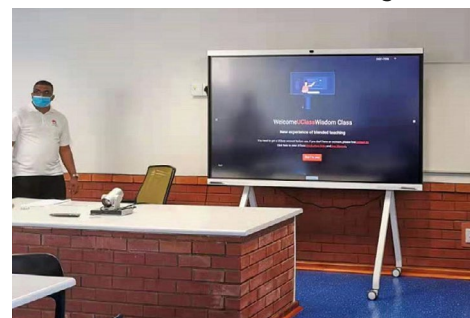
High School Oos-Moot gains future-proof connectivity

High School Oos-Moot in Pretoria, South Africa, is a secondary school catering to some 1,500 pupils and 90 staff members. In keeping with its commitment to a strong and rounded education, the school required a modern IT infrastructure, implemented by a reputable deployment partner.

A disparate systems scenario

High School Oos-Moot faced a challenge like many other educational institutions, in that it had a legacy network consisting of non-enterprise network switching and access points. The wireless local area network (WLAN) was extremely inconsistent, did not offer adequate coverage, and was unreliable at best. Moreover, three separate networks had been installed and expanded over time, creating a disparate and highly confusing scenario.

"These networks were LTE driven, with only one of the networks being connected via an outdated and very small firewall. More than this, some essential areas were not directly connected to the LAN — meaning they had no internet access and were functioning as standalone networks," said Johan Meyer, terrain and building manager at High School Oos-Moot. "Furthermore, only a selected number of on-site network office machines were connected to one of the LANs, and telephony was also not up to standard. This meant the school had to employ the services of multiple service providers for the management and upkeep of this distributed scenario."

Due to the separate networks established over time, each had its own unique challenges.

Moreover, their problems were also occurring very frequently, and local resources as well as external service providers were constantly having to fix issues.

"It became extremely frustrating for the users — to the point where staff could no longer rely on the WiFi at all for uninterrupted teaching purposes. Costs were escalating and continuous fault calls required constant attention. It was clear something had to be done to improve the situation," said Meyer.

A unified network - delivered in time for school

A wide range of products were recommended by CommScope to solve Oos-Moot's challenges.

These included installing CommScope Category 6 cabling, as well as single mode fibre-optic cabling, while cable routes were also required for all new cabling. Various port switching solutions were deployed, along with 10G stacking licenses and several different RUCKUS access points. Sinewave double conversion UPSs with surge protection were implemented for all cabinets, along with a network monitoring server, which included sensor licensing for all LAN devices. VoIP handsets were installed to make voice communication much easier and more effective; and, finally, a large CCTV system — including 4MP FHD cameras and related head-end NVRs, server, and software — were also installed.

Despite the complexity, the complete installation was undertaken in less than four weeks, meaning it was ready by the time school opened again.

"The results have been incredible: we now have consistent wired LAN performance along with logical and sensible VLAN planning and deployment. We have increased our WAN bandwidth and uptime, not to mention coverage, stability, and concurrency, as well as our cybersecurity approach on upstream WAN," said Meyer. "Furthermore, we have unified all networking devices and services onto a single network structure and added 73 IP-based full-HD CCTV cameras for physical security."

Other aspects of the project include futureproofing as well as expansion and flexibility options; a full, fibre optic-based backbone structure with increased bandwidth availability; a unified voice platform and general voice improvement; and the addition of UPS units to assist in dealing with South Africa's erratic power utility supply.

"We are also pleased to have begun the journey to the cloud and, by partnering with a single managed services provider, we have ensured long-term maintenance and upkeep via SLA," said Meyer. "I would have to say we have been particularly impressed by the coverage and consistency that the RUCKUS WiFi has delivered. Emtelle, as the implementing partner, managed to not only solve all our pain points, but also delivered the project as an OpEx-based model, which enabled us to meet our budget expectation."

South Africa schools have a strong need for modern IT infrastructure and reputable deployment partners. Schools have historically been limited by CapEx availability in implementing such projects. This has led to them often committing to inexperienced service providers — resulting in many schools ending up frustrated with the world of IT.

"We're thrilled to have helped High School Oos-Moot implement a new and streamlined, non-disruptive network infrastructure," said Gary Newbold, VP regional sales EMEA, RUCKUS Networks at CommScope. "Upgrading the existing network – which consisted of non-enterprise network switching and access points – was essential given that the current quality of connectivity was short range, intermittent and totally unsuitable for providing adequate coverage to a campus of over 1500 pupils and staff."

"This project has not only eliminated such frustrations for Oos-Moot but will assist us with marketing our school as having a truly modern IT infrastructure — something to which potential new students are definitely attracted to. The work done by Emtelle and CommScope at Oos-Moot is a demonstrable example that schools can, in fact, afford to have top-notch IT infrastructure — when a trusted and adequately certified partner is chosen to assist in this journey," concludes Meyer. ■

EXFO offers new field-testing tools for fibre link validation

EXFO has announced its new D-Series of OTDR solutions, advanced field-testing tools that deliver highly accurate measurements to characterise and validate fibre links. These tools support critical fibre deployments and network operations in FTTH and RAN mobile networks, as well as data centres.

EXFO's new OTDR series combines several advanced and unique features within a single solution to bring dramatic efficiency

gains to OTDR field tests. These advanced field-testing tools enable versatility and flexibility, critical to field technicians for fibre network construction, activation, and maintenance.

Continuous testing of critical fibre links often results in worn device connection ports over time, which can degrade the quality of test results – an issue that can only be addressed by returning the device to the manufacturer for repair. EXFO's D-Series features an optical port connector health monitoring wizard, and field-swappable optical port connectors that can be simply replaced in the field once worn. This patented innovation allows operators and contractors to benefit

from EXFO's optical performance throughout the entire life of the product without the extra cost and down time linked to returning units for changing worn connection ports. This translates into significant cost of ownership savings.

EXFO's D-Series OTDR also combines both optical link mapping and power measurement (optionally a dual-channel PON power meter) through the same optical connector port, allowing technicians to move between power checking to troubleshooting mode without having to disconnect the fiber under test to swap to a separate power meter unit. This feature again substantially improves testing efficiency.

EXFO's OTDR D-Series is part of a full ecosystem that connects to EXFO Exchange, a collaborative cloud-based software platform that unifies, automates, and optimises field-testing, reporting, workflows, troubleshooting processes and more. All test plans, data and reports can be stored, shared, and analysed collaboratively in real-time, bringing yet more field-test efficiency.

EXFO's OTDR D-Series features five models. Three are dedicated OTDR models in EXFO's MaxTester range, the 715D for last mile, the 720D for PON/access, and the 730D for PON/metro. Two further models are swappable FTB modules, the 720D for PON/access, and the 730D for PON/metro.

IIoT gains ultra-robust SPE and USB 3.2 Gen 2 connectors

Fischer Connectors has released ultra-robust Single Pair Ethernet (SPE) and USB 3.2 Gen 2 connectivity solutions to meet the specific requirements of Industrial Internet of Things (IIoT) applications in rugged environments.

With the increase in sensor density, actuators, and controllers in Industry 4.0 and IIoT operational settings, high power levels and massive amounts of data must be securely and efficiently managed through ultra-fast transmission lines with cables running over long distances. Miniature connectors and cables are needed to interconnect smaller and smaller devices and sensors in areas that are sometimes confined and hard to access. Connectivity must be ruggedised to resist shock, vibration, extreme temperatures, water, and corrosion when exposed to demanding environmental and chemical conditions, both indoors and outdoors.

To address these challenges, Fischer Connectors has developed new high-speed data and power connectivity solutions combining Single Pair Ethernet and USB 3.2 Gen 2 high-speed protocols with the rugged, high-density, and miniature features of its flagship product lines. They enable space-saving and cost-efficient integration in industrial automation and robotics, chemical

plants, food processing, automotive production lines, outdoor sensing, and unmanned systems.

The Single Pair Ethernet solutions from the Fischer Core and Fischer UltiMate™ Series allow for 1Gbps data transfer per IEEE 802.3bp - 1000Base-T1. Exceptionally rugged, they outperform other suppliers' SPE solutions in terms of security, durability, as well as environmental and mechanical performance. Fischer SPE is compliant with MIL-STD norms (through Fischer UltiMate™) and offers 10,000 mating cycles, three locking mechanisms (push-pull, screw, quick-release), and hermetic sealing in addition to IP68/ IP69 ratings. SPE is also featured in the ultra-miniature Fischer MiniMax™ connector in 'size 06' (Ø 10 mm receptacle).

The demand for USB 3.0+ protocol is high in Industry 4.0 operations, as it offers high data transfer rates with low latency for IIoT control applications, nearly twice the power output than USB 2.0 (900 mA vs. 500 mA), better power efficiency due to lower consumption in idle state, and larger bandwidth. Fischer MiniMax™ connectors with USB 3.2 Gen 2 allow for 10Gbps data transfer, offer additional power contacts up to 8 A, and are half the size of some competitor connectors with similar speed but no power.

Mobile-first security platform offers dynamic protection from emerging threats

Zimperium has launched the Zimperium Mobile-First Security Platform, which unifies Zimperium Mobile Threat Defense (MTD) - formerly known as zIPS - and Mobile Application Protection Suite (MAPS), delivering powerful new features for teams who bear security responsibility across the entire mobile security spectrum.

Through a single pane of glass, customers now have centralised access to and management of both Zimperium's mobile application security and endpoint security solutions, providing them full mobile coverage to dynamically adapt to emerging threats.

The launch comes at a time when attacks against mobile devices and apps are increasing exponentially. Our world is becoming increasingly mobile, and the Bring Your Own Device (BYOD) trend that exploded during the pandemic has become a staple of business operations. At the same time, mobile applications are being used for everything from banking to managing medical devices and have become a critical part of many enterprise's business models. Unfortunately, this has opened the door to new attack vectors across devices and apps and has created an expanded,

distributed attack surface for enterprises to manage and secure.

The Zimperium Mobile-First Security Platform uniquely combines capabilities across mobile threat defense (MTD) and mobile app security (MAPS) such as centralised management and access to device and app security through a single interface on any cloud and on-premises; protection for all devices against critical mobile threats; privacy-by-design to protect employee privacy on both corporate and BYOD devices; pervasive risk management for apps to find risks in apps you develop and third-party apps used by employees; advanced in-app protection to prevent reverse engineering, protect cryptographic keys, and create self-defending apps; an enhanced mobile ecosystem with enterprise integrations; deep forensics and enhanced search capabilities to enable advanced threat hunting.

In-building 5G augmented with indoor antenna from HUBER+SUHNER

The SENCITY Occhio Plus indoor antenna from HUBER+SUHNER offers mobile network operators a faster and more reliable way to ensure high data throughput in 5G frequency range in buildings.

The antenna provides coverage in buildings such as airports, train stations, shopping malls and sports stadiums which are hard to reach with traditional macrocell solutions. The latest addition to the HUBER+SUHNER antenna portfolio, the omnidirectional antenna builds on the SENCITY Occhio to offer high performance with a MIMO 4x4 configuration in 5G sub-6GHz frequency range from 617MHz to 6GHz.

The SENCITY Occhio Plus utilises the HUBER+SUHNER-exclusive smart connect-system which enables safe and secure installations. The self-locking adaptor and quick-lock feature make installations simple and efficient, saving time and, in turn, money.

"The SENCITY Occhio Plus combines contemporary design with innovative engineering to achieve discreet placement with low visible impact, as favoured by interior designers and architects," said Cristina Olimpieri, product manager at HUBER+SUHNER. "It addresses the growing need for increased data rates inside buildings."

E-band radio delivers premium coverage in dense and rural environments

Nokia has released UBT-m XP, the latest addition to its Wavence product family designed to support mobile operators and enterprises with premium coverage in both dense urban and rural environments.

Nokia's newest E-band radio is a high-capacity outdoor unit with a small, light form factor and the highest transmit power available on the market, ideal for urban microwave transport applications. It is joined in an industry first by the launch of the Nokia SteadEband, a stabilized three-foot antenna that combats common E-band issues, which include tower vibrations and movements due to thermal effects. Combined with the UBT-m XP, it can increase the typical E-band link distance by up to 50%, helping MNOs deliver multi-gigabit 5G connectivity to their customers.

The UBT-m XP is a single ultra-broadband transceiver with an integrated modem and diplexer, offering best-in-class energy efficiency with twice the transmit power compared to the industry average. In recent tests, Nokia demonstrated a 12km-long link using the Nokia UBT-m XP and the SteadEband antenna. Combining two UBT-m XP units with XPIC will allow operators to reduce spectrum fees, because of frequency re-usage and to go up to 20Gbps with 2000MHz channel spectrum. Additionally, XPIC 2+0 solution can be used to extend the link hop compared to a 1+0 solution, for a given capacity. Combined with Nokia UBT-S and UBT-T radios and a multiband antenna, using Layer-1 Carrier Aggregation, the UBT-m, UBT-mX or UBT-m XP enables the combination of E-band carrier with any additional microwave, achieving a compact, three-carrier solution (single-carrier E-band and two-carriers microwave), either in split-mount (combined with MSS-8 or MSS-HE) or all-outdoor.

Two new CPE devices deliver multi-gigabit connectivity

Broadband network operators can ensure a seamless smart home and business experience for users thanks to the release of two new multi-gigabit Customer Premises Equipment (CPE) devices.

The Iskratel Innbox X24 can operate as a bridge or router, offering a dual-box FTTH setup in both single or multi-operator deployments. In addition to a gigabit Ethernet LAN port, the Iskratel Innbox X24 has a 10Gbps LAN port which supports multi-gigabit speeds of 2.5, 5, and 10Gbps and provides an enhanced user experience. The device has an integrated fibre-termination unit (FTU), simplifying deployment and reducing operational expenditure.

The Iskratel Innbox M92 functions as an agent access point, mesh controller, and can also utilise its gigabit Ethernet WAN to act as a home gateway, excelling in single-box ETTH setups and dual-box setups with FTTH or 5G FWA. While supporting 1,800Mbps cumulative WiFi data rate, Iskratel Innbox M92 delivers full gigabit throughput over dual-band WiFi 6 and two gigabit Ethernet LAN ports. The device hosts the Innbox Premium Application Suite that enhances security and privacy of users and enables operators to increase revenue.

Argentina to boost digital economy with 6GHz spectrum

The Ente Nacional de Comunicaciones (ENACOM) has opted to fully embrace the 5925-7125MHz band for unlicenced use, aiming to stimulate development across Argentina's digital economy, according to Dynamic Spectrum Alliance (DSA) Martha Suarez.

Unlicenced use of WiFi requires large amounts of spectrum to be made available to expand services and reach thousands of small and medium-sized enterprises (SME), internet providers, telecommunications cooperatives, and community networks. These are essential in connecting all types of communities, neighbourhoods, schools, hospitals, and other groups operating in critical sectors. With the decision to enable the entire 6GHz band for unlicenced usage, thousands of professionals across Argentina will be able to enjoy the benefits of reliable connectivity and new Wi-Fi technologies.

"The DSA welcomes the recent decision by ENACOM," said Suarez. "After a study process of almost three years and numerous consultations with both the general public and organisations within the industry, we will soon see a boom within the national industry. Ultimately, Argentina now has the tools export products and services of high value that can fully integrate into the global digital economy, placing the country at the forefront of technological innovation."

Several industry bodies, including the DSA and some of its members, have pledged to support the government and provide training to technicians and national SMEs found in the country. This will enable value-added equipment and services to be developed and oriented to the new connectivity models enabled through full use of the 6GHz band. Through the decision, digital tools designed to create software, skills training, or entertainment content – areas where Argentina is already a regional power – can be supported within newer concepts such as virtual and augmented reality.

Nine countries in the Americas region already enabled access to the entire 6GHz frequency band, providing 254 million households and 78% of the continent's population with reliable connectivity and the tools for further evolution in WiFi technologies. A recent study carried out by the Telecom Advisory Services indicated Argentina could enjoy a $63 billion economical boost by 2031 as a result of opening the full 6GHz band.

"Argentina's alignment with the prevailing trend within the region is a wise decision which will provide certainty regarding the evolution of connectivity solutions, services and technologies," said Suarez. "The promotion of WiFi will be essential in connecting all citizens, and enhancing the development of technologies within gaming, virtual and augmented reality, the Internet of Things (IoT) and the metaverse. The decision will lead to the creation of more jobs and help the country meet its high productive potential, while accelerating the digitalization and evolution of industries and production processes."

Unlicenced access for WiFi in turn will accompany the development of 5G within Argentina, as a large portion of mobile traffic is offloaded over fixed wireless access networks.

DoT uses AI-enabled ASTR to detect dubious mobile connections, protecting users

India's Department of Telecommunication (DoT), with the help of ASTR, an artificial intelligence and facial recognition-powered solution, has detected 40.87 lakh dubious mobile connections and blocked 36.61 lakh connections to date.

As per the DoT, West Bengal holds the top position for the largest number of SIMs disconnected (12,34,111), followed by Haryana (5,24,287), Bihar-including Jharkhand (3,27,246), Madhya Pradesh (2,28,072), and Uttar Pradesh-East (2,04,658). Similar actions were also taken in other states like Gujarat, Assam, Punjab, Uttarakhand, Odisha, Tamil Nadu, and Andhra Pradesh. Himachal Pradesh has the lowest number of cases of disconnecting SIM connections, the number is 3,491.
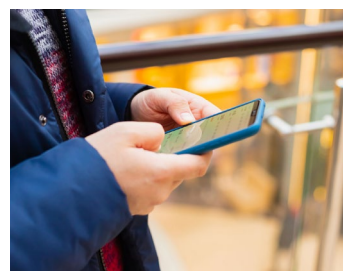
Bad actors obtain mobile connections using fake or forged documents to conduct cybercrimes, so DoT developed the AI-powered tool ASTR, which also includes data analytics techniques to identify SIMs issued using such documents.

In the first phase with paper-based KYC, the authorities analysed more than 87 crore mobile connections. The Param-Sidhhi Supercomputer was employed for the big data processing. During the investigation, there were several cases when bad actors used a single image to get hundreds of connections. Apart from the detected and blocked dubious connections, the service providers have blacklisted 40,123 Point of Sales (PoS) — where a customer makes the payment for the services — involved in selling such mobile connections, and more than 150 FIRs have been filed across India.

Uttar Pradesh-East has the highest number of blacklisted PoS (13,067) followed by West Bengal (10,915), Kolkata (3,937), Haryana (3,024), Bihar-including Jharkhand (2,904), and Odisha (2,417).

"In one case, a person made 5,300 connections using the same image with various names, while in another, a person made 6,800 connections in a similar fashion. These are some extreme examples of such incidents," said union minister for railways, communications and electronics & IT, Ashwini Vaisnaw.

XConnect launches PoP in Sao Paolo

XConnect, a Somos Company, has expanded its global footprint in LATAM with the launch of its point of presence (PoP) in Sao Paolo, Brazil.

The PoP enables XConnect to improve its coverage and latency in the region. It will deliver faster responses to an increasing number of traffic queries from Tier 1 carriers, voice, messaging, e-commerce, social media and fintech providers.

The launch into LATAM allows XConnect to deliver its Global Number Range (GNR), Number Portability (NPQ) and Home Location Register (Live Status) responses with the lowest latency, highest quality, and highest precision into the South American market.

"South America is a highly developed and rapidly growing telecoms market and we want to be able to serve our expanding base of customers in the region so that they are able to deliver voice and messaging traffic with precision, performance and trust," said Tim Ward, VP, number information services at XConnect. "This is just one way we are continuing to grow our global presence and empower more regions to fight against the biggest telecoms challenges including OBR surcharges, robocalling and the artificial inflation of traffic (AIT)."

Over the past year, XConnect has also introduced PoPs in Mumbai and Singapore as part of its global expansion strategy, adding to its local presence in APAC, Europe, the US and LATAM.

"Our new PoP is moving us one step closer to empowering our customers in all corners of the globe. We want them to effectively build trust, gain control over their traffic, and grow their business with confidence and efficiency," said Ward. "The addition of this PoP allows us to build on our reputation for ultra-fast, accurate query responses and deliver new value for our GNR, Number Portability and HLR solutions."

The deployment of its latest PoP is part of XConnect's drive to support its growing customer base in LATAM. It has recently expanded its on-the-ground presence in the region with the hiring of Jose Augusto Vilhena and the onboarding of number portability query (NPQ) data for Uruguay and Columbia.

Cellnex and Airbus explore expansion within business and mission critical communications

Airbus and Cellnex have signed a Memorandum of Understanding (MoU) to explore collaboration in business and mission critical communications.

The MoU will be used to explore joint opportunities around mission- and business- critical communications in different countries around Europe.

In the frame of the MoU, Airbus will provide both private and public end-user organisations with critical communication solutions using Airbus' Agnet platform which allows individual or group voice, video, and image communication as well as additional features such as geo-positioning and team mapping. Cellnex will provide services such as the deployment, operation, and maintenance of networks and applications.

Through this agreement, Airbus will be able to further address communication needs on key verticals such as public safety agencies, airports, healthcare, utilities, and energy in various European countries. Airbus will benefit from Cellnex's connectivity solutions and service capabilities in mission-critical private networks, as well as the company's presence in European countries where Airbus has not yet introduced its state-of-the art collaboration technology.

"The MoU should increase our chances to generate and grow joint business for both business- and mission-critical users from various vertical segments in different countries in Europe," said Eric Davalo, head of Europe for secure land communications at Airbus. "This will fully allow us to further address communication needs on key verticals such as public safety agencies,

airports, healthcare, utilities and energy and – together with Cellnex - help companies embrace their technological evolution, with the use of our Agnet solution."

"We are proud to be working hand-in-hand with Airbus and are eager to contribute to transforming the market with a more cost efficient communication solution while meeting our customers' needs," said Mikko Uusitalo, global director of mission critical & private networks at Cellnex Telecom. "As telecom infrastructure market leader in Europe, Cellnex will benefit from Airbus' extensive experience and knowledge in end-user organisation's operations and needs, while continuing to provide next-generation solutions to our loyal customers around the continent."

The MOU will allow both companies to gain in positioning
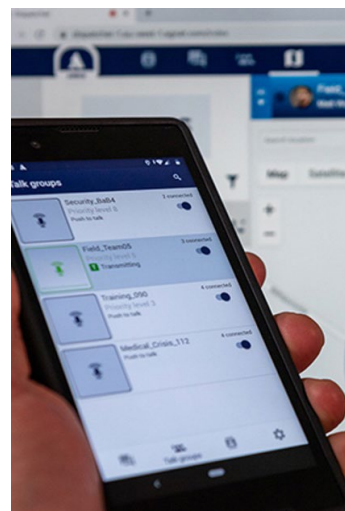
and market leadership through the implementation and delivery of intelligent solutions to solve public-safety and business communication needs.

Latin America to gain e-health via satellite

Hispasat has reached an agreement with Comitas e-Health to market a satellite telemedicine solution in remote areas of Latin America.

The partners aim to provide early medical attention in emergency situations or routine monitoring such as pregnancies, allowing doctors and patients to avoid long and expensive trips.

This telemedicine solution consists of installing a teleconsultation, equipped with medical examination and diagnostic equipment, that

is connected to a hospital centre where specialist doctors can care for the patient. Both locations will be connected via satellite by means of a high-quality videoconference capable of transmitting in real time the examination that the healthcare provider will perform on the patient with the help of various easy-to-use peripherals. This system makes it possible to know the patient's vital signs in real time, examine the skin, iris, throat, or ears, and perform electrocardiograms or ultrasounds, among other analyses.

Hispasat and Comitas-eHealth have worked together on several pilot projects that have demonstrated the effectiveness of this solution, including one in Ecuador at the end of 2021.

Comitas e-Health will provide the hardware and the software, while Hispasat contributes its satellite capacity over the Latin American region. The universal coverage provided by the satellite also allows this solution to be implemented on board vessels to urgently attend to health problems of the crew on board.

Ucom and Ericsson Nikola Tesla target infrastructure upgrade

Armenia's Ucom is renewing its collaboration with Ericsson Nikola Tesla to upgrade its infrastructure across the market.

Ralph Yirikian, director general of Ucom, described the extension of the longstanding partnership as "a new era of strategic development," with a statement from the operator noting that the partnership "introduces a new model of green responsibility with less adverse carbon footprint in addition to the lowest energy consumption" to ensure "greater efficiency, readiness, and agility to meet the future demands of the network."

"Based on our mutual cooperation and the latest software solutions, Ucom's network will be even more efficient in the future and will bring greater benefits to their customers," said Gordana Kovacevic, president of Ericsson Nikola Tesla.

Polembros Shipping to gain Starlink service courtesy of Marlink

Marlink is set to install the Starlink LEO service for Athens-based ship manager Polembros Shipping.

Polembros is already a user of Marlink's hybrid network, including guaranteed throughput VSAT services across its fleet. The deployment of the SeaLink NextGen service will bring much faster throughput and lower latency to the company's business and crew communications, enabling the deployment of digital solutions and crew welfare services.

Sealink NextGen combines GEO VSAT and MSS back-up with customers' required mix of LEO or MEO connectivity, 5G and digital solutions, all controlled and managed via Marlink's smart platform XChange. This hybrid solution integrates and protects critical maritime connectivity, powering new applications for business and crew.

"Polembros Shipping and Polembros Bulkers are companies with a reputation built up over many years for dedication to safety and quality; we value innovations like Starlink as a contributor to our performance," said Vasilis Kottas, IT manager, Polembros Shipping. "Our partnership with Marlink is a factor in our success as a company which delivers the high standard of communications required by our fleet managers and our shipboard teams."
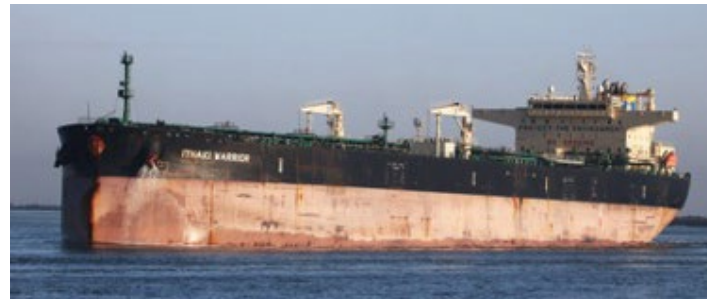
"Marlink is proud to help Polembros Shipping take this next step in its journey with new digital services that enable a new generation of applications and tools to support fleet performance and safety," said Tore Morten Olsen, president, Maritime, Marlink. "Adding the Starlink LEO service to the Marlink hybrid network is a further strengthening of our valued and longstanding relationship that positions Polembros as a future-focussed company."

Indonesia's fixed communicationss market to expand at 7.6% CAGR over 2022-2027 to $1.7 billion

GlobalData has forecast that Indonesia's fixed communications services market revenue will increase at a compound annual growth rate (CAGR) of 7.6% from $1.2 billion in 2022 to $1.7 billion by 2027.

The growth is expected to be driven by a strong uptick in fixed broadband service adoption, with GlobalData's Indonesia Fixed Communication Forecast (Q1 2023) forecasting that circuit switched subscriptions are expected to drop at a CAGR of -2.6% over 2022-2027 as users continue to shift towards mobile and internet-based communication services.

The overall fixed voice service ARPU levels in both residential and business segments are also expected to drop from $0.36 to $0.27 and $2.75 to $2.05, respectively, between 2022 and 2027, which will lead to a considerable drop in total fixed voice service revenues.

Meanwhile, fixed broadband accounts will grow at a CAGR of 10.6% over the forecast period, led by the rising adoption of high-speed fibre-optic broadband services. Fibre-to-home/business (FTTH/B) lines will account for 93% of total fixed broadband accounts in the country by end of 2027, driven by the rising demand for high-speed broadband services and further expansion of fibre-optic networks in the country.

"Cable and DSL's share in the overall fixed broadband lines will decline to reach 5.2% and 1.8%, respectively, by the end of forecast period. Telkom Indonesia is expected to lead both fixed voice and broadband service segments, by subscriptions over the forecast period 2022-2027," said Pradeepthi Kantipudi, telecom analyst at GlobalData. "Telkom Indonesia's strong footprint in the traditional circuit switched segment as well as in the VoIP segment will support its leadership position in the fixed voice services market. The operator's strong position in the fixed broadband segment can be attributed to the ongoing modernisation of its fixed infrastructure with fibre-optic networks across the nation."

Indonesia: Fixed Voice Services ARPU by Consumer Category (US$), 2022-2027
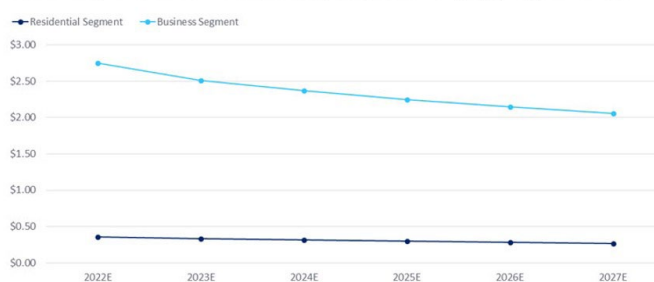
Source: GlobalData Technology Intelligence Center | Note: E: Estimated

Airbus and Telefonica Spain to co-create 5G products for armed forces

Telefonica Spain has signed an agreement with Airbus to jointly develop 5G-based products and technology for use by the country's armed forces.

The framework agreement was around a joint effort to integrate standalone 5G into aerospace platforms for the defence and security sector. It will cover work for 'strategic multi-domain operations' for the next five years.

Results of the collaboration are expected to contribute to wider digital adoption in the sector and will 'allow both the improvement of the military capabilities of the armed forces and the development of tactical clouds.'

Vietnam's top MNOs apply for 5G spectrum licences

Viettel, VNPT-Vinaphone, MobiFone and Vietnamobile, four of Vietnam's major MNOs, have applied to compete for three spectrum licences at the country's next auction, according to local media.

Three 15-year licences for mobile spectrum in the 2300MHz to 2400MHz band for the development of 4G and 5G services will be available in the auction. Successful bidders will be limited to 30MHz of spectrum each in the following slots: 2300MHz-2330MHz; 2330MHz-2360MHz; and 2360MHz-2390MHz.

The auction will be held by the Ministry of Information and Communications.

Cuba and Dominican Republic to gain 700MHz spectrum for 4G and 5G

The Dominican Republic and Cuba are set to make 700MHz spectrum available for the provision of both 4G and 5G services.

In the Dominican Republic, regulator Indotel (Instituto Dominicano de las Telecomunicaciones / Dominican Telecommunications Institute) will put unused 700MHz frequencies up for auction within the next few months, with the process slated for completion by the start of 2024. This spectrum was previously put to auction in 2021 alongside 3.5GHz spectrum but was unsold. Indotel may sell additional frequencies alongside the unsold 700MHz spectrum, saying that the government "has focused on the reorganisation of disused radio spectrum, so that it can be used to improve the coverage of the services offered by the providers in the national territory."

"In the same sense, they have taken concrete measures, such as the closure of more than 50 stations that were operating illegally, the recovery of idle spectrum and the cleaning up of radio communication bands," said Indotel.

Meanwhile, in Cuba, 700Mhz spectrum is becoming available as the country undertakes its switchover to Digital Terrestrial Television (DTT). As analogue signal broadcasts cease on national channels, the 700MHz band is being vacated, with the Ministry of Communications noting that the freed-up spectrum would be used by regulator ETECSA to provide LTE connectivity.

Zain and Omantel launch Zain Omantel International

Zain and Omantel have launched Zain Omantel International (ZOI), an unprecedented joint venture that will establish itself as the Middle East's premier international wholesale services provider. This partnership aims to revolutionise the wholesale telecommunications sector by offering a unique proposition that combines the strengths of both parties to deliver unparalleled service and support to customers worldwide.

ZOI signifies a substantial advancement in the telecommunications industry and is poised to become a global powerhouse due to Zain's extensive regional presence and success in the retail and digital arenas, combined with Omantel's exceptional wholesale capabilities and comprehensive international subsea and terrestrial networks. The joint venture will cater to the end-to-end telecommunications needs of operators in the Middle East, as well as international carriers, data centers, hyperscalers, content, and cloud providers seeking services within the region and beyond.

As a result, ZOI will manage all international wholesale requirements of Zain and Omantel operations in eight countries, serving over 55 million customers. Furthermore, ZOI will optimize the existing wholesale businesses of both companies by reducing operating costs and increasing competitiveness through access to state-of-the-art low-latency and high-capacity services over its extended footprint.

"This strategic value-enhancing partnership reflects the next stage of industry collaboration and advancement, and represents another significant milestone of our '4Sight' profitable growth strategy," said Bader Al-Kharafi, Zain vice-chairman and Group CEO. "It also demonstrates our commitment to transforming the business and creating synergies while extending our reach and capabilities to provide the highest quality services to our customers. ZOI is ideally positioned to evolve into a significant international player on the wholesale telecommunications scene that will benefit both Zain and Omantel on financial, commercial and operational levels."

"The joint venture with Zain is a testament to our unwavering commitment to transforming the international arm of Omantel group into a leading global provider, building on our existing position as a top regional wholesale player," said Talal Al Mamari, Omantel CEO. "ZOI is poised to become the primary gateway from our region to the rest of the world, leveraging the combined strengths of Omantel and Zain. With these differentiating factors, ZOI is the preferred partner with a truly unique presence in the international telecommunications landscape."

ZOI, in collaboration with the Omantel and Zain Group operating companies, will ensure that Zain and Omantel customers continue to experience supreme quality in international services such as internet connectivity, voice, roaming, messaging and more. Some noteworthy projects that ZOI will undertake, along with its consortium partners include the development of Blue-Raman; Africa-1; Jeddah to Marseille (J2M) subsea systems and an extensive terrestrial network connecting most of the regional countries to the landing stations and data centers.

Sohail Qadir has been appointed as the CEO of ZOI. Qadir has spearheaded the development and expansion of Omantel's international wholesale business. During his 13-year tenure as the vice president of wholesale at Omantel, he successfully positioned the company on the global map and increased revenues tenfold.

"The region has matured in terms of the scope and consumption of reliable wholesale services, and this strategic partnership in this integral part of the telecommunications business is well-timed to capitalize on global trends," said Sohail Qadir, ZOI CEO. "I look forward to leading ZOI in delivering differentiated services to regional and international customers alike, and providing increased value and enhanced customer-experience to all associated stakeholders across our extensive operational footprint."

NTT and Nippon Airport Radio partner for 5G critical comms

NTT East has partnered with Nippon Airport Radio Services to interconnect the operator's 5G service with the wireless infrastructure at Narita International Airport, claiming a breakthrough in integrated mission-critical communication.

NTT said that the companies used a Motorola Solutions system to integrate voice communication between 5G-enabled handsets equipped with a push-to-talk application and terrestrial trunked radio (TETRA) devices in the airport's ramp area. Trials are underway.

Interoperability between the systems is an important step, enabling airport staff to carry a single device instead of many.

The Motorola and TETRA systems consist of dedicated radio waves and closed networks, and are not affected by failures or congestion of mobile networks.

NTT East and Nippon Airport Radio Services plan to promote the deployment of 5G at other airports, along with developing new push-to-talk use cases.

Uztelecom deploys AirPON for remote and mountainous regions

Uzbektelecom (Uztelecom) is pushing high speed fibre broadband access across Uzbekistan by deploying AirPON (Air Passive Optical Network) fixed-mobile convergence (FMC) technology.

The operator has to date deployed 12,288 AirPON devices, each designed to provide triple-play internet, telephony and IPTV to one end-user premise via last-mile fibre.

Uztelecom has completed AirPON deployments in the regions of Tashkent, Kashkadarya, Surkhandarya, Samarkand, Syrdarya, Jizzakh and Fergana and plans to connect a further 76,800 premises nationwide.

Q&A

Utpal Bhowmick, senior sales director, Middle East & Africa, Hughes Network Systems

Who was your hero when you were growing up?

Like most kids who grew up in the 90s in India, I absolutely idolized the cricket player Sachin Tendulkar! He is one of the world's best cricket players, and whether or not you follow the sport, he was a huge inspiration to so many people. He showed us what you can achieve by putting in the hard work and even at the peak of his success, he always displayed such humility and a great attitude.

What was your big career break?

I can honestly say my big break was when I started working at Hughes Network Systems. Prior to Hughes, I worked for a big equipment provider, so it was a big transition to move into the satellite niche within the telecommunications industry. It was a welcome challenge to step into this role and a great opportunity. I feel very fortunate to be part of an innovative company

"I'd love to share a meal with Prince Charles, especially now that he has been promoted to King Charles! I've been following him over the last few decades and its very cool to watch him come into his own style as he's been in the royal spotlight."

like Hughes with such a long and rich history in the satellite industry – we've been at this for over five decades now! While I've only been here about five years, I can now say I am thoroughly entrenched in this industry and can't imagine working elsewhere.

What did you want to be when you were growing up?

I always knew I wanted to be an engineer. My dad was an engineer and I've looked up to him my whole life so it was ingrained in me that I would eventually become an engineer. I am proud to have completed my engineering degree at one of the top schools in India. Although I'm not using my technical engineering skills every day, I am still an engineer at heart! I am a self-proclaimed technology geek, and my engineering degree comes in handy as I help companies design innovative and flexible connectivity solutions across the Middle East and Africa.

If you could dine with any famous person, past or present, who would you choose?

I'd love to share a meal with Prince Charles, especially now that he has been promoted to King Charles! I've been following him over the last few decades and its very cool to watch him come into his own style as he's been in the royal spotlight. I admire all the work he's been doing to promote sustainability and the preservation of nature.

What's the best piece of advice you've been given?

My father gave me this advice a long time ago and it still rings true. He told me – 'the harder you work, the luckier you get.' I've carried this mantra with me throughout my professional and my personal life, from school to post grad and as my career continues to progress. I try to reflect this every day in my attitude and my work ethic, and I've seen the payoff that comes from working hard.

If you had to work in a different industry, which would you choose?

I really love technology so I think I would still be in the IT field in some capacity. If I could combine my technology skills with a way to give back in the education or healthcare space, that would suit my interests well. On a lighter note, I also love traveling – so maybe in my dreams I could be a travel blogger or influencer!

The Rolling Stones or the Beatles?

Honestly, I'm much more of a jazz fan. I grew up listening to Indian pop and Bollywood music. But if I had to choose, I'd align myself much more with the Beatles and their boys next door image. I'm not edgy enough to choose the Rolling Stones!

What would you do with £1 million?

First and foremost, I think the best thing to do would be to invest most of the money for my family's future and my children's education. I'd take some and travel the world, and then I'd take the rest and donate it. I'm already very involved with Child Rights and You (CRY) in India, so I'd love to be able to give back even more to the underprivileged children who need support.

"Honestly, I'm much more of a jazz fan. I grew up listening to Indian pop and Bollywood music. But if I had to choose, I'd align myself much more with the Beatles and their boys next door image. I'm not edgy enough to choose the Rolling Stones!"
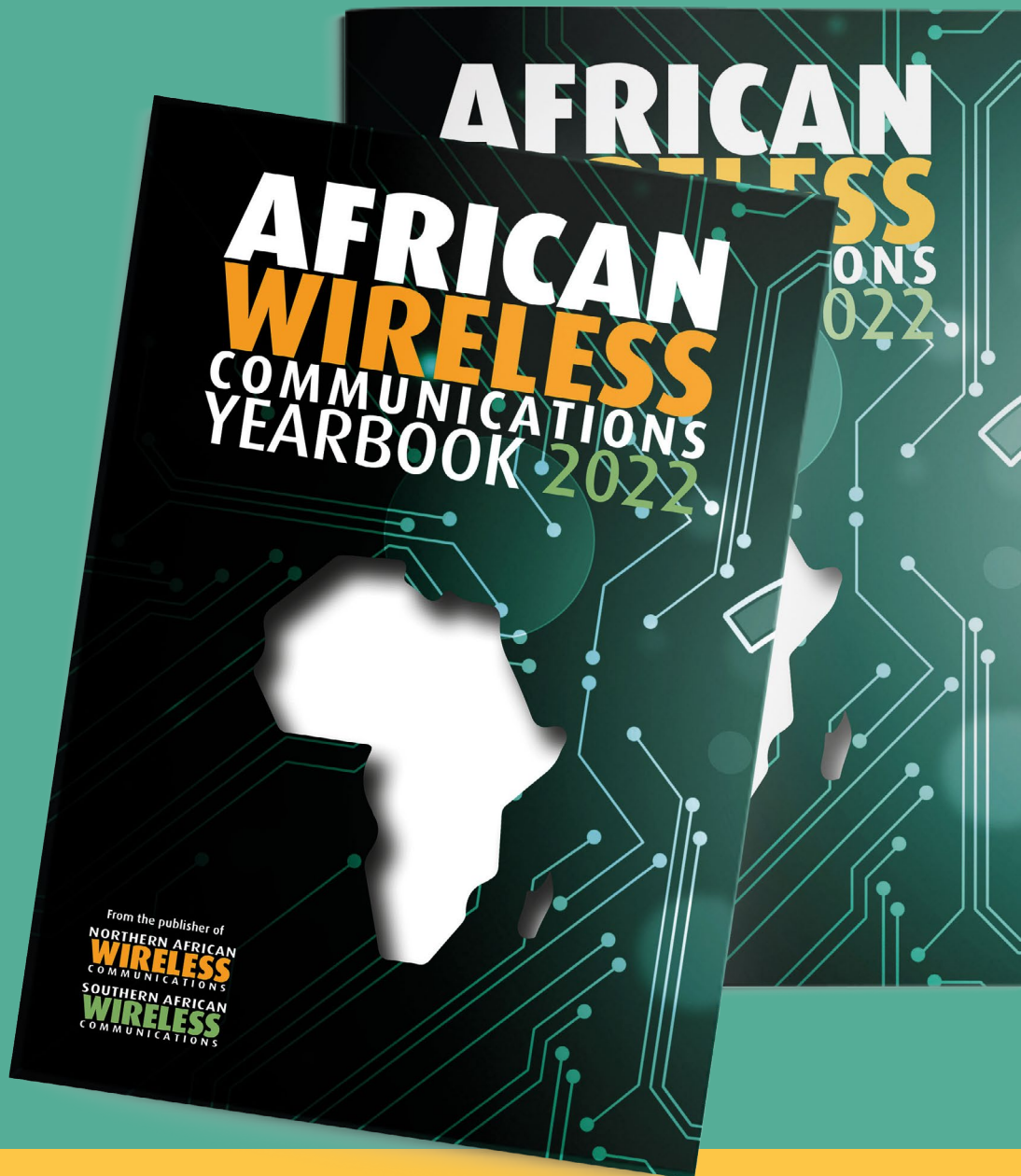
What's the greatest technological advancement in your lifetime?

Without a doubt, the internet! The dot com boom was just starting when I was in college, and I've seen first-hand how the internet has dramatically changed every single aspect of our lives. It has impacted our ability to stay connected, to book appointments, to travel the world, to bank online – just about everything we do these days relies on the internet. I can't imagine how we would have survived the past few years without the internet as our lifeline. And it's so interesting to see the next generation of the internet emerging with AI and ChatGPT – I can't wait to see what is yet to come. ■