SEPTEMBER/OCTOBER 2017
Volume 22
Number 3

southern african wireless COMMUNICATIONS

For communications professionals in southern Africa

- Rural connectivity: overcoming the MNO's greatest challenge
- Wireless users: network uptime during your downtime
- Evolving network architecture for the web-scale era

SPARKLE | CLOUD & DATA CENTER PLATFORM

You grow and together we evolve.

February 2017: Ooredoo Tunisia lands in Sparkle's Sicily Hub in Palermo and expands reach across Europe.

Ooredoo's multiservice PoP in Sicily Hub will serve as main European point of presence, offering an enhanced data experience for consumers and businesses and providing direct access to new markets in highly growing regions. Discover Sparkle's Cloud & Data Center Platform, an interactive ecosystem based on a global communication network in constant evolution. Its governance ensures the creation of value for customers, suppliers and partners, every day, before they even know they need it. Because we're always looking ahead.

Sparkle. The world's communication platform.

SPARKLE | IP&DATA PLATFORM

SPARKLE | CLOUD & DATA CENTER PLATFORM

SPARKLE | CORPORATE PLATFORM

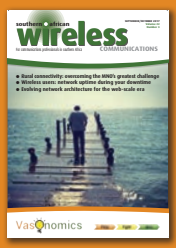
SPARKLE | MOBILE PLATFORM

SPARKLE | VOICE PLATFORM

SPARKLE

TISPARKLE.COM

southern african wireless COMMUNICATIONS



SEPTEMBER/
OCTOBER 2017
Volume 22
Number 3

This cover is dedicated to the spirit of entrepreneurship and the dream of a digital Africa.

We are pleased to present to you one such dreamer, who started his African adventure with less than USD7,000 in his hand and has today connected some 250 million SIM cards with super returns from high-risk markets in sub-Saharan Africa, and who has reinvested the USD6.5m he has made so far.

The year was 2010 when Mr Vikas Dixit, founded Vasonomics in Nigeria, with a mission to connect the unconnected and provide low-cost, meaningful and life-changing feature & smartphone-based apps for bottom of the pyramid customers.

Today his first product, StoryBox, is a major revenue spinner for leading cellular networks in Nigeria, Kenya, Uganda, Tanzania and is being deployed in major markets in the region. With the success of StoryBox, more voice, SMS, USSD products soon followed and there are 8 to 10 data products due for release by Vasonomics this year including Topup & Wallet, Video Streaming and iGaming apps.

Vikas Dixit Contact Details

Name: Vikas Dixit (Founder & CEO)
Mobile No: Nigeria +2348034875434
Kenya +254732219327
India +91 9810107008
Email ID: vikas.dixit@vasonomics.com
sales@vasonomics.com.
Skype: vaso.in.vd
Website: www.vasonomics.com
www.vikasdixit.com

Turn to page 12 to find out more.

KADIUM

CONTENTS

Features:

SUBSCRIPTIONS:
Southern African Wireless Communications is a controlled circulation bi-monthly magazine. Register now for your free subscription at www.kadiumpublishing.com
Readers who do not qualify under the terms of control can purchase an annual subscription at the cost of £110.
For more information and general enquiries please contact Suzanne Thomas at suzannet@kadiumpublishing.com or call +44 (0) 1932 886 537.

EDITORIAL:
Editorial director: **Rahiel Nasir**
Designer: **Alan McClenaghan**
Contributors: **Brian Richardson**
Fady Masoud

ADVERTISEMENT SALES:
Sales executive: **Andrew London**
andrewl@kadiumpublishing.com

Production & circulation:
Production: **Suzanne Thomas**
suzannet@kadiumpublishing.com
Tel: +44 (0) 1932 481728

Editorial enquiries:
rahieln@kadiumpublishing.com
Tel: +44 (0) 1932 481729

Publishing director: **Kathy Moynihan**
+44 (0) 1932 481730

South African office: Kadium Publishing Pty Limited, Unit 2, GSW Building, Techno Park, Gold Street, Northgate East, 7405, South Africa

Printed in England by The Magazine Printing Company

PCCW Global

Gateway
Connecting Africa

Meet us at AfricaCom, Stand #C45

Digital Solutions Delivered

Our Trusted Global Network brings Digital Platforms to Life

- **Mobility Solutions** – Global Roaming & Messaging
- **nTwine** – Cloud Unified Communications & Collaboration Platform
- **Crypteia** – Cybersecurity Solutions
- **ONTAPtv** – Global Media Platform
- **Tap & Go** – Mobile Payment Platform

Contact us

Email: Africa@pccwglobal.com
Web: www.pccwglobal.com

HKT Here To Serve

a PCCW Group member

Vodacom spearheading IoT with millions of new connections

Vodacom has proclaimed that the Internet of Things is no longer hype as its IoT division has now passed the three million connections milestone.

In late September, the operator said it was averaging 55,000 new IoT connections per month in South Africa.

"It's worth noting that it took us eight years to get to two million connections and it took us only one year to get to three million," says Deon Liebenberg, managing executive for Vodacom IoT. "The rate of IoT adoption is picking up speed locally, and with the commercial rollout of NarrowBand-IoT, this is only going to accelerate even faster. The Internet of Things is no longer hype – it's real and it's becoming more and more a part of our daily lives."

Earlier this year in February, Vodacom announced that it had successfully completed the launch of Africa's first live NB-IoT site, in partnership with Huawei. The live site, which is on the roof of Vodacom's data centre in Johannesburg, is the first step towards the development of a smart campus which will monitor and meter utilities on the network. The operator says collection of these data will reduce the risks of water losses, mitigating both environmental sustainability and cost risks.

The live site was followed with Vodacom opening a new lab at its campus in June. The facility aims to commercialise M2M and IoT systems using narrowband low power. It has been designed to provide a controlled test environment and framework for customers and developers to come up with hardware and applications as well as test their endpoint devices on the NB-IoT network.

Liebenberg *(pictured)* says: "Our ultimate goal is to nurture an ecosystem of developers, engineers and entrepreneurs for NB-IoT applications on the continent."

NB-IoT is a low power wide area (LPWA) network technology which enables new use cases for IoT solutions, according to Vodacom. It says: "LPWA networks can communicate with devices where radio penetration has not previously been possible. LPWA devices are also power efficient, resulting in devices being deployed in-field with multi-year batteries."

Earlier this year in February, Vodacom's parent company Vodafone said that it had become the first global IoT mobile provider to exceed 50 million connections, demonstrating growth of around one million new connections a month. It said performance was particularly strong in the automotive, healthcare and utilities sectors.

Mauritius aims to be nation of technology innovators

Children at primary schools in Mauritius are to be given PC tablets under a new government initiative to encourage digital literacy. As from the start of the school year in January 2018, grade 1 and 2 pupils will be provided with the devices which will be used as part of the teaching-learning process.

Mauritius sees itself as a leader in technology-assisted learning and is keen to set an example for other African nations to follow. This latest initiative is part of the government's efforts to upgrade the education system and ultimately turn the country into a high-income economy by 2030.

Minister of information and communications Yogida Sawmynade (left) says the country needs a nation of "innovators and technology creators".

The move was announced at the *eLearning Africa 2017* conference that was held on the island in late September. Speaking during the opening session, minister of education Leela Devi Dookun-Luchoomun said: "The introduction of ICT to early childhood education will be intrinsically linked to the major reform process under implementation in the education sector in Mauritius."

Yogida Sawmynade, Mauritian minister of information and communications, added that rather than just being users of new technologies, young people must understand how technology works.

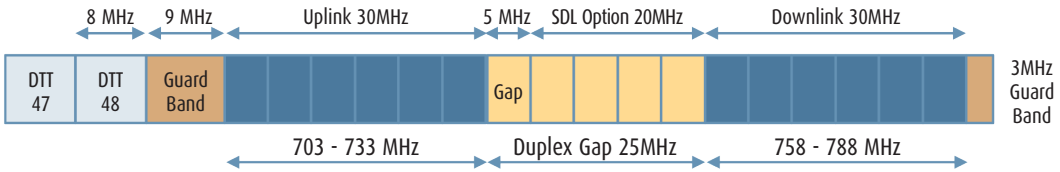
"We do not want a nation of users only. We want a nation of innovators and technology creators," he told the audience. "The challenge will be to educate our kids for the new jobs and new skills of the future which, by definition, have not yet been created. It is imperative that we start using modern educational tools and techniques in order to create a modern workforce."

Digital dividend frequencies to be auctioned in Tanzania

The Tanzania Communications Regulatory Authority (TCRA) is planning to allocate digital dividend spectrum by June 2018.

It says that following the successful migration from analogue to digital television, the 700MHz frequency range has now been released and is available to be assigned for mobile broadband services.

The authority plans to sell 2 x 30MHz of FDD through an auction process subject to a reserve price. Further details of the process should become available after the authority has conducted consultation exercises with key stakeholders during 1Q18. To ensure that consumers benefit fully from access to mobile broadband services, the TCRA says it will include coverage obligations as part of the assignment process.



Note: The SDL Option: "The zero or up to 4 blocks of 5MHz approach" provides flexibility for other options being considered.

CEPT Channel Arrangements – APT 700MHz Lower Duplex – 3GPP Band 28. SOURCE: CEPT REPORT 60 APPROVED 1ST MARCH 2016 BY THE ECC

The authority plans to publish a finalised information memo about the sale at the end of February, and the deadline for receiving applications from interested parties is expected to be in early May. This will lead to the actual auction which will take place from the middle to the end of that month.

As well as helping to further Tanzania's National ICT Policy, the TCRA says the sale of 700MHz spectrum will bring a number of benefits to the country. As well as the socio-economic benefits, it believes mobile communications costs will fall due to savings as a result of deploying fewer base stations for wider coverage, and that more people, especially those in rural areas, will be able to access mobile broadband services.

Brian Richardson, co-founder, WIZZIT International

ON THE NETWORK

Why USSD won't replace apps for a while

Despite predictions by some financial service providers (FSPs) that app-powered banking would usurp USSD, the latter remains the most successfully integrated and widely adopted technology in emerging markets.

What makes USSD so popular and usable is the ability to access it from any mobile, not necessarily a smartphone within data range as with app-based banking. And of course, not every customer has a smartphone and most won't have Wi-Fi connectivity in more rural or inaccessible areas.

MNOs have most notably leveraged USSD to offer VAS to customers. This has won them favour with new and emerging markets as the technology, while perhaps not as elegant as app-powered mobile banking, is relevant and inclusionary.

USSD is smart, quick and safe, which are three integral benefits FSPs should be offering customers in a mobile banking service.

But the power of USSD doesn't render app-based banking redundant – they're different offerings for very different customers and market segments. Some customers might have one, some might have both.

The key takeaway for FSPs is to avoid assumptions made on the part of new and potential customers in emerging markets. Understanding the needs and wants of the untapped market requires extensive research.

So it remains equally important for FSPs to develop app-powered mobile banking services. There are a number of notable benefits for consumers, such as the use of biotechnology for security, for example. And the range of services that can be offered through app-based mobile banking – which go so far as to replace desktop online banking – is extensive.

It's not a case of one or the other. FSPs who are agile enough to offer both will reap the rewards.

Competition in mobile market "ineffective"

The Independent Communications Authority of South Africa (ICASA) has published its findings following a review of the 2014 Call Termination Regulations (CTRs).

At the start of 2017, the regulator announced that it would conduct a review of the pro-competitive conditions imposed as part of the CTRs. These were originally proposed in October 2013 and finalised in September last year after protracted wrangling between ICASA and local mobile operators.

The regulations included provisions for asymmetrical symmetric pricing of call termination rates to address differences in economies of scale between operators. This would allow smaller companies (such as Cell C and Telkom) with less than 20 per cent share of the total minutes billed in either the fixed or mobile market, to charge up to 40 per cent more than the reciprocal rate. This is on a three-year glide path from ZAR0.20 to ZAR0.10 for mobiles, and ZAR0.12 for fixed calls within a calling area and ZAR0.19 for calls terminated outside the area.

Smaller operators were given five years from 2014 to grow their market share to 10 per cent of call minutes terminated. Once their share hits the threshold, they have to charge the reciprocal rate.

In essence, the 2014 CTRs mean that market leaders Vodacom and MTN pay their smaller rivals more to terminate calls on their networks.

ICASA said that after "careful consideration" of all submissions from the industry, it would not change the definitions of mobile termination and fixed termination markets in terms of regulation 3 of the 2014 CTRs, with the exception of the exclusion of termination of internationally originated voice calls.

It said competition in the relevant markets was still "ineffective", and that all network service licensees that offer wholesale voice call termination services continue to have "significant market power" in their own networks for wholesale voice call termination

ICASA added that pro-competitive conditions imposed in 2014 remained relevant, but following concerns it has extended the current glide path for 12 months and has outlined the consultative approach and timeframes to determine new termination rates.

Vivacom to use *EUTELSAT 8 WEST B* in Africa

Vivacom has signed a multi-year contract with Eutelsat for C-band capacity in order to expand its video business in Africa.

The Bulgarian telecoms services provider's aim is to provide contribution services for international channels seeking carriage by major African pay-TV operators.

The first six channels are already being uplinked to *EUTELSAT 8 West B* via Vivacom's Plana teleport in Bulgaria. Plana is also one of Eutelsat's partner teleports, and is certified by the World Teleport Association.

Vladimir Rangelov, senior manager of broadcasting services at Vivacom, says: "Through our Plana teleport, we offer channels end-to-end solutions for signal acquisition, encoding, encryption, uplink and downlink via satellite with excellent quality and reliability. This contract adds new value for our customers by giving them access to the African market."

Orbiting at 8°W, *EUTELSAT 8 West B* was launched in August 2015 *(see News, Jul-Aug 2015 issue)*. It is equipped with Ku- and C-band transponders, as well as 10 physical C-band transponders connected to footprints covering Africa and reaching South America.

TCCA has BIG idea to support broadband

The TCCA (TETRA and Critical Communications Association) has formed a new working group to encourage broadband vendor cooperation in the development of common global critical communications solutions.

The Broadband Industry Group (BIG) will drive market adoption of standardised critical communications LTE and subsequent 5G technologies for the benefit of critical communications users and organisations. It also aims to promote an evolutionary approach towards future solutions.

The TCCA says this work will build on its achievements of driving and supporting open standards and interoperability, and ongoing research into professional users' requirements to protect customer investments for the long term.

"With the formation of the BIG, TCCA has provided industry a home to advance critical service based on broadband, including migration to 3GPP LTE and 5G standard technologies," says TCCA chief executive Tony Gray. "In parallel, we will continue to recognise the importance of narrowband PMR, and model our broadband activities on the success of those technologies in supporting professional users worldwide. This success will be further strengthened by the evolution of interworking between critical narrowband and broadband technologies."

Philippe Agard, Nokia's global public safety and defence segment leader, will chair the new Broadband Industry Group (BIG). He will be supported by Jason Johur, Ericsson's market development director for mission-critical communications, as vice-chair.

Ericsson's Jason Johur *(pictured left)* says BIG will focus on ensuring 3GPP-compliant products and services meet the evolving needs of all critical comm users. Also pictured is the group's chair, Philippe Agard. PHOTO: Erillisverkot

Progress made in bringing electrical power to Africa

More than 50 million people on the continent can now access electricity for the first time, according to Power Africa.

As has been well documented, a lack of reliable electricity is a major obstacle in emerging markets and is one of the key challenges faced by mobile operators when it comes to expanding networks to remote and rural communities.

Launched in 2013, Power Africa is a US government-led initiative to double access to electricity in sub-Saharan Africa, and is claimed to be one of the world's largest PPPs in development history. It consists of more than 150 public and private sector partners which have collectively committed more than USD54bn towards achieving the initiative's goals. The aim is to increase installed generation capacity by 30,000MW and add 60 million new electricity connections by 2030.

In its annual report published in August 2017, those behind Power Africa state that the programme continues to lay the foundation for sustainable economic growth in Africa while creating opportunities for American businesses.

It says that since 2013, Power Africa has facilitated 80 financing agreements valued at more than USD14.5bn with projects that have generated more than USD500m in US exports. These are expected to generate more than 7,200MW of power across the region. This is in addition to the more than 10 million electrical connections that have been facilitated by the project which have brought electricity to millions of people for the first time.

The report also highlights the role of women in Africa's power sector. For instance in 2016, microelectronics engineer Netsanet Kinde won a USD100,000 grant from the Power Africa Off-Grid Energy Challenge. Kinde has developed the first solar home system designed for Ethiopians, by Ethiopians. Using her electrical engineering background, she has designed a solar home system that includes two lamps and a charging system for devices, such as mobile phones and radios. According to the engineer, off-grid systems that are independent of the national grid are an essential part of the solution for rural electrification.

Over the next year, Power Africa says it plans to work with more than 100 US companies, African partners, donors and the private sector to harness the technology, ingenuity, and political will necessary to bring the benefits of modern energy to even remote parts of Africa while promoting economic growth. The initiative will also expand beyond its initial focus on solar lanterns and renewable energy to support more on-grid power projects in natural gas and other sources.

Netsanet Kinde works on one of the solar home systems that she designed in her workshop in Addis Ababa.

PHOTO: NBK ELECTRICAL CONSULTING ENGINEERS

IOX brings connectivity to Indian Ocean islands

Mauritius Telecom will use IOX Cable to enhance global internet connectivity in the country. And in a separate announcement, IOX also plans to connect the island of Réunion.

Mauritius Telecom will be the anchor tenant for ultra high speed connectivity on IOX's new submarine system that will be the first to connect Mauritius and Rodrigues Island to South Africa and India *(see News, May-Jun 2017)*. The system will be built by Alcatel Submarine Networks and is scheduled to go live in 2019.

IOX reckons its cable will be a driving force behind what it says are the world class open access data centres being built in Mauritius. The company says it will support these key initiatives by providing better connectivity and putting an emphasis on high availability through diverse network design.

In early September, IOX announced that it will be expanding its reach to now include Réunion. It said that the connectivity will offer new routes and redundancy between the island, South Africa and India.

According to IOX, its strategy is to promote regional economic development across the Indian Ocean islands. It claims it will do this by offering users "abundant" capacity on an open access basis, as well as "state-of-the-art" products and services.

IOX says it will offer the first open access cable system in the region.

Intelsat 37e launched

Following a delay of more than three weeks, *Intelsat 37e* has now been successfully launched. It blasted off from Arianespace's launch site in French Guyana on 29 September and is now aiming to begin commercial services in 1Q18 after all in-orbit tests are successfully completed. The satellite will cover Africa from 342°E and is the fifth to use Intelsat's high throughput *EpicNG* platform. It was originally scheduled for launch on 5 September but this was aborted due to a technical fault *(see News, Jul-Aug 2017)*.

GlobalTT upgrades

Belgium-based GlobalTT has completed an upgrade of its inbound C-band service which offers pan-African coverage. The VSAT operator says it now offers 2Mbps using a 'regular' modem or 3Mbps using a 'professional' one. It adds that download capacity is still up to 30Mbps. GlobalTT has also upgraded its inbound Ku-band capacity that is also said to offer satellite connectivity anywhere on the continent. The service works using a small 1.2m dish and is now said to offer more than 1Mbps upload speeds as well as up to 30Mbps downloads.

Africa-wide domain

More than 8,000 companies and individuals on the continent are said to have so far registered for the new *.africa* internet address. Lucky Masilela, CEO of the ZA Central Registry (ZACR) which is responsible for administering the domain name, describes *.africa* as "valuable virtual real estate". He says: "Leading continental and international brands are snapping up *.africa* domain names because they recognise the importance of being associated with Africa's bright future online."

Guichet Unique set to roll out in Africa

Senegalese fintech firm InTouch will work with global integrated energy producer Total, and transactional services specialist Worldline, to bring a new mobile payment solution to the continent.

Guichet Unique ('single window' or 'one-stop shop') has been designed to provide retail networks with what's claimed to be a "unique customer-friendly" device that makes it possible to securely and seamlessly accept all means of payments, including mobile money, cards, as well as cash. The system also enables retailers to distribute third-party services, such as subscriptions to media content, bill payment, money transfer, card top-up, banking and insurance.

Under the agreement, Total and Wordline will support the implementation of the *Guichet Unique* platform in Burkina Faso, Cameroon, Côte d'Ivoire, Kenya, Mali, Morocco and the Republic of Guinea. It is already installed in more than 170 Total service stations and more than 600 independent points of sale in Senegal, where the platform is said to manage more than 30,000 transactions per day.

InTouch is now targeting deployments to more than 5,000 retail network and independent points of sale in the above mentioned African countries. As part of the agreement, Total and Worldline will fund the first phase, and will also become shareholders in InTouch alongside its founder Omar Cissé.

As well as providing its payment expertise, Worldline says it will provide secure, enterprise-class hosting infrastructure to support the rollout and operation of *Guichet Unique*.

Meanwhile, Total will introduce the platform to its service station network in each country, with the possibility of further deployments to another 30 African and Middle Eastern territories.

BoFiNet outlines its new *Strategy 2020*

Botswana Fibre Networks (BoFiNet) says 'doing business as usual' is not an option anymore, as it unveiled its new strategy for the next three years.

Speaking at the official launch of the *BoFiNet Strategy 2020* in early September, Ratsela Mooketsi, chairman of the company's board of directors, said: "One has to be creative to ensure that they get the lion's share of the market."

BoFiNet chairman Ratsela Mooketsi wants the "lion's share" of the market.

In setting out its new goals, the wholesale provider of national and international telecoms infrastructure's said it will be guided by three strategic themes: national broadband coverage; service and operational excellence; and operational sustainability.

Mooketsi added that it was important to reflect on where BoFiNet started and where it wanted to be in the future: "Having been established in 2013, we can look back with pride on the strides we have made thus far," he told his colleagues. "We started as a very small organisation with a big mandate to implement. As I speak to you, we have deployed and continue to deploy broadband infrastructure in almost all the four corners of the country".

Mooketsi also directed staff to put the customer at the centre of their activities. "The *Customer Satisfaction Survey* that we undertook last year pointed to certain areas that need improvement; issues around stakeholder engagement, issues around service quality on the end-user side, and issues of pricing were among those that need to be seriously looked into. Hence our renewed commitment, through this strategy, to address them."

Societe Generale to open mobile wallets with *YUP*

The service has already been launched in Côte d'Ivoire and Senegal and is based on a network of third-party agents.

Societe Generale, said to be one of Europe's largest financial services groups, has developed a new mobile money solution for Africa that is claimed to already have more than 30,000 open wallets and nearly 600 agents.

Following its earlier introduction in Côte d'Ivoire and Senegal, *YUP* is now planned for launch in Ghana by the end of this year, and Cameroon, Burkina Faso, Togo and Guinea in 2018.

Societe Generale says *YUP* is a mobile money solution for accessing a full range of transactional and financial services even without a bank account. Based on a network of third-party agents with whom the bank has formed partnerships (such as service stations, for example) the service is accessible via an expanded network of distributors equipped with adapted terminals. It is also available using the mobile apps of Societe Generale's different banks throughout Africa.

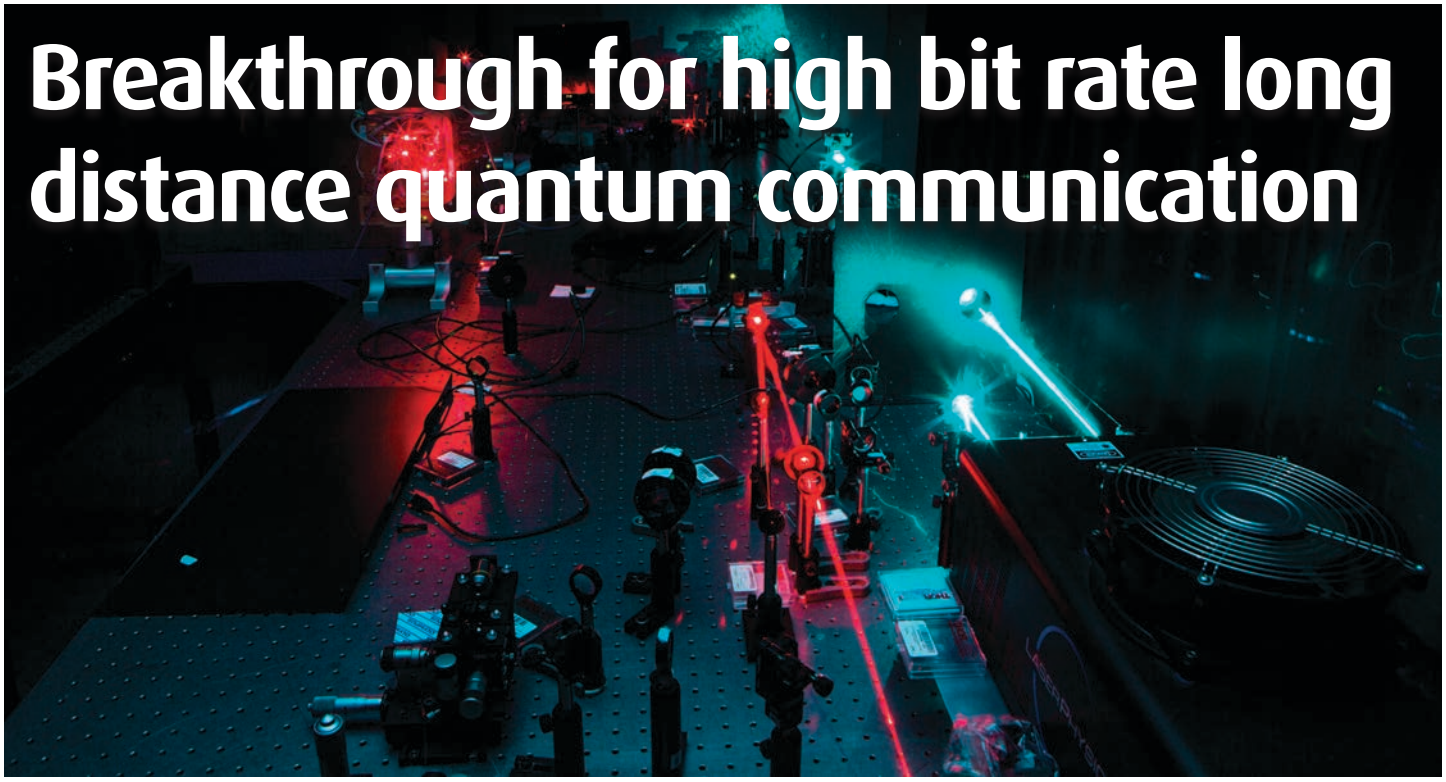
YUP is aimed at customers with or without bank accounts, and for anyone with any type of mobile phone, regardless of which operator they subscribe to. Users can withdraw, deposit and transfer money, pay bills, buy phone credit and make retail payments. The solution also digitises corporate payment flows, and financial services such as payday advances, credit, savings products and international transfers will also soon be added.

Societe Generale created the service in partnership with African startups as well as with Tagpay, a French fintech in which it is a shareholder. Tagpay has developed NSDT (near sound data transfer) contactless authentication technology, which is claimed to be innovative and more intuitive for users than existing solutions on the market.

Societe Generale's ambition is to open one million wallets by 2020 and expand its network by hiring 8,000 agents over the same period.

Why USSD won't replace apps for a while (and why banks must offer both) – On The Network, p6

Breakthrough for high bit rate long distance quantum communication



An experiment being conducted in the Structured Light Laboratory at Wits University. PHOTO WITS UNIVERSITY

University researchers from South Africa and Scotland demonstrate quantum teleportation of patterns of light.

Researchers from South Africa and Scotland say they have demonstrated quantum teleportation of patterns of light, paving the way for high bit rate secure long distance quantum communication.

According to the researchers – from South Africa's University of the Witwatersrand (Wits) and Heriot-Watt University in Scotland – current communication systems are very fast but not fundamentally secure. To make them secure, researchers have used the laws of nature for encoding by exploiting the properties of the quantum world.

One such property is 'entanglement'. When two particles are entangled, a measurement on one immediately changes the state of the other, no matter how far apart they are. Entanglement is one of the core resources needed to realise a quantum network.

According to the researchers, quantum communication over long distances is integral to information security. They say it has been demonstrated in free space and fibre with two-dimensional states, recently over distances exceeding 1,200km between satellites. But using only two states is said to reduce the photons' information capacity, so while the link is secure it remains slow.

Overcoming this requires a higher-dimensional 'alphabet', for example, using patterns of light, of which there are an infinite number. One such pattern set is the orbital angular momentum (OAM) of light. The researchers have found that increased bit rates can be achieved by using OAM as the carrier of information.

However, such photon states decay when transmitted over long distances, for example, due to mode coupling in fibre or turbulence in free space, thus requiring a way to amplify the signal.

While such amplification is not possible in the quantum world, it is possible to create a 'quantum repeater' which is analogous to fibre repeaters in classical optical networks.

An integral part of a quantum repeater is the ability to entangle two photons that have never interacted. This so-called 'entanglement swapping' is accomplished by interfering two photons from independent entangled pairs, resulting in the remaining two photons becoming entangled.

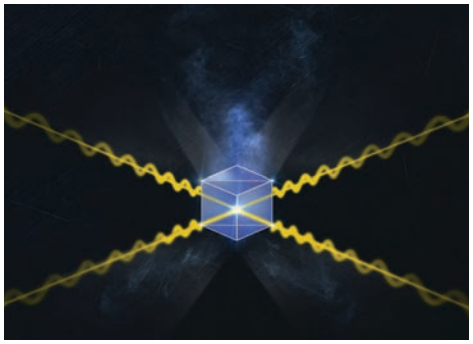
The scientists say this allows the establishment of entanglement between two distant points without requiring one photon to travel the entire distance, thus reducing the effects of decay and loss. It also means that you don't have to have line of sight between the two places.

As a result, the information of one photon can be transferred or "teleported" to the other. "If two photons are entangled and you change a value on one of them, then other one automatically changes too," says the researchers. "This happens even though the two photons are never connected and are in fact in two completely different places."

The team from Wits and Heriot Watt say they have now performed the first demonstration of entanglement swapping and teleportation for OAM states of light. They claim their experiments showed that quantum correlations could be established between previously independent photons, and that this could be used to send information across a virtual link.

The researchers add that, importantly, the scheme is scalable to higher dimensions, paving the way for long distance quantum communication with high information capacity.

Professor Andrew Forbes of the Structured Light Laboratory at Wit's School of Physics says: "We are continuing with this work and looking at quantum key distribution across a virtual link, as well as introducing noise to the link and attempting to show robust communication over long distance even in the presence of noise. With these advances we will have a practical quantum repeater for communication."



The core element of the quantum repeater is a cube of glass. Researchers put two independent photons in, and as long as they could detect two photons coming out the other sides, they knew entanglement swapping was possible. PHOTO WITS UNIVERSITY

Moving Wireless Forward

Mobile Mark is a leading supplier of innovative, high performance antennas to wireless companies across the globe. We've been in the wireless industry for over 30 years and have our roots in the early Cellular trials. We have grown and evolved over the years, along with the industry.

Today, we benefit from enhanced design capabilities and expanded production capacity – along with a greater understanding of new and emerging markets – all of which have allowed us to become one of the best antenna developers in our field.

Our customers have been our partners throughout the years. We believe in taking the time to understand our customers' individual needs. Through close consultation with clients, we are able to deliver innovative, tailored solutions that meet specific antenna requirements.

Rapid prototyping capabilities allow us to take our designs from concept to reality in an extremely short time span, and to verify the performance of the antenna. A variety of network analyzers and an anechoic chamber enable us to conduct measurements up to 13 GHz, and ensure that the antennas designed meet or exceed customer requirements.

We have onsite injection molding equipment and a fully equipped modeling shop staffed with skilled model makers to assist in the design phase and help us come up with a superior product – an antenna that not only meets the customer's electrical specifications, but is also very attractively packaged.

Mobile Mark antennas are used in many sectors of the wireless industry. Here are just a few examples:

Asset Tracking & RFID

Managing and tracking important assets can be a challenge in the field, and both RFID and WiFi offer effective wireless solutions. RFID / WiFi technology allows us to identify, monitor and track items ranging from medicine to fruit to parcels to people. Since each application has its own challenges, Mobile Mark offers a range of antennas so network developers can choose the right mix.

MobileMark
antenna solutions

We are now looking for distributors throughout Africa

Commercial Fleet Management

Mobile Mark has consistently lead the industry with the most extensive and innovative range of antenna solutions that combine multiple wireless technologies: from simple GPS & Cellular antennas to complex 6-cable antennas combining LTE MIMO, WiFi MIMO, DSRC and GNSS in the same antenna housing. This combination of wireless technologies allows fleet owners to track and/or redirect their fleets of cars and trucks for optimum efficiencies. Mobile Mark antennas are rugged enough to handle tough environments and efficient enough to maintain reliable connections.

Public Transit & Bus Management

From monitoring the location of the bus to monitoring the condition of its tires, wireless has become an essential part of professional bus management. Mobile Mark's multiband antennas allow the system to capture that information and transmit it back to a central monitoring station with real-time connectivity. For an added touch, real-time WiFi service can also be added for the passengers. That's why companies like INIT have selected Mobile Mark antenna to complete their product offerings. And they have made the following endorsement:

"INIT GmbH – as a worldwide leading supplier of integrated planning, dispatching, telematics and ticketing systems for buses and trains – uses Mobile Mark bus antennas in public transportation projects all over the globe.

For example: INIT has installed Mobile Mark antennas in projects located in Abu Dhabi, Hertfordshire UK, Turku Finland, Oslo Norway, Montreal Canada, Luxembourg, as well as several German projects.

In 2017, a fleet of more than 1,500 buses will have Mobile Mark Antennas installed in one of INIT`s current major projects for National Express, West Midlands, UK."

Remote Monitoring & Surveillance

Surveillance plays an important role in maintaining secure settings. Network deployments need to be low maintenance and weather resistant. Broadband surface mounts offer flexibility for multi-frequency coverage and are rugged and dependable. YAGI antennas provide practical point-to-point coverage. Our antenna solutions are designed to handle tough conditions while providing the reliable wireless connection you would expect from a Mobile Mark antenna.

Mining & Exploration

Modern mining operations rely on a battalion of vehicles, ranging from massive extraction vehicles to modest-sized material transport trucks. These vehicles operate in tough environments where high vibration is a frequent wear and tear challenge. Mining companies throughout Africa have relied on our rugged, foam-filled mobile antennas for consistent connections. Mobile Mark's infrastructure antennas have been used for rapid deployment and redundancy coverage for effective wireless coverage in isolated settings.

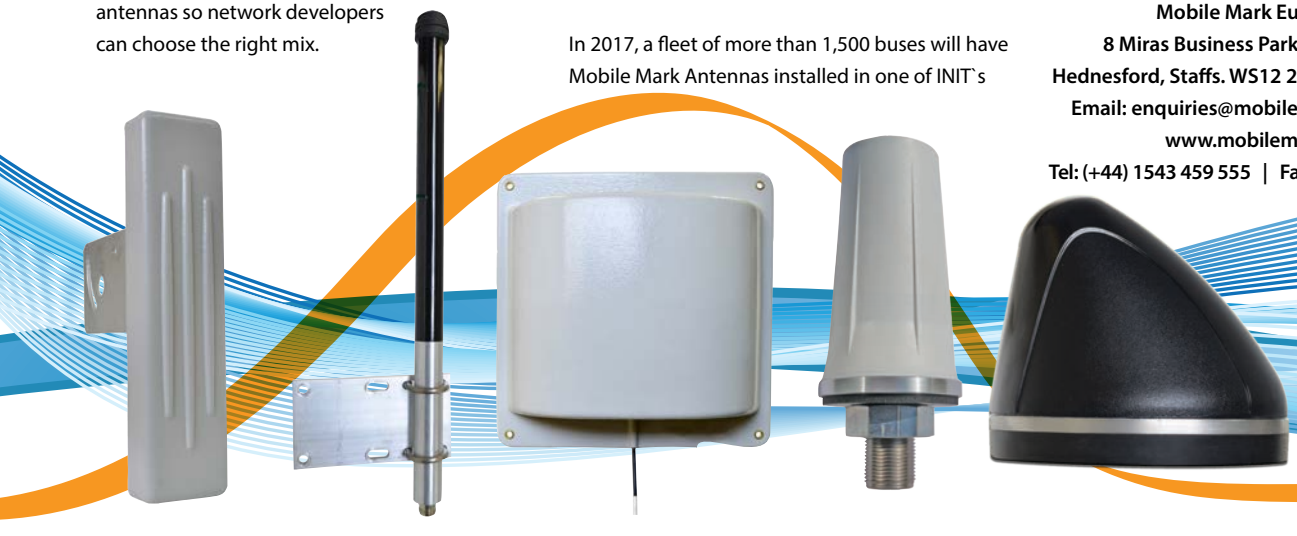
Smart Cities & Smart Highway

For cities and highways, the lynchpin of a successful "Smart" system will be dependable wireless connections. Companies like Kapsch understand this, and have worked with Mobile Mark to find ideal antenna solutions. Wireless networks must reach seamlessly into hard-to-cover corners of city intersections and along vast expanses of highways. They must be carefully embedded in city lighting and electrical meters. Mobile Mark offers both small network infrastructure as well as embedded antenna elements to help network designers tie all the pieces together.

Let us know how we can help

We understand the RF wireless world and are ready to help you evaluate your options. Contact us by email, phone or fax and let us know how we can help.

Mobile Mark Europe Ltd
8 Miras Business Park, Keys Park Rd.
Hednesford, Staffs. WS12 2FS, United Kingdom
Email: enquiries@mobilemarkeurope.co.uk
www.mobilemark.com
Tel: (+44) 1543 459 555 | Fax: (+44) 1543 459 545



Come see us at AfricaCom 2017 on stand B44

Vasonomics
Play Fight Win

Building a digital Africa, one SIM card at a time…

Headquartered in Lagos, Vasonomics was founded in 2010 by African telecoms entrepreneur Vikas Dixit, who is die-hard and passionate about Africa.

We are on a mission to connect and transform at least a million African lives by providing MNOs with highly-localised, low-cost mobile entertainment and informative services for their end users.

Vasonomics does this by leveraging its team's extensive experience in African markets and knowledge of the local ecosystem, and by developing exclusive local content and strong partnerships with local market participants.

We are now poised to become a leading VAS, SaaS and CaaS (Content-as-a-Service) provider to major telecom operators in West and East Africa.

Our offerings include IVR (interactive voice response) applications as proprietary content, as well as services for:

- Festivals & events
- Health & lifestyle
- Ringtones & music
- Farming
- Contests, news & information
- Customer gratification
- Loyalty management (lottery based) genres

The company also offers **subscription engines**, **managed outbound diallers** as well as **SMS** & **USSD** applications to complement an MNO's voice strategy.

By using out SaaS products, MNOs can enhance their ecosystems with intelligent, interactive, innovative, real-time transactions, and thus automate their processes. This in turn brings value to the entire chain, impacting the revenue and profitability of the operator's partner.

Today, Vasonomics has **1 million-plus active** mobile customers, a database of 1.7 million, and the potential to reach some 250 million mobile consumers with Direct Charging Connectivity in major emerging markets.

We currently have customers in Nigeria, Kenya, Uganda, Tanzania, Bangladesh, UAE and Afghanistan. So far, we have helped some of them sell USD300,000 worth of digital goods **per month** across Africa's mobile ecosystems.

Vasonomics targets markets in East, West and Central Africa that lack development infrastructure such as power, logistics and internet, and are characterised by relatively higher average revenue per unit (much more than Asia), moderate teledensity (40-60%), high population, and political volatility.

It is these gaps in the development infrastructure that have inspired Vasonomics to get inside sub-Saharan African markets. And as well as doing its bit to help the region catch up with the rest of the world, the company also creates a profitable business out of this disparity.

Recently, Vasonomics has strategically invested in one igaming company, Creatiosoft, to make a plethora of real-time igames available to telcos.

Find out how Vasonomics can change your business:

+2348034875434

+919810107008

IR@Vasonomics.com

www.vasonomics.mobi

Africa leads way in network sharing

Nigeria is the most successful network sharing country in the world, according to IHS Markit's latest *Mobile Infrastructure Market Tracker* report.

The analyst says Africa, India and Latin America are three regions where network sharing has been working well. It points out that although India pioneered network outsourcing in 2005 and has since moved fast to network sharing and managed services, it is EMEA that is now leading this area with network sharing deals across Eastern Europe and Africa.

"We can't really pick a particular country because consolidation among service providers led to pan-African shared networks," says Stéphane Téral, IHS' executive director of research and analysis, mobile infrastructure and carrier economics. "However, in Africa I think Nigeria, the most populous African [nation], is the most successful and innovative telecom infrastructure country."

IHS says that as service providers all over the world operate in saturated markets, they increasingly focus on customer satisfaction and retention, and on business and network transformation. These require increasing dedicated resources.

However, the analyst adds that because significant revenue growth may no longer be achievable, it is necessary for MNOs to "de-emphasise" network operations through outsourcing, managed services, and network sharing to preserve margins and sustain cash flow.

In its latest tracker report, IHS identifies a number of trends that it is seeing in infrastructure sharing in emerging markets. As well as EMEA leading the way here, it says Africa-based IHS Towers is the largest company of its type in emerging countries and is contributing to the success of Nigeria.

IHS Market analyst Stéphane Téral believes Nigeria is the most successful and innovative telecom infrastructure country.

IHS predicts that more towercos will emerge in the future because of market saturation putting pressure on revenue growth for cellcos. It says: "More and more service providers will sell their towers to companies like IHS Towers, which is in a strong position to keep growing. There is also the opportunity for others to create competition in the tower business."

The analyst also believes that NFV will provide the next wave of operational efficiencies in network sharing. "By moving more network functions from hardware to software, using off-the-shelf IT components and platforms, the cost of network nodes decreases and new services can be turned up and down at the power of a click. Overall, with the concept of network slicing, it will become easier to share networks among several service providers."

ICASA seeks clarification from Cell C following recapitalisation

The Independent Communications Authority of South Africa (ICASA) believes Cell C may not be complying with the terms of its license in the wake of its recent recapitalisation.

Following a two-year process, in August 2017 South Africa's third MNO announced that it had completed its re-capitalisation *(see Wireless Business, Jul-Aug 2015 issue)*. As a result, Blue Label Telecoms now has a 45 per cent shareholding in the company, 3C Telecommunications has 30 per cent, Net1 has 15 per cent, and 10 per cent is held on behalf of Cell C management and staff.

ICASA received notification from the operator about its change of shareholding, and said this was filed in terms of the appropriate sections within the 2010 Regulations on Standard Terms and Conditions for Individual Licences.

But after considering the notification, the regulator said: "The preliminary view is that the Cell C recapitalisation transaction – on the face of it – triggers the provisions of Section 13 of the Electronic Communications Act of 2015 and ought to have been filed as an application for change of control of the licensee.

"The Authority is engaging Cell C to seek clarity on this apparent non-compliance with the legislative provisions. In addition, the Authority is also taking external legal advice on the matter, including on appropriate enforcement actions it can take to ensure compliance."

In a media statement issued online, Cell C said that despite "repeated requests", it remained "unclear" as to why the regulator had reached its conclusion without first discussing it. It said: "Cell C has received extensive legal advice and is comfortable that the recapitalisation does not amount to a transfer of control that would have required approval. The company is of the view that once ICASA, or whomever ultimately considers the transaction, has a proper understanding of it (which Cell C is at pains to provide), it will be clear that there has not been any transfer of control and that no approval is required."

Digitata becomes part of 'Industry 4.0'

4Sight Holdings has acquired Digitata Mauritius on a share for share basis in June 2017. Financial terms of the transaction have not been disclosed.

Digitata Group CEO Tinus Neethling says: "With a shared vision and synergistic values and focus, this partnership with 4Sight Holdings is a natural next step on our journey as a forward-looking technology company."

He adds that Digitata retains its operational autonomy, and that its management, 150 staff and product offerings remain unchanged.

The acquisition brings 97 per cent of 4Sight's revenue in dollar-based income, with South Africa revenue contributing the remaining three per cent.

Incorporated in Mauritius, 4Sight is an international technology holding company. The firm earns its income through its subsidiaries, mainly from licensing intelligent algorithms in an SaaS annuity revenue model.

In October 2017, 4Sight began to be listed on the JSE's Alternative Exchange (AltX). The company says this will offer South Africans the opportunity to invest in a "pure data" technology company.

4Sight seeks to raise up to ZAR300m which will be used for acquisitions and the incubation of new products in sectors such as retail and healthcare. It says the next round of strategic acquisitions will be concluded before December 2017, enabling it to offer mining and manufacturing customers the ability to optimise value chains

INVESTMENTS, MERGERS & ACQUISITIONS

Date	Buyer	Seller	Item	Price	Notes
21/9/17	Public offering	Telenor Group	90 million common shares in VEON	USD4.15 per ADS/ share	Telenor's offering of its 5.1% holding of VEON's total outstanding common shares is in the form of common shares and American Depositary Shares (ADSs). Sale results in net proceeds to Telenor of USD365m. The Norwegian telco still has approximately 256.7 million VEON ADSs which is 14.6 per cent of VEON's total outstanding common shares.
21/9/17	Alphabet Inc.	HTC	Pixel division	USD1.1bn	Google's parent company has bought the HTC division that develops its *Pixel* smartphones. As part of the deal, Google gains 2,000 HTC employees & a non-exclusive license for the Taiwanese manufacturer's intellectual property; it does not include any manufacturing assets.
22/9/17	Procera Networks	Sandvine Corporation	Company acquisition	Approx. USD562m	The two companies have combined to offer a wider portfolio of network intelligence solutions. Merged entity will operate under Sandvine name led by Lyndon Cantor as president & CEO.

and plant operations in real-time. This includes new AI technology which, it's claimed, can predict physical asset failures up to eight weeks in advance, providing customers with the means to reduce operational downtime.

4Sight says it focuses on investing in companies that are part of the fourth industry revolution, or 'Industry 4.0'. While the first three revolutions brought mechanical innovations, mass production, and computers and the internet, it's claimed Industry 4.0 will lead to system-wide innovations that are being driven by the continued digitalisation of networked societies.

"We foresee a growth in demand for real-time decision solutions in the fourth industrial revolution," says 4Sight CEO and co-founder, Professor Antonie van Rensburg. "The underlying power to unlock economic value lies in the use of scientific and engineering skills applied cross-functionally with disciplines such as econometrics, medical sciences, bio-informatics, and astrophysics."

SEACOM acquires MacroLan to extend fibre reach

In early August, SEACOM announced that it had acquired South African ISP and managed services provider MacroLan for an undisclosed sum.

MacroLan manages an expanding fibre network that is said to serve a growing number of enterprise users in Cape Town. It also owns and manages fibre infrastructure and access at numerous commercial buildings, offering clients access to a range of business broadband services as well as value-added services.

LATEST COMPANY RESULTS

Date	Company	Country	Period	Currency	Sales (m)	EBITDA (m)	EPS (units)	Notes
3/8/17	VEON	Amsterdam	2Q17	USD	2,417	977	0.11	Total revenue increased 12.3% YoY and 3.7% organically. Mobile service revenue grew 4.3% in organic terms, with data increasing by 30.5% YoY. Fixed-line service revenue declined by 11.5%.
11/8/17	Singtel	Singapore	1Q18	SGD	4,232	1,269	NA	Operating revenue up 8%, but underlying net profit down 4%. Singtel also holds around 36% of Airtel, making it the largest shareholder in the Indian company. Airtel's pre-tax profit contribution dropped 42% despite what was said to be "strong" cost management & lower depreciation in Africa.
23/8/17	IHS Netherlands Holdco	Netherlands	1H17	USD	199,129	126,894	NA	YoY revenue increase of 2.5%. The towerco group predominantly serves Nigeria's four main MNOs. As of 30 June 2017, it owned 5,927 towers, with a PoP lease-up-rate (LUR) of 1.64x, based on 9,692 PoP tenants & a combined LUR (including technology tenants) of 2.07x based on 12,273 tenants.
24/8/17	ZTE	China	1H17	RMB	54,010	NA	0.55	First-half revenue increased 13.1%, powered by growth in mobile network & smartphone businesses. Carrier Networks division accounts for 59.9% of revenue.

NEW APPOINTMENTS

Date	Name	New employer	New position	Previous employer	Previous position
15/7/17	Trond Westlie	VEON	Group CFO	A.P. Moller-Maersk	CFO. Replaces Andrew Davies who is stepping down
27/7/17	Matthias Kassner	EnOcean	VP product marketing	EnOcean	Product marketing director
8/8/17	Michael J. Van Rassen	Rajant	EVP of business development	US Army	Programme manager
8/8/17	Ed Preston	Rajant	Programme manager	Northrop Grumman Information Systems	Chief engineer
23/8/17	Troy Mattern	Motorola Solutions	Head of cyber security for products & services	Zurich Insurance Company	VP of cyber security
28/8/17	Nischal Gupta	Sterlite Tech	Chief transformation officer	Flipkart	Head of corporate strategy execution
28/8/17	Manish Sinha	Sterlite Tech	CMO	QuikrHomes & Commonfloor.com	EVP & business head
28/8/17	Sanjeev Bedekar	Sterlite Tech	Chief delivery & technology officer, telecom services	Telesonic Networks	CEO
29/8/17	Yacine Barro	Microsoft	Country manager for West & Central Africa	Africa24	Executive director
1/9/17	Mohamed Shameel Aziz Joosub	Safaricom	Non-executive director	–	Joosub continues in his current role as CEO & executive director of Vodacom Group as well as chairman of the Vodacom Group executive committee & Vodacom (Pty) Ltd.
1/9/17	Linda Watiri Muriuki	Safaricom	Non-executive director	–	Retains current position as a senior partner with LJA Associates
4/9/17	Fabien Garcia	Cambium Networks	Regional sales director for France & Morocco	Ruckus Wireless	Regional sales manager
5/9/17	Tonny Tugee	SEACOM	Regional head of Sales for Kenya, Uganda & Rwanda	Safaricom	Head of enterprise sales & retention
7/9/17	Willem Marais	Liquid Telecom	Chief business development officer	Liquid Telecom	CEO for South Africa
19/9/17	Jürgen Walter	Kathrein Group	COO	Kathrein Group	Head of solutions business unit
26/9/17	Douglas Craigie Stevenson	Cell C	COO	Telekom Networks Malawi	CEO
3/10/17	Dr. Graeme Milligan	CyanConnode	Global head of integration	UK Smart Metering Implementation Programme	Consultant

SEACOM said that the deal is in line with its strategy to extend its fibre network reach to more metropolitan areas across South Africa, as well as to bolster its managed services capability for enterprise customers.

MacroLan will become SEACOM's Cape Town regional office and will lead the operator's expansion in the Western Cape market for fibre internet access to business-customer premises.

"This transaction gives us the backing of a major pan-African telecom partner, in turn offering us access to the resources and muscle we need to grow our business," said Paul Johnson, CEO, MacroLan. "Our network will now integrate directly into SEACOM's African networks and submarine cable investments."

Hytera and Motorola lock horns in patent disputes

Motorola Solutions is taking further legal action against Hytera *(see Wireless Business, Mar-Apr 2017 issue)*. But the Chinese firm has now also filed complaints against its US rival, accusing it of patent infringement.

As part of its ongoing dispute, Motorola Solutions has filed new complaints with the regional court of Mannheim in Germany that also target Mobilfunk, Hytera's German operation.

Motorola alleges that Hytera's two-way wireless communication devices with improved squelch functionality are infringing its European patent number EP1139562 B1. It is seeking an injunction preventing the company from offering and delivering products with this squelch feature in Germany, as well as the recall and destruction of what it describes as "infringing" products and various damages.

With these additional actions in Germany, Motorola now has five pending IP litigations against Hytera. They include separate patent infringement and trade secret misappropriation complaints filed with US authorities in March, and a complaint previously filed with the regional court of Düsseldorf in April.

Mark Hacker, general counsel and chief administrative officer of Motorola Solutions, says: "We are confident that the steps we are taking globally will be effective in stopping Hytera's unlawful conduct."

Hytera has so far responded by accusing Motorola Solutions of infringing its patent that covers its sound adjustment control technology.

On 28 August, the firm announced it had filed a lawsuit in a federal district court in Ohio stating that Motorola was infringing its US patent number 9,183,846. The complaint asserts that Motorola "unlawfully misappropriates" Hytera's patented technology for sound adjustment, incorporating it into its *MOTOTRBO* portable radios.

Hytera is also alleging contributory infringement and says: "Motorola has been and still is indirectly infringing [the] patent by actively inducing direct infringement by other persons who use products that embody one or more of the claims of the patent while Motorola had knowledge of the patent, knew, or should have known, that its actions would induce direct infringement by others, and intended that its actions would induce such direct infringement."

Hytera says it is seeking damages and will pursue further relief "as appropriate".

The company adds that it currently holds 480 issued patents, including 269 for DMR, TETRA and PDT digital products. Andrew Yuan, the company's president of North and South America, says: "Hytera is an adamant advocate of intellectual property rights. We will look to enforce our patents in court in the US and worldwide."

DragonWave in receivership

DragonWave has gone into receivership. In recent months, the Canada-based microwave backhaul specialist has de-listed from the Toronto Stock Exchange (TSX) and NASDAQ, and seen a number of its board directors resign.

Following an application from Comerica Bank as agent for DragonWave's senior lenders, the Ontario Superior Court of Justice has appointed KSV Kofman as receiver and manager over all of the company's property, assets and undertakings. In mid-August, the court approved an expedited sale process for DragonWave's business and assets. It set an offer deadline of 15 September 2017 and a target transaction closing date of 29 September.

In a statement issued online, the company's CFO Patrick Houston said: "The receiver has advised that numerous parties have already shown interest on an unsolicited basis since its appointment and these parties have all been included in the prospective purchaser list."

He added that the company continues to operate "business as usual" during the sales process, and that all current orders and new orders will be delivered as usual.

According to reports earlier this year, DragonWave had been struggling to repay debts of CAD17.2m, and had been trying to pursue alternative financing. On 28 July, the TSX suspended trading of the company's shares and KSV Kofman was appointed as receiver on 31 July. The following day, the board of Peter Allen, Claude Haw, Cesar Cesaratto and Lori O'Neill resigned their board director positions with immediate effect. In the US, DragonWave was de-listed from Nasdaq on 2 August.

According to James Bagnall of the Ottawa Citizen, two "seismic events" stripped DragonWave of 60 per cent of its annual revenues in just two years. He claimed one of these was a "technical glitch" that led to the vendor stopping shipments to a customer in India. The other was Nokia's acquisition of Alcatel-Lucent, which was a major competitor, effectively killing more than half of DragonWave's sales.

Huawei launches new partner programme

Huawei has launched a new global partner programme backed by an investment of USD250m.

The Solution Partner Programme includes independent software and hardware vendors, systems integrators, and consulting partners. Huawei says it will provide them with the technical, marketing and sales resources they need to design, build and market solutions based on its technologies. The investment includes USD70m for co-marketing projects.

The new programme, which is due to go live in October, will bring together all solution partners previously working with the vendor in separate programmes run by its Enterprise Business Group, Carrier Business Group, and Products and Solutions unit.

Huawei claims its solution partner programmes have already attracted more than 1,000 partners. It says that the number of OpenLabs, where partners can collaborate and test new solutions, has grown from five to 16, and that there will be a total of 24 by 2020.

Sicap uses artificial intelligence to help cut mobile churn

Customer churn costs mobile operators 18 per cent of their revenue, according to Sicap. It has introduced *AI Engine* which, it says, identifies with 85 per cent accuracy those 24 per cent of subscribers most likely to leave.

When combined with *TargetMe*, its customer engagement automation solution, Sicap says *AI Engine* predicts and identifies churn-prone subscribers by combining customer-related data, statistical and analytical techniques, and self-learning neuronal networks.

Subscriber data are provided by the company's device and SIM management platforms, as well as internal and external data sources from operators. Before deployment, Sicap says the engine's neuronal network system is trained by using an operator's historic data and then continues to increase accuracy as it learns.

Sicap says *AI Engine* provides a churn prediction list which includes potential causes for a customer switching networks, subscriber segments, and a subscriber's likelihood to churn. The results are then used to automatically engage customers with targeted and personalised incentive offers, depending on the segment the subscriber belongs to.

The company says the results from the first proof of concepts are convincing. Using predictive and adaptive data models, it's claimed that subscribers most likely to churn were identified with 85 per cent precision.

MANUFACTURER: Sicap

PRODUCT: AI Engine

MORE INFORMATION: www.sicap.com

Quick install access point at "half the price"

Aerohive Networks says it takes less than two minutes to install its new *AP150W* combination access point and switch. And it claims that the product is half the price of competitors.

According to the company, the *AP150W* is the industry's first small form factor wall plate AP and switch combination with embedded IoT capability. It offers 802.11ac Wave 2 Wi-Fi, GbE switching, Bluetooth Low Energy (BLE) and ZigBee technologies.

The firm adds that the inclusion of its subscription-free lifetime cloud management, *Aerohive Connect*, makes provisioning of the access point simple. Guest and IoT secure network access is also said to be simplified with the device's PPSK capability. Furthermore, each *AP150W* features anti-counterfeit and platform-integrity measures that protect network secrets and prevent operation without valid access verification.

The AP is said to be ideal for use in hotels, retail areas, cruise ships and residential halls. Aerohive says it can power VoIP phones, IoT sensors and cameras through its integrated PoE switch and passive pass-through port. The company reckons this provides investment protection for existing cabling and switch infrastructure.

MANUFACTURER: Aerohive Networks

PRODUCT: AP150W

MORE INFORMATION: www.aerohive.com

VSAT terminal promises efficient use of bandwidth

Advantech Wireless reckons its latest flyaway VSAT terminal includes today's most advanced technology.

The *Engage Class* 2.4m transportable terminal is designed for ease of deployment and use. It is based on a ruggedised, tri-band-ready, 2.4m flyaway antenna, which can cover X-, Ku- or Ka-bands by replacing the feed only. The antenna is optionally motorised with an integrated satellite finding controller.

The terminal features two built-in independent triple access mode satellite modems based on the new ASAT II system, or SCPC mode military grade AMT-83L modems, and Direct Sequence Spread Spectrum (DSSS) technology. Advantech claims that the ASAT II system technology allows the same modem to operate three different access wave forms, and achieve the most efficient bandwidth utilisation possible.

The RF section includes second generation GaN-based technology SSPA/SSPBs. These support X-band from 20W to 100W, Ku-band from 16W to 125W, and Ka-band from 10W to 40W.

The entire terminal is said to be fully compliant with MIL-STD-188-164a, MIL-STD-810F, NATO STANAG 4484, IP65, and XTAR.

MANUFACTURER: Advantech Wireless

PRODUCT: Engage Class 2.4m flyaway VSAT terminal

MORE INFORMATION: www.advantechwireless.com

Mesh networking boost for Bluetooth technology

Bluetooth technology is forecast for growth in many-to-many industrial-grade uses now that the Bluetooth Special Interest Group (SIG) has announced its support for mesh networking.

The group, which has 32,600 worldwide members, says the new mesh capability is optimised for creating large-scale device networks, making it ideal for building automation, sensor networks and other IoT uses where tens, hundreds, or thousands of devices need to reliably and securely communicate with one another.

The SIG believes Bluetooth mesh networking will mirror the rapid growth in connected devices when Bluetooth Low Energy (LE) was introduced. It sees commercial building and factory automation as major market opportunities, giving examples such as wireless sensors, points of interest, and wayfinding services.

Bluetooth mesh networking operates on Bluetooth LE and is compatible with core specification version 4.0 and higher.

In building automation, the group says new control and automation systems – from lighting to heating and cooling to security – are about to make homes and offices smarter, supported by Bluetooth mesh networking.

It adds that Bluetooth LE is an attractive alternative for asset tracking over active RFID.

MANUFACTURER: Bluetooth SIG

PRODUCT: Bluetooth mesh networking

MORE INFORMATION: www.bluetooth.com/mesh

Boosting Wi-Fi speeds with new AC access points

D-Link says its latest dual-band wireless AC access points will enable users to upgrade their wireless networks cost-effectively. The company says they will be able to boost wireless speeds, tap in to the 5GHz wireless band where there is less interference, and create an easy-to-manage wireless network that can grow with the business.

MANUFACTURER: D-Link

PRODUCT: AC access points

MORE INFORMATION:
www.d-link.com

There are two new models to choose from: the *DWL-3610AP* selectable dual-band unified access point, and the *DWL-6610APE (pictured)* which also has external antennas. Both have dual-band support for 802.11n and 802.11ac and up to 867Mbps on the 5GHz band.

With centralised management, D-Link says up to 16 units can be grouped to form a self-configuring cluster. With the company's wireless controller, up to 1,024 APs can be centrally managed.

With multiple SSIDs, up to 16 virtual access points *(DWL-3610AP)* or 32 virtual access points *(DWL-6610APE)* can be created from a single AP. D-Link says that enables Wi-Fi resources to be separated for different purposes, such as internal/guest access, PoS equipment, electronic signage, etc.

The firm has also redesigned its A120 dual-band unified access point, the *DWL-6610AP*. Like the new *DWL-6610APE*, it is now less than 4cm in height so that both can be installed discreetly on a ceiling or wall.

Calix claims "more revenue and less hassle" for service providers'

Service providers can increase their revenue and cut service costs by offering their own Wi-Fi products, says Calix. The company reckons its products can now offer carrier-class Wi-Fi for subscribers at a fraction of the price being paid for consumer-class mesh products.

MANUFACTURER: Calix

PRODUCT:
Gigacenter & 804Mesh

MORE INFORMATION:
www.calix.com

Calix claims its mesh-enhanced carrier class Wi-Fi solution is the first to be designed specifically for communications service providers. It is delivering mesh-enabling software upgrades to its *GigaCenter* solutions and adding the new *804Mesh* satellite Wi-Fi repeaters which have been designed for self-install to ensure that subscribers get up and running at the lowest cost possible.

GigaCenters offer either 2.4GHz or 5GHz with concurrent dual-band networking, allowing continued usage of the 2.4GHz band for data and legacy consumer devices while supporting IPTV and high-speed data at 5 GHz.

Both products can be managed via Calix's cloud service.

According to the firm, more than 50 per cent of service provider customer care calls are about Wi-Fi. This means that even if the service provider is not managing the equipment, it is still paying the costs of supporting subscribers, and facing the risk of increased churn if the problems were not solved.

IDT offers operators a stronger voice

According to IDT, the international voice industry is in a "little bit of trouble". Revenues are decreasing, margins are "razor thin", traffic is migrating to OTT apps, and the move to IP technology has removed one of the barriers to entry into the international wholesale voice market.

MANUFACTURER: IDT

PRODUCT: Voicehub

MORE INFORMATION:
www.idt.net

As a result, IDT has come up with *VoiceHub*. This is specifically designed for any telecom operator with inbound or outbound international voice traffic that wishes to leverage IDT's resources and expertise to boost its operating and financial performance.

VoiceHub offers a portfolio of outsourcing solutions to address the specific circumstances of an operator based on region, volumes and routes. It features a range of different solutions which include a hybrid arrangement. This is where an operator wishes to retain certain routes or customers directly while optimising the rest of its business. Here, IDT would simply manage a subset of destinations, for example, regional or long tail.

Other solutions offered include managing the inbound traffic flow, minimising grey routes, and bypass eradication; and managing the inbound and outbound traffic.

IDT claims it has the global reach, minute volumes, network and the expertise to be able to achieve financial stability for a telco's international voice business.

ALSO LOOK OUT FOR

Network bonding tech promises seamless fail-safe connections

Livewire Digital has come up with a new product that it says could help the emergency services save lives.

According to the UK-based company, *Razorlink* will provide mobile phone users with ubiquitous and seamless coverage via satellite and terrestrial cellular networks. It says the technology is based on cross platform software that operates in the background, completely transparently to the user's application.

Razorlink has been designed for use over WANs such as international links, cellular, Wi-Fi and satellite. It features the ability to bond 3G, 4G, Wi-Fi, DSL and satellite connections to increase the available bandwidth and to offer a backup network for critical application.

Livewire gives the example of paramedics who need advice while on the move. It says if a cellular signal fails, *Razorlink* connects to a satellite service; if line of sight is lost during a satellite call, it can switch to an available mobile service. In both cases, the firm says that there would be no break in connection.

It adds that *Razorlink* can aid connectivity issues in Africa by making access to the internet and cloud services faster and more reliable.

Livewire has been awarded EUR900,000 by the European Space Agency to take the technology's development to the next stage. The firm says it will use the funding to accelerate the development of the SDN technology that it uses for network bonding. Development will include enhancements to the protocols, scaling for SaaS and cloud service offerings, and integration with backend infrastructure to facilitate deployment in telco networks.

RazorLink Smart Networking is available as software for *Windows*, *Mac* and *Linux OS*, or as a 'black box' device, similar to a router. Alternatively, *Razorlink* can be virtualised as private or cloud-based endpoints.

AFRICAN.

We can bring world-class banking to all of Africa.

We believe better, more accessible banking can help unleash Africa's unlimited potential. It's why we've built Africa's largest fibre infrastructure and provide an award-winning satellite network, capable of making systems faster, more dependable and more secure across the continent. Because we are not just a telecoms company.

We are your technology partner.

LIQUID TELECOM

www.liquidtelecom.com

Building Africa's digital future

There are plenty of technological solutions to cost-effectively connect the unconnected, including Google's ambitious *Project Loon* that has attracted much interest in Asia.

Flights of fancy

Billions of people around the world have yet to make their first phone call, let alone access the internet. Connecting them is going to prove to be industry's toughest challenge yet, as RAHIEL NASIR discovers.

Five billion people across the world are now mobile subscribers. That milestone was reached earlier this year and, according to the GSM Association (GSMA), a further 620 million users will be added by 2020 to reach almost three quarters of the global population. Asia will drive the growth and account for 60 per cent of new subscribers globally. Sub-Saharan Africa will represent 16 per cent (99 million additional users) while MENA is forecast to account for seven per cent (41 million additional users).

But in its *Global Mobile Trends 2017* report published in September, the GSMA warns that the rate of growth is slowing. It says that while it took four years to move from four billion global subscribers to five billion, reaching the next billion will take longer and will be the "toughest challenge" yet.

And with 50 per cent of the world's population still not online, the report says: "The digital divide is greatest in India and sub-Saharan Africa which account for 42 per cent of the world's unconnected, with more than 60 per cent of their respective populations not yet on the internet."

At current rates of progression, Ericsson predicts that mobile broadband will provide network coverage to around 95 per cent of the world's population by 2022. So will that be sufficient for wireless service providers? With dwindling ARPUs continuing to afflict mobile operators everywhere, what incentives do they have to invest in rolling out their networks to remote and rural areas?

Sort your costs out

Canada-based NuRAN Wireless has developed cost-effective mobile network infrastructure to enable rural connectivity in emerging markets. Bradley Shaw, the company's MEA regional manager, believes that there are profits to be made in such low ARPU environments, as long as operators make the right equipment choices. "You just have to be efficient with the capex and the opex. Operators had no interest in expanding service into remote rural areas with traditional infrastructure because it meant operating at a loss. We now see operators rolling out sites based on NuRAN, and soon-to-come *OpenCellular*, for less than USD30,000, and paying back the investment in less than 18 months. Some low-traffic sites even get built for USD10,000, all inclusive. The efficiency in terms of spend is critical when you're working in low ARPU environments."

OpenCellular is one of the initiatives being developed by the Telecom Infra Project (TIP). Established in 2016, TIP describes itself as an "engineering-focused" collaboration between operators, suppliers, developers, integrators and startups. Their aim is to come up with fresh technologies, examine new business models, and drive investments into telecoms. Its *OpenCellular* project group focuses on the development of wireless access platforms and is co-lead by experts from NuRAN Wireless, Facebook, Keysight, amongst others.

Earlier this year in June, NuRAN presented details of its new *OpenCellular* product, the *OC-2G* to TIP members. The company said that the base station will be integrated with its proprietary software stack and base station controller in order to form a complete RAN solution for carriers looking to expand their footprint to communities of 400 to 1,500 inhabitants.

But, as has been well documented in the industry and as Shaw goes on to reiterate, it's not just a question of deploying mobile infrastructure in remote and rural areas. For example, he says: "Voice traffic, as we all know, is declining and data services are increasing. The use of data and

the increase of ARPU through data services is largely device-driven, but in rural areas you have very low penetration of smartphones."

Of course that is likely to change moving forwards with the GSMA pointing out that, like subscriber growth, smartphone uptake is also being driven by developing markets. In its *Global Mobile Trends 2017* report, the association said that Nigeria is one of five markets forecasted to account for more than 40 per cent of the 1.6 billion new smartphone connections by 2020 (the others are India, China, Indonesia and Pakistan).

The power to succeed

However, the challenges of remote and rural connectivity cannot simply be solved by building low capex and low-cost networks and making affordable handsets available. From Africa to Asia, another basic problem in many emerging markets is a lack of grid power. (*Also see Power Africa update report, News, p7*)

"We are seeing sites that are being closed down because they are not profitable," says Shaw. "Why is that the case? The operator is running a diesel generator which is, say, five hours from the closest urban environment. So the cost of purchasing the diesel on top of the cost of shipping it makes that site unsustainable. Whereas if the operator had put in a solar, low-powered base station, the returns from that site might be marginal but at least it would still be breaking even."

NuRAN itself offers several products here, including the *LiteCell 1.5* which it claims is the world's "most affordable, lowest power consumption, and easiest to deploy GSM base station". Specifically designed to reach the next billion subscribers, it is said to only consume 65W, thereby minimising the capex associated with solar panels and batteries, or opex in the case of diesel-powered sites.


Bradley Shaw, Regional manager MEA, NuRAN Wireless

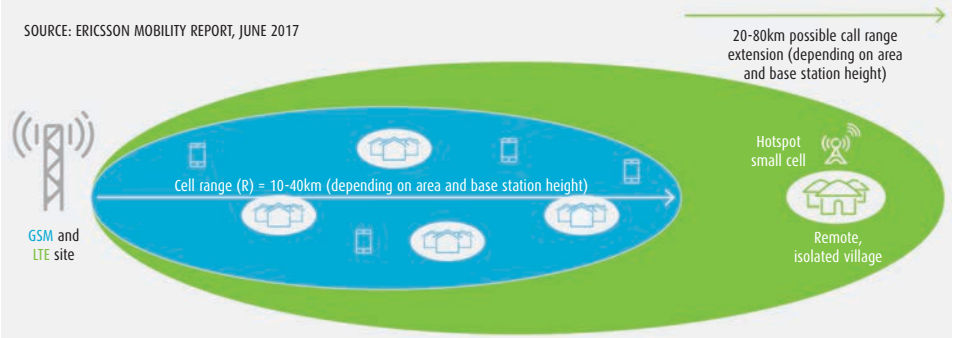
"The use of data and the increase of ARPU through data services is largely device-driven, but in rural areas you have very low penetration of smartphones."

The firm adds that the hand-carried, tower-mounted *LiteCell*, does not require any machinery to install, nor any kind of shelter to protect it. Antennas connect directly to the unit, while an all-IP interface makes it easy to connect to any IP-based terrestrial or satellite backhaul.

Earlier this year in May, wholesale operator Raeanna Group announced that it would use NuRAN's system for more than 1,000 sites in Nigeria over the next five years. This followed a separate deal with Global Communications Extension Services which will also use the vendor's platform as part of an initial deployment for an unnamed Tier 1 MNO in Nigeria.

Of course, NuRAN is not the only company to make specialised infrastructure for remote and rural mobile sites. Since 2004, India's Vihaan Networks Limited (VNL) has been developing and offering low-powered base stations that can be run using solar energy as part of its *WorldGSM* system. The company, which is part of the Shyam Group, says its systems have since been deployed to rural areas in Kenya, Uganda and Ghana, as well as many other Asian countries.

Another innovative infrastructure specialist that made its debut in the telecoms market a few years ago is Range Networks, the US company that claims it developed the industry's first



Example of solutions for providing mobile broadband coverage in remote rural areas.

commercial open source cellular system. Range says its software runs on off-the-shelf hardware that is typically less than 20 per cent of the cost of custom hardware to deliver full-featured mobile services. It reckons this allows the operator to make a profit while charging a price that "almost any" subscriber can afford.

Range has designed its system to support different radio interface protocols. It says the system can run as virtual machines on the same standard *Linux*-based server hardware while sharing the same 'IP core'. The same software is utilised for microcell to macrocell coverage, with the operator or systems integrator mixing-and-matching COTS hardware for the most appropriate, complete coverage solution. The solution provider can either virtualise network functions or implement a self-contained *Linux* OS base station.

"This means that a greenfield carrier can start with a simple 2G network and, over time, develop a mixed 2G-3G-4G system, using whatever technology is best adapted to particular sites," states the firm. "Core network upgrades are just capacity upgrades, replacing existing servers with more cores or faster processors as the traffic volume increases, or by adding incremental software upgrades to provide new features, such as MMS, as they become available."

In 2013, working in collaboration with the University of California Santa Barbara, Range installed a two-tower cellular extension in rural Zambia to expand coverage of an existing cellular network (*News, Jul-Aug 2013*). The village is home to more than 130,000 people but is spread out over an extremely large area. Many large sections of it are without cellular service.

A water tower and school building were used to mount two new systems running Range Networks' software. Working in tandem they added approximately 35km² of new coverage for the residents. It's claimed that it took just two days to establish this new infrastructure.

One project that has been garnering headlines over the last few years is *Project Loon*. The initiative is being developed by Google as a way of putting broadband within reach of millions of currently unconnected people. It involves 12-metre tall balloons that act like floating mobile towers. They fly on stratospheric winds at altitudes twice as high as commercial planes, and are fitted with low-powered electronics to beam an internet connection down to the ground. As one *Loon* drifts out of range, another moves in to take its place (*also see News, May-Jun 2013*).

The project has undergone trials in many countries, notably in South Asia. For instance in Indonesia, it has been tested by the country's three biggest cellcos, while in Sri Lanka the government has bought a 25 per cent stake in a joint-venture setup with Google in return for the spectrum that will be allocated for the project. But in February 2017, it was widely reported that the ITU blocked Google from using the same frequency as Sri Lanka's public broadcasters over fears of interference.

Faster than fibre – the new space race

When it comes to connecting remote and rural users, satellite technology comes into its own in terms of its speed of deployment and ubiquitous coverage.

But at the same time, critics often point out the high price of satellite capacity which, it would seem, is at odds with the idea of MNOs drawing a profit by investing in building networks to low ARPU outposts.

The satellite industry is countering by talking about decreasing satellite prices, particularly in terms of the cost per megabit rather than cost per megahertz. And if the analysts are to be believed *(see Wireless Business, Jul-Aug 2017 issue)*, the market looks set for further price falls as the latest generation of smart and efficient high throughput satellites from the likes of ABS, Intelsat, Yahsat, *et al*, find their way into space.

But the real game-changer is likely to come with the launch of the low-Earth orbit satellites (LEO) that have been much talked about over the last few years. Even the GSMA in its *Global Mobile Trends 2017* report believes that satellite "has re-emerged from the ashes of failed attempts in the early 2000s" as an alternative connectivity option. It said the technology could provide an alternative backhaul option in reaching rural unconnected areas in emerging markets and serve as a complement to mobile networks, offering capacity wholesale to operators.

One of the companies that has attracted some big name backers for its LEO mission is OneWeb. With directors from major players such as Airbus, Bharti, Coca-Cola, Intelsat, Virgin and others on its board, the company's aim is to fully bridge the digital divide by 2027.

OneWeb says its small satellites will feature fewer components and weigh less than 150kg, thus making them easier to produce at scale and cheaper to launch. Once in space, they will create a 'mesh' style network by intelligently interlocking with each other to create a planet-wide footprint.

Working with manufacturer Airbus and its launch partner Virgin Galactic, OneWeb plans to send its first 10 satellites into space early next year. Assuming these successfully pass all in-orbit tests, the full launch campaign will begin six months later with services going live in 2019.

OneWeb will ultimately use a constellation of 648 satellites orbiting the Earth at an altitude of around 1,100km. The company reckons this closer position will result in much better web performance, and is targeting latency of around 30 milliseconds – that's much lower than the 240ms delay geostationary satellites suffer from as they circle the planet at an altitude of approximately 35,786km above the equator.

US-based LeoSat is aiming to go even better with its constellation of around 78 to 108 high-power Ka-band satellites that are planned for launch in 2019. They will use polar orbits to provide full global coverage, and each one will be interconnected using unique laser links. Once uplinked to the constellation, LeoSat says data will travel from satellite to satellite until it reaches its downlink destination – there is no need to interconnect with any third-party network or any satellite gateway infrastructure to carry data.

According to the company, all this effectively creates an optical backbone in space which is about 1.5 times faster than terrestrial fibre backbones. It promises an average latency of below 120ms, which would make it better than terrestrial fibre. LeoSat's website explains that it is all down to physics: "Light travels faster in free space than it does in a fibre optic cable once that cable reaches a certain length. Our services will start making up the extra distance [light] has to travel back and forth to the spacecraft (at 1,400km), and then get ahead of fibre. That critical cable length is about 5,000-5,500km, subject to the type and age of cable, the amount of switching panels on the route, the latitude of the begin and endpoints of the connection, to name a few variables."

2G, 3G, 4G or 'white elephant'?

When building networks in greenfield sites today, MNOs may face a dilemma: should they invest in basic but higher margin 2G networks, or enable first-time users in remote and rural areas to 'leapfrog' technologies and benefit from faster but pricier next-generation infrastructure?

"You have got to look at the device penetration in these areas," advises Shaw. "The way that operators can do that with 100 per cent certainty is to put up a 2G network, cover everywhere, and then see what devices are registering on their network. Where they find there are pockets of high-penetration 3G devices, build 3G networks. And if by some chance they find pockets of very

high 4G-enabled devices, they should put up a full LTE base station."

Ericsson agrees here. In its *Mobility Report* published in June, the vendor offers detailed advice about how operators should go about choosing the right generation mobile technology.

For instance, in areas already covered by 2G, it says factors such as demand for connectivity, availability of device types, cost sensitivity among mobile subscribers and operator business case will influence whether upgrading to 3G or 4G coverage will be preferred as an initial solution.

One of the ways operators can decide which sites to upgrade from 2G to 3G and/or 4G is by using CDRs associated with the existing network. Ericsson says the data here can determine which 2G sites have the highest number of expected mobile broadband-capable users.

Another useful exercise for MNOs is to see how their spectrum assets match the capabilities of their subscribers' device capabilities. "Existing spectrum assets, spectrum re-farming opportunities and device penetration (supported technology and bands) influence the revenue potential of 3G and 4G deployments," states the report.

But the GSMA is keen to point out that operators should avoid a 'if you build it, they will come' type mentality. Despite the fact that most advanced countries now have national 4G networks, its says take-up patterns are mixed. It even describes India as an anomaly: "Coverage is out of sync with consumer demand. With operators only able to reduce pricing so much in an already competitive market, the risk is that 4G becomes a 'white elephant'."

So what about delivering mobile broadband to areas where there is no coverage, 2G or otherwise? Here, Ericsson says that any villages that are within 2G coverage zones, can be upgraded with 3G or 4G. Villages outside these zones can then install an outdoor high-gain antenna that can be used to provide fixed wireless broadband access to important hotspot sites within the community.

"This solution requires low investment and the 4G site can serve a hotspot that is located 20-80km outside the 2G coverage range," says the report. "In this scenario, the school or hospital is equipped with a roof-top antenna which, as an example, would get 3Mbps downlink speed (wireless indoor coverage and LTE modem connected to, for example, a Wi-Fi router) at a distance of 100km away from the 4G-upgraded base station site using 2x10MHz of spectrum."

Making the connection

Clearly, connecting the next billion people requires a monumental effort, and the responsibility does not lie solely with the operator. An entire ecosystem of vendors, developers, regulators, governments, etc., has to be mobilised in order to make it happen.

The GSMA has developed a *Mobile Connectivity Index* that measures and quantifies the barriers to mobile internet access across four key enablers: infrastructure; affordability; consumer readiness; and content. The index is built up through 39 specific indicators, such as mobile tariffs, handset prices, spectrum, local incomes, etc., to ultimately give each country an aggregated score from 0-100 for each of the four enablers.

According to the index for 2016, Australia topped the rankings of 150 member countries with an overall score of 87.3. It was followed by Norway (85.5), New Zealand (85.2), Finland (83.9) and Singapore (83.4).

The first African country to appear is Mauritius which ranks 76th with an overall score of 62.71. South Africa comes in next in 84th place with 59.97, followed by Tunisia at 89 with a score of 57.42 *(see GSMA Mobile Connectivity Index table, right).*

African countries go on to dominate the lower end of the table. Niger is at the bottom with an overall score of 17.2. It was only slightly outperformed by the DRC (17.7), followed by Chad (20.2), Guinea (20.3) and Afghanistan (23.1).

Thus, mobile coverage is not the only barrier according to the association's *Global Mobile Trends 2017* report. It states: "The largely rural populations and lack of fixed line infrastructure make extending coverage a long-standing challenge for many developing countries. Of the 3.7 billion not yet on the internet, around a third (1.2 billion) live outside a 3G or 4G signal and so could be considered excluded because they don't have fast enough coverage.

"The corollary is equally important: for two thirds of the unconnected, coverage is not the problem. Affordability, content relevance, literacy skills and gender factors are all part of the discussion." ■

GLOBAL POSITION 2016	COUNTRY	OVERALL SCORE 2016	OVERALL SCORE 2015	OVERALL SCORE 2014
75	Mauritius	62.71	60.96	57.07
84	South Africa	59.97	57.40	54.26
89	Tunisia	57.42	53.31	51.35
95	Morocco	55.14	51.76	47.44
96	Egypt	54.95	54.94	53.11
99	Algeria	52.72	48.50	45.47
102	Botswana	51.16	48.17	45.48
103	Namibia	50.21	48.60	46.87
106	Ghana	48.73	44.96	44.02
110	Angola	48.23	45.23	40.99
114	Gabon	46.40	41.90	39.52
116	Swaziland	43.86	39.63	37.10
117	Nigeria	42.02	39.25	36.02
118	Kenya	41.66	38.07	35.12
120	Lesotho	39.69	37.13	33.36
121	Sudan	39.16	37.34	34.35
122	Ethiopia	38.67	31.20	26.48
124	Zimbabwe	37.99	34.72	32.01
125	Cameroon	37.92	32.95	31.27
127	Congo	37.45	35.64	32.88
128	Tanzania	37.29	29.83	27.20
130	Rwanda	35.63	34.35	30.07
131	Côte d'Ivoire	35.52	31.43	28.93
132	Senegal	35.26	32.52	30.31
133	Zambia	34.99	32.10	30.95
134	Mozambique	34.16	32.20	29.21
135	Sierra Leone	34.14	30.26	27.05
136	Gambia	33.90	31.29	29.90
137	Mauritania	33.05	29.13	25.19
138	Liberia	32.94	29.03	25.25
139	Madagascar	32.16	31.25	25.53
140	Uganda	31.58	27.03	23.93
141	Benin	31.23	28.71	26.88
142	Togo	29.93	27.42	24.07
143	Mali	28.91	26.36	25.59
144	Burkina Faso	28.59	26.06	22.69
145	Malawi	23.06	26.49	24.62
147	Guinea	20.31	19.78	14.13
148	Chad	20.21	17.03	17.55
149	DRC	17.66	15.85	14.43
150	Niger	17.22	16.20	15.26

Extrapolated data for African countries from the GSMA's *Mobile Connectivity Index.* SOURCE: GSMA INTELLIGENCE

Challenged by the bush

Much of the 700km *Absa Cape Epic* cycling race takes place in remote locations and wildlife reserves without any comms infrastructure.

From recreation to media creation, the continent's remote and harsh terrains present tough challenges for wireless network providers to overcome.

Since 2002, the Discover Africa Group has been helping travellers to experience Africa's beauty and diverse wildlife. In an effort to attract new tourists it has developed *HerdTracker*, a web app that allows users to see the spectacular great wildebeest migration that take place across the Serengeti plain. They can witness the event unfold in real-time on a Google map, and keep up with a *Twitter*-style timeline.

After seeing the app, Kenya's tourism authorities realised that it could help encourage holidaymakers to choose the country as a holiday destination. They then approached Discover Africa and gave the company a brief to use *HerdTracker* as the centrepiece of a 'good news' story to promote Kenyan tourism.

In its response to brief, Discover Africa wanted to do something different. Rather than simply publishing content on the app, the tour operator wanted to provide an insight into some of the unique experiences Kenya has to offer. It wanted to create a world first and share with potential holidaymakers the awe-inspiring 'great migration' that takes place when more than two million animals travel from the Serengeti National Park in Tanzania to the greener pastures of the Masai Mara National Reserve in Kenya during July through to October.

The annual wildebeest migration is described as one of the world's most breathtaking and spectacular sights, filled with chaotic scenes of the animals thundering through the bush – this was the spirit that Discover Africa wanted to capture. As the migration has been filmed, photographed and documented many times over, the company came up with an idea that would bring the migration to people, wherever they are located, by streaming live footage of the event.

While 3G coverage in the Masai Mara National Reserve is surprisingly good, it is patchy and doesn't offer the reliable bandwidth needed to stream live video. Discover Africa turned to the idea of satcoms and approached Applied Satellite Technology, South Africa (AST SA) and its local reseller Sat4Rent, to understand if there was a dependable connectivity solution to stream live footage.

In what was claimed to be a world first, Discover Africa filmed the great migration of wildebeest, and shared it online with the world in real-time.

Discover Africa chose Inmarsat's global *BGAN HDR* service. As well as offering a diverse range of streaming options, the company says that the asymmetric half-channel rate accessed through a *SATCOM EXPLORER 710* portable satellite streaming terminal offered the optimum balance of image quality.

AST SA's technical support team showed Discover Africa how easy it was to set up a streaming connection in minutes, using a terminal which is the size of a laptop. The film crew was then ready to set out for the wilderness to capture the migration live and in real-time for the world to see. When the wildebeest made their move, for a week period, viewers were taken on journey to experience the thrill of the migration with two daily live broadcasts. Discover Africa's team used *BGAN HDR* to live stream the event to *YouTube*, and Periscope to upload footage to the *HerdTracker* website. *Periscope* is a streaming app that can be accessed and controlled via a smartphone. Satellite connectivity enabled viewers to ask rangers in the vehicles on the Masai Mara questions in real-time.

Discover Africa successfully completed the world's first live streaming of the migration. The tourist authorities were satisfied that the live satellite feeds helped increase awareness of what Kenya has to offer. As well as attracting global media attention from the likes of the BBC, CNN, Time, etc., the pre-event promotional campaign

is said to have reached 1.7 million people with 140,000 engaged via social media channels; there were 58 live web broadcasts on *Periscope* totalling more than 8.5 hours of streaming video with an average of 200 viewers per broadcast, and more than 25,000 views on *YouTube*.

Up close and personal with big cats

Freelance journalist and award-winning National Geographic explorer Martin Edström is on a mission to re-invent the way animals are filmed in the wild. While conventional film makers merely aim to get in close, his pioneering technique aims to put viewers at the heart of the action. One of his more recent videos, *Lions 360*, presents a cat's-eye view of life in a Zambian pride. It clocked up three million hits within three weeks of going live on Facebook for National Geographic.

This kind of immersive storytelling is said to result from meticulous planning and expert use of technology in extremely challenging conditions which have to be overcome before filming can even begin.

Working with National Geographic for the video shoot in Zambia in November 2016, Edström needed a broadband data device that would enable him to send photos and post to social media every day while deep in the bush. He chose the Thuraya *IP+* satellite data terminal.

Most days, the team set out before dawn to look for lions in Zambia's South Luangwa National Park. They stopped to rest in the shade during the hottest hours from 11am to 3pm, and set up the Thuraya on the roof of the vehicle, using it to upload images and video captured in the morning to the team back at base camp. Edström says it was very quick and easy to get the terminal up and running. He says: "It was our mobile office in the bush and made it possible to work even in this very remote place. We used the *IP+* to coordinate our daily activities with our hosts, the Zambian Carnivore Programme, and to stay in touch with our colleagues and families in Sweden."

Finding lions to film was only the first step. The next challenge was to get close to the predators without endangering either people or equipment. The secret was a video camera mounted on a large remote-controlled car that was armoured. It took the team about one week to get the lions to accept the car and camera. After that, it was a matter of keeping out of the way and remaining patient as the stunning footage rolled in.

Edström and his team also carried Thuraya's rugged *XT-PRO* satphone for voice calls and messaging. Its value as an essential item of safety equipment in dangerous environments was proved on the day that, according to Edström, "everything went wrong".

First the team forgot to take enough food and water. Then their Land Rover became stuck in a dried-up riverbed and an axle broke as they tried to drive out. Finally, as they laboured in 45º heat and blazing sunshine to patch it up, they spotted a pride of lions taking an interest in what they were doing. It could have been a nasty moment but Edström and his companions were on top of the situation.

"We were relieved to have the *XT-PRO* with us because you cannot always rely on radio in the bush. "We had already used it to tell our colleagues at the Zambian Carnivore Programme what had happened and to get advice. They helped us plan a route home that our damaged vehicle could handle."

As for the lions, they were no threat as long as they kept their distance. "They were feeling the heat too and weren't in the mood to bother us," says Edström. "We were actually very pleased to see them because one was a large male we had been trying to locate for a long time."

The male, named Pala by the team, went on to become one of the stars of the video.

On another occasion, the vehicle broke down in the bush late in the day. The crew couldn't get the radio to work, so they used the *XT-PRO* to call base and get advice from a mechanic, who got them home before dark. "The *XT-PRO* has great battery life, so it was always charged and available if we needed it," says Edström.

Going forward, Thuraya says it is evolving its data offering for those who continually operate on the fringes of reliable coverage. The company has recently launched its *WE* service that allows users to switch automatically between satellite and GSM networks with a click of a button using a mobile app and web interface. The company says it also allows users to connect up to 10 smart devices wirelessly and share internet within a range of about 100 feet.

Left: Martin Edström and his team used Thuraya's *IP+* satellite data terminal and *XT-PRO* satphone – the latter proved crucial during one fateful day when "everything went wrong". **Right:** a video camera mounted on an armoured remote-controlled car was used to capture close-up footage.

The *Rallye Aïcha des Gazelles* is a women-only rally that sees competitors race across 2,500km across the Western Sahara. PHOTO: MAIENGA

Supporting desert racers

Marlink – Airbus Defence and Space's re-branded commercial satellite communication division – is supporting the *Rallye Aïcha des Gazelles*, a 100 per cent women-only off-road rally which attracts more than 120 teams from 30 countries.

Organised by French event company Maienga, the rally takes place in March every year, and sees the competitors cover 2,500km in six legs across the Western Sahara. Given the remoteness of the region, reliable satellite and radio communication services are a top priority for both logistics and safety.

Marlink has provided communication services for the *Rallye Aïcha des Gazelles* for 25 years. According to the global business critical communication solutions specialist, its responsibility as the turnkey communications provider is far-reaching.

The firm's satellite links are used to enable internet access for the organisers and media working in the camps. The satellite connectivity is also used to provide VoIP services at the rally control centre and to offer recreational services to the competitors, enabling them to call home.

Marlink also provides airborne radio networks for audio communications between field staff and the local control centre. Two helicopters cover each leg transmitting duplex radio communications to fixed terrestrial relay stations. Organisational vehicles used by medical teams and assistance vehicles, for example, are equipped with radio receivers so that they can communicate with the HQ and be dispatched for prompt assistance to injured or stranded competitors.

Tracking and safety services are provided by Marlink's satellite-based *Iritrack* system, and distress beacons are mandatory equipment for all racers. In addition to real-time tracking of competitors, *Iritrack* enables them to send alarms to HQ in case of emergencies or make hands-free calls via integrated voice capabilities.

Marlink says its field engineers ensure the smooth functioning of all communication services deployed in the field. They are responsible for the technical maintenance of the fleet of tracking devices, and assist safety and security staff to monitor the rally from the control centre.

Connecting the world's toughest mountain bike race

When the *Absa Cape Epic* was launched in 2004, founder Kevin Vermaak wanted to create a mountain biking stage race that would capture the world's imagination. He created several unique aspects, including making it the world's first team endurance event, with riders – who could be amateurs as well as pros – having to race in pairs.

However, the most visible differentiator is having much of the eight-day event take place in remote locations and wildlife reserves that are often subject to extreme weather conditions. Most of the 700km race therefore fell into terrain without infrastructure. An innovative solution was therefore needed to enable riders, organisers, the venue operating centre, caterers, medical personnel and media to communicate with one another and the outside world.

Dimension Data was called in to design a solution and then deploy and manage it. Working with its subsidiaries, Internet Solutions and Britehouse, as well as with Cisco, it implemented a secure LAN and WLAN based on an enterprise class 10G fibre backbone, capable of supporting location-based services and collaboration tools.

By supplying strategic hotspots with high-speed, high-performance connectivity, Dimension Data says Wi-Fi 'bubbles' along the route enable live streaming that has enhanced both broadcast and social media coverage. For instance, the thousands of riders participating in each event can now use their smartphones and *GoPro* cameras to communicate their race experiences with their own audiences.

The company adds that the network connects everyone involved in the race in real-time. For example, the mobile race hospital is connected to the Mediclinic national hospital network, enabling field triage and aftercare treatment.

Logistics vehicles and riders are also tracked. Fans can see where their riders are on the route, where they finish, and what their ranking is. Competitors can upload their own stats to assess their performance on the go.

Dimension Data says it continues to develop the network for each tournament. For instance in 2015, it included live video conferencing with UK commentator Rob Warner at the course hotspots; in 2016 it expanded with live coverage from the route and on-screen data snippets; and for this year's competition, a race centre app was deployed along with Microsoft's *Power BI* tool for real-time analytics. This enabled the display of the professional riders' heart rates and power data on the race website.

Satellites will look after the safety of riders during next year's *Absa Cape Epic* following a new partnership between the organisers and Globalstar Satellite Africa. It will provide each of the 680 teams with a lightweight *SPOT Gen3* device. *SPOT Trace* devices will also be supplied to 60 support vehicles and two helicopters.

The agreement with Globalstar is part of a three-year investment that sees the race migrate from a GSM-based cellular tracking system to one that uses satellite.

Working with Cisco, Internet Solutions and Britehouse, Dimension Data implemented a secure LAN and WLAN based on an enterprise class 10G fibre backbone.

The company says that given the remote, rugged nature of the Western Cape, some sections of the route have little or no cellular coverage. For instance in the past, it says riders would sometimes disappear from the race website tracking for long periods on the GSM network.

Globalstar says satellite technology will allow fans, friends and family to follow the progress of the teams on the race website and via an activation at the race village. It says the use of its devices will ensure continuous connectivity and enable the organisers to keep tabs on all teams from start to finish during each stage. Should a rider need assistance, he or she can simply push the S.O.S. button on the *SPOT Gen3* to alert the organisers to set in motion emergency support if needed.

The event organisers has also developed the *Epic Command* platform that will manage the flow of the data from the tracking units and ensure that all of the relevant parties receive the required feed.

SPOT to the rescue during Saharan marathon

Since being founded in 2007, Globalstar has become no stranger to supporting extreme recreational events around the world including Africa.

For example in 2016, its *SPOT* devices were used to safeguard the Gin South African Nationals, the biggest paragliding event of its kind on the continent. Over seven days in December, more than 100 competitors averaged 70km to 90km per day as they raced across the remote Cederberg and Winterhoek mountain ranges, Swartland, Berg River and Breede valleys, all the way to the border of the Northern Cape.

The devices are also used during the *Titan Desert* race that takes place every April and sees 400 extreme cyclists ride more than 660km across Morocco's cold Middle Atlas mountains followed by the vast expanses and searing heat of the Sahara.

In another deployment, 18 athletes were rescued thanks to the *SPOT Gen3* during the 2015 *Marathon Des Sables*.

During what's said to be the world's "most extreme running race", 1,330 competitors faced the most extreme terrain as they raced 250km across the sands of Morocco in temperatures as high as 50°C.

As with the previous year's event, all race marshals carried Globalstar's devices, and they were also outfitted on security vehicles, medical vehicles and helicopters. In addition, customised software was provided by athletic gear and tracking specialist WAA Tracking, Globalstar's partner based in France. Thanks to this interface, sponsors, friends and families of participants were able to search for and locate the positions of individuals and teams.

During the race, organisers were able to precisely locate 18 competitors in distress and quickly dispatch rescue personnel. For example, when one Japanese competitor digressed from the normal route, WAA's geo-fencing software, *MDS_PC Course*, raised an alarm that alerted race headquarters instantly. The participant was moving away from the official route in an area that was particularly difficult to access, even for the rescue team's experienced 4x4 drivers, so one of the race organiser's two helicopters landed close by. The doctor on board checked the athlete's health and declared him able to continue the race. The crew advised the athlete how to get back on course since any competitor who is transported is automatically disqualified.

Commenting at the time, *Marathon Des Sables* CEO Patrick Bauer said: "With sand in their eyes and no other athletes nearby, competitors can easily miss the markers and stray off course. Thanks to *SPOT Gen3*, we can ensure more athletes complete the race by quickly spotting anyone wandering off route as well as getting immediate assistance to anyone who presses the SOS button." ■

During what's said to be the world's "most extreme running race", more than 1,000 competitors race 250km across the desert sands of Morocco in temperatures as high as 50ºC.

emcom

Whatever YOUR communication requirements.

EMCOM has the solution.

- TWO-WAY RADIOS
- DMR
- MICROWAVE
- MPT 1327
- TETRA
- QUASI SYNC

Tel: 031 3129288 Fax: 031 3129296

www.emcom.co.za

1 – 5 Adrain Road, Stamford Hill, Durban 4001

Mission Critical Africa

Co-located with Africa Com

Supported by TCCA

7 - 8 November 2017
CTICC, Cape Town

BUILDING SAFE CITIES THROUGH TECHNOLOGY INNOVATION

FROM THE PRODUCERS OF THE CRITICAL COMMUNICATIONS WORLD SERIES COMES AFRICA'S FIRST DEDICATED MISSION CRITICAL TECHNOLOGY EVENT

"HAVING EVENTS SUCH AS MISSION CRITICAL AFRICA WILL GO A LONG WAY TO ENLIGHTEN, CONVINCE AND PROVIDE GUIDANCE TO A LARGER AUDIENCE OF DECISION MAKERS."

THOMAS BOSMAN, MANAGER, SPECIALISED ELECTRONIC & RADIO SERVICES

tmt.knect365.com/mission-critical-africa

#MCAFRICA

Delivered by KNect365 TMT

Evolving network architecture for the web-scale era

The IoT and shift to cloud-based applications are redefining how underlying networks are designed, operated and developed, as FADY MASOUD explains.

The IoT is shaping our day-to-day lives – it is estimated that thirty billion devices[1] are expected to be connected to the internet in 2020.

Moreover, cloud-based applications are also changing today's enterprise landscape, from the products manufactured and the services offered to the way enterprise employees interact with each other, or with customers and partners. In fact, enterprise applications are doubling every 2.5 years, and global cloud traffic is expected to increase almost four-fold between 2015 and 2020[2].

As the cloud relies heavily on data centres, annual global data centre IP traffic (the data centre to data centre traffic known as 'east-west') is expected to reach 15.3ZB by 2020[2], up from 4.7ZB in 2015.

The fast-paced proliferation of internet-connected devices and the paradigm shift to cloud-based applications are fuelling major disruption and redefining how the underlying networks are architected, operated and evolved.

There was a time...

The evolution of optical transport networks from asynchronous and proprietary – for example, Asynchronous Transfer Mode (ATM), Token Ring, or fibre distributed data interface (FDDI) – to synchronous and standards-based (such as SONET/SDH) in the early 1990s has changed the telecoms landscape forever.

[1] www.mckinsey.com/industries/high-tech/our-insights/the-internet-of-things-sizing-up-the-opportunity

[2] siliconangle.com/blog/2016/11/11/global-cloud-traffic-to-increase-by-3-7-fold-by-2020-cisco-says/

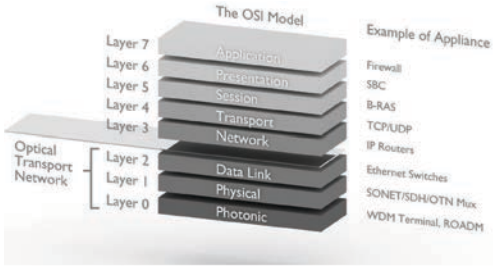


Figure 1: The Open Systems Interconnection model and examples of corresponding network appliances.

Pre-defined frame rates, containers and multiplexing hierarchy unlocked interoperability between different carriers' networks and allowed the extension of optical transport networks to reach all four corners of the world. Voice protocols comprised the majority of traffic carried across the network, with fixed bit rate (typically 64kbps) and pre-determined (or predictable) traffic patterns.

Simultaneously, Ethernet has evolved in data rates as well as in traffic engineering and management capabilities to provide a ubiquitous, simple and cost-effective way for data networking over ATM, Token Ring, FDDI, etc.

Accompanying this evolution, the seven-layer Open Systems Interconnection (OSI) networking model was introduced in the mid-1980s. This was the reference architecture to which the different types of optical terminals were designed and built *(see figure 1 above)*.

"Layer 0" has been added to reflect the advancements of WDM and its new wavelength-based routing and switching capabilities. Later on, the concept of "Layer 2.5" was added to reflect MPLS and VLAN technologies.

In the late 1990s and early 2000s, the optical networking industry witnessed numerous technology breakthroughs in hardware and software that led to the creation of a new breed of optical platforms. This generation offers networking capabilities in adjacent layers to further maximise return on investment and simplify network operations *(see figure 2 below)*. This was the birth of a still-evolving new type of optical equipment called packet-optical transport systems (P-OTS).

The rise of the ICPs

The proliferation of the internet and the paradigm shift in broadband access and optical networking have fuelled the creation of many online content providers. Most internet content providers' (ICPs') revenue streams are from online advertisements and monthly or yearly subscriptions for access to content such as movie or music streaming. Ensuring that end users have constant access to content is therefore crucial for every ICP's business model. As a result, they tend to spend heavily on their networks, particularly on data centres and cloud infrastructure. It is no surprise that the share of capex is increasingly coming from major ICPs.

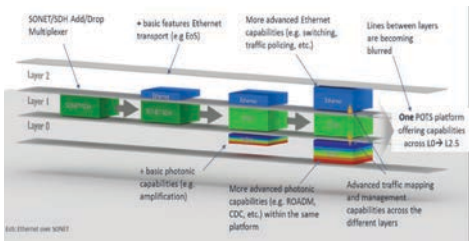


Figure 2: The arrival of packet-optical transport systems highlights how the lines are becoming blurred between the different layers in the OSI model.

The rise of the ICPs added a new type of player to the telecoms landscape. With hundreds of millions of end users (or even billions for some) spread all over the globe, an unheard-of demand for scalability and traffic growth, and significant revenue streams directly related to end users' QoE, ICPs have become a major driving force for new equipment that can offer unprecedented levels of network performance, automation and programmability.

With an ICP business model in which content is king and must be accessible anywhere, anytime and on any device with the highest level of quality, it became clear to the industry that the 1980s-era OSI model architecture underpinning the delivery of this content has reached a tipping point. It no longer supports the constant evolution in networks (e.g. NFV, SDN, etc.), nor the new service delivery model based on cloud applications, service virtualisation, etc.

OSI's heritage of function- and layer-specific network appliances, closed and proprietary protocols, rigid networking capabilities, and high operational costs sparked the urgent need to evolve toward a simpler, more efficient and agile architectural model to underpin the accelerated adoption of cloud-based networking.

Welcome to the New World

The new model consolidates and simplifies cloud service delivery and networking into two layers where all networking layers (Layer 3 and below) are represented by the transport layer, while all application layers (Layer 4 and above) are grouped under the cloud services layer.

The transport layer contains the transport functions from Layer 0 (photonic) to Layer 2.5 (packet switching), or even to Layer 3, offering 'packet-aware' transport capabilities. This layer sets the guidelines and principles for the transport of data streams, whether between end users and data centres or between data centres with bursty and often unpredictable traffic patterns.

The transport layer also defines the features and capabilities that increase network agility and performance and sets the cost points for new benchmarks in service delivery and cost-effectiveness, all key ingredients to the successful deployment of any cloud application.

Moreover, the transport layer is the cradle of numerous open concepts and projects (e.g. *Telecom Infrastructure Project* or *TIP*, etc.) aimed to ensure seamless interoperability between networking equipment vendors across the lower layers in the OSI model. The transport layer's support of open networking helps network operators smoothly transition and evolve their existing infrastructure to the cloud with ease and efficiency. It elevates network infrastructure from rigid and dedicated to shared and highly virtualised, thus allowing operators to maximise the utilisation of existing assets and defer premature capex-heavy network overbuilds.

The cloud services layer contains all applications, functions and services that run

Figure 3: Evolution from OSI to transport and cloud layer model.

in the cloud, including consumer and business applications, VNF, SDN-based service creation and orchestration tools, software frameworks and applications for big data and machine learning.

The rise of ICPs and their business model, where content must be delivered to hundreds of millions of users across the globe with the highest levels of quality, has driven the creation and development of numerous breakthroughs in defining protocols and building smart software tools. This enables large-scale task automation and programmability to streamline operations, eliminate the sources of human errors, and reduce operating costs. The massive demand for connectivity driven by the IoT and cloud-based consumer and business applications is evolving toward a model in which real-time network decisions are made autonomously (cognitive networking) over highly virtualised hardware and software resources.

The new model also defines an efficient communication and information sharing channel between the two layers through open and standards-based APIs such as RESTCONF, NETCONF/YANG and gRPC. These interfaces ensure an efficient and bi-directional information flow between the two layers to turn the network (transport layer) into a dynamic pool of resources for service requests triggered from the upper layer (cloud layer). This dynamic interworking model provides all the building blocks and mechanics to enable network-wide task automation, proactive network monitoring, dynamic bandwidth allocation and much more, as depicted in *figure 3* above.

Elevating the transport layer to web-scale

The transport layer plays a vital part in enabling cloud applications. By underpinning service requests created in the cloud services layer, which are often characterised by being spontaneous, dynamic in nature and requiring high capacity, the transport layer acts like a dynamic and instant pool of resources to provide scalable, secure and efficient connectivity as requested by upper-layer applications.

Network performance and its ability to meet the demand of the cloud services layer's applications are the cornerstone for any successful deployment of consumer or business cloud applications. Therefore, the transport layer must have the following attributes:

High capacity and seamless scalability: Technology breakthroughs in optical transport networking – such as super-channels, integrated photonics and advanced modulation schemes – unlock the ability to transport massive capacity over unprecedented distances to underpin the continuous demand for bandwidth and meet the stringent requirements of high-performance cloud applications. Transport networks must be scalable to meet future growth without network interruption or a massive infusion of capital.

- **High level of efficiency and cost-effectiveness:** While the network is key for the successful operations of all cloud providers, it represents a cost centre where opex can be lowered by choosing equipment that offers low power consumption, reduced footprint, and low cost per transported bit.
- **High level of task automation:** To deal with massive data streams and bursty, often unpredictable traffic patterns between end users and data centres or between data centres, cloud providers can leverage smart software tools to automate recurring tasks, enhance service management, and streamline operations. Emerging technologies like software-defined capacity (SDC) offer providers a network model with pay-as-you-deploy bandwidth, flexible bandwidth pools, and movable bandwidth across the infrastructure to instantly respond to forecasted and unforeseen events.

  They can also take advantage of new types of operational procedures centred around easy and rapid installation, provisioning (e.g. zero-touch), streaming telemetry, and proactive maintenance.
- **Support of open concepts/frameworks:** Many cloud providers value openness and seamless interoperability between networking equipment vendors across layers. In fact, numerous cloud providers are founding members of open concept projects and initiatives such as the *Open Compute Project* (*OCP*), *TIP* and many others. Hence, optical transport networks must support open networking concepts to help smoothly transition and evolve existing infrastructure to the cloud with ease and efficiency.

The cloud and IoT are redefining how networks are architected, operated and evolved. The fast-paced proliferation of internet-connected devices and the paradigm shift to cloud-based applications are driving an architectural evolution toward a new model based on a transport layer and a cloud services layer.

In order to better adapt to this new era of hyper-connectivity and web-scale, an intelligent transport layer leverages the latest technology breakthroughs to reach an unprecedented level of scalability, efficiency and automation. ■

Fady Masoud, Principal, products & field marketing, Infinera

20th Anniversary

AfricaCom

7-8 November 2017
CTICC, Cape Town,
South Africa

The largest telecoms, edia and technology event in Africa

13,000 Attendees, **450** Exhibitors & **400** Visionary Speakers from across the entire digital ecosystem

Launching AfricaCom 20/20, showcasing future tech trends and digital solutions at the cutting edge of disruptive innovation

14 conference tracks and 5 immersive social features. A year's worth of knowledge and networking value in a single, action-packed week

Launching the Innovation Hall, a brand new exhibition space dedicated to mapping Africa's journey through the Fourth Industrial Revolution

NEW themes including: Digital Health, Powering Telecoms, Industrial IoT, the Sharing Economy, and more

@AllAboutCom #AfricaCom
comworldseries
AllAboutCom
Africa Telecoms, ICT & Media Group

Delivered by
KNect365
TMT

Rohde & Schwarz says this was the first time its *TS-LBS* setup was used to validate a device for A-BeiDou location based services.

Equipment verified for use with China's satellites

Location-based services have been verified for use in U-plane and C-plane with China's global navigation satellite system, A-BeiDou.

Rohde & Schwarz (R&S) carried out the verification of the MediaTek device under test using its *TS-LBS* equipment. This has been designed to allow mobile manufacturers, chipset makers, test houses and network operators to verify chipsets and devices in order to obtain permission to operate them in a particular network.

R&S says this was the first time that the setup was used to validate and verify a device for A-BeiDou location-based services. It comprises a *CMW500* as the base station simulator and a *SMBV100A* GNSS simulator. The *CMW500*, says R&S, provided assistance data to the device under test while the *SMBV100A* simulated the BeiDou satellites.

The BeiDou Navigation Satellite System (BDS) now comprises 23 satellites. It has provided services for China and its surrounding area since 2000 and services for most of Asia-Pacific by the end of 2012. It's claimed the system has brought significant economic and social benefit in transportation, fisheries, hydrologic monitoring, weather forecasting, geodetic surveillance, intelligent driving test, mobile phone navigation and vehicle navigation.

Its operator, the China National Space Administration (CNSA) says the plan is to expand services to offer global coverage by 2020.

Europe goes 5G with new connection in Berlin

Deutsche Telekom (DT) says it has become Europe's first operator to launch a 5G connection based on the latest 3GPP standard.

The connection has gone live on DT's commercial network in Berlin. Using 3.7GHz spectrum, it is said to offer a data rate of more than 2Gbps and latency of three milliseconds.

The operator worked with its long-standing partner Huawei on the deployment. It used the vendor's pre-standard 5G equipment and software which is said to closely track the 3GPP global standard for so-called 'Non-Standalone New Radio' (NR). Using this for enhanced eMBB (enhanced mobile broadband), Huawei says the connection is anchored in LTE while 5G NR carriers are used to boost data rates and reduce latency.

According to the company, 5G NR's characteristics make it "ideal" for the sub-6GHz mid-band needs for 5G applications that will require mobility support, wide-area coverage, as well as multi-gigabit throughput speeds and millisecond low latency. It says: "Therefore, 5G new radio will be deployed with the evolution of LTE as the baseline for wide-area broadband coverage. The specifications enabling that system will be complete by December 2017 as part of the first drop of 3GPP Release 15."

Deutsche Telekom CTO Bruno Jacobfeuerborn adds: "When the standard is defined, we will trial it in 2018 to prepare the ground for a wider deployment of commercial sites and the offering of devices for the mass market as they become available."

First MCPTT interoperability *Plugtests*

More than 1,000 tests were carried out during the mission critical push to talk (MCPTT) *Plugtests* event carried out earlier this year.

Hosted by ETSI (European Telecommunications Standards Institute) and the TCCA (TETRA and Critical Communications Association), the sessions were supported by the European Commission, and were the first in the world to test the interoperability of MCPTT products and services. They were observed by seven government and public safety network operator organisations from Belgium, Finland, France, Norway and the UK.

For this first session, a test specification was developed for the 3GPP Release 13 MCPTT, comprising 47 test cases. Equipment tested included: MCPTT application servers and clients; user devices; LTE network components including EPC, eNB and eMBMS, and IMS.

ETSI says the tests had a success rate of 85 per cent and that 19 vendors took part. Companies here included Airbus, Athonet, ETELM, Ericsson, Hytera, one2many, ZTE, amongst others.

The final tests of the *Plugtests* event included pre-arranged and chat mode group calls. This involved several MCPTT clients, a control room, an LTE cab radio and a TETRA radio.

As commercial products are developed, the TCCA will implement the vendor certification process for mission-critical products and applications, including MCPTT. The association says its key goal is to have one global standard for MCPTT.

According to the TCCA, although the PMR market shows no signs of slowing, mission-critical broadband LTE will offer complementary capabilities. Citing data from IHS Markit, it says the market is expected to grow at CAGR of 20 per cent, from USD1.1bn in 2015 to USD2.6bn in 2020.

Sailing in space: mission aims to clear junk

A 72-day test flight that investigated the possibility of cutting the amount of debris left in space by using a drag sail has been hailed as a success.

Backed by funding from the EU, the *InflateSail* is attached to a small CubeSat satellite. It features a 10m² sail that is connected to a one metre boom. The idea is to slow the satellite when in low Earth orbit so that it burns up on reaching the planet's atmosphere.

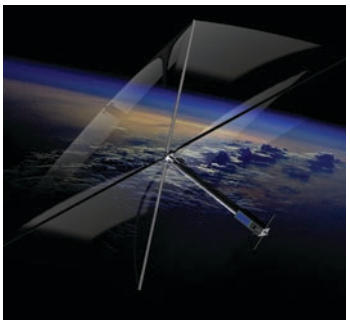
InflateSail was designed and built by the Surrey Space Centre (SCC), part of the UK's University of Surrey, for the Von Karman Institute, a non-profit scientific organisation based near Brussels.

SCC says the technology will prevent satellites from contributing to the 7,000 tonnes of space junk in orbit and avoid potentially disastrous collisions.

Dr Andrew Viquerat, lecturer in structural mechanics at the University of Surrey, adds: "Inflatable space structures allow very large, lightweight objects to be packaged in an extremely compact way during launch."

Early next year, SCC is set to launch another test mission, also with European funds, called *RemoveDEBRIS*. One of the systems it uses includes a net to grab junk and tow it behind a spacecraft until it burns up on re-entry. Researchers claim very large pieces will fall safely into the Pacific Ocean. During the test, the main spacecraft will release test junk, a 10cm metal cube.

The scientists says that a drag sail – pushed by photons of light from the sun – could in the future be attached to larger pieces of rubbish, forcing them back into the atmosphere.



A drag sail could be used to send tonnes of potentially dangerous space junk back in to the Earth's atmosphere so that it burns up.

TETRA secures Erbil International

Erbil International Airport (EIA) in Iraq is relying on a TETRA communications system from DAMM to support passenger safety.

Located in the city of Erbil in northern Iraq, EIA is one of two international airports in the Kurdistan region and is served by airlines from across the Middle East and Europe.

DAMM says its reliable voice and data communication system will be used for securing the safety of passengers at all times at EIA. The Denmark-based critical comms specialist says its solution was chosen as it includes the BS421 single-carrier outdoor TETRA base station which is "easy" to integrate, install and commission. DAMM adds that the "unique" IP65 encapsulated compact and rugged unit provides a fully redundant communication system, serving both EIA as well as airline customers.

The vendor installed the solution in collaboration with local partner, Sabaaco, a specialist in secure communications. Its deputy CEO Mustafa Al Mukhtar says: "The easiness of integration with the existing TETRA system saves both time and costs. With fast set up and installation time, the space saving compact outdoor base station provides low capex. In addition, opex is also saved as minimal air conditioning is required due to the power efficiency."

Liquid Telecom upgrades fibre ring to 100G

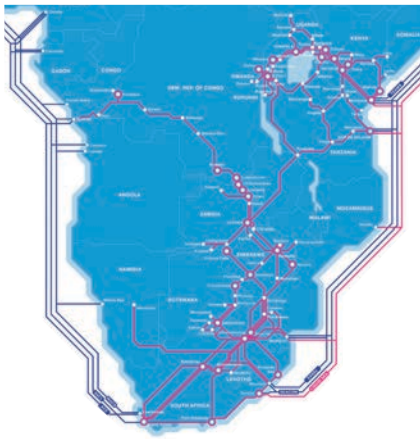
Liquid Telecom has completed 100G upgrades to key routes on its East Africa Fibre Ring. The operator says the enhancement to its pan-African fibre network that now stretches more than 50,000km enables it to offer the largest lit backhaul capacity on the continent.

The upgrade to 100G wavelengths takes advantage of the latest DWDM technology from Ekinops. Liquid says it delivers up to 10 times the speed of previously used 10G waves.

The 100G links are available in the cities of Kigali in Rwanda, Kampala and Tororo in Uganda, and Nairobi and Mombasa in Kenya, with further 100G upgrades planned for the East Africa Fibre Ring in the near future.

Liquid Telecom group CEO Nic Rudnick says: "By upgrading to 100G, Liquid Telecom is ensuring that its fibre backbone can meet the rising demand for high-bandwidth, video and internet services from businesses and consumers across the region."

Liquid claimed it had made history when it announced the completion of the East Africa Fibre Ring in 2014. Built at an initial cost of USD20m, the network connects Kenya, Uganda, Rwanda and Tanzania, with onwards connectivity to Liquid's fibre networks in Burundi and eastern DRC. It also offers direct access to international subsea cables.



The East Africa Fibre Ring now spans 50,000km. The upgrade means users in Rwanda, Uganda and Kenya will be able to experience 100G network connectivity for the first time.

The company says it remains the first fully redundant regional fibre ring with multiple routing options. "In the event of an incident, internet traffic is automatically and instantly re-routed around the ring, giving consistently high speeds and continuous uptime for customers," states the firm.

Russia's first commercial Gigabit LTE network

Russian MNO MegaFon says it has showcased the capabilities of Gigabit LTE on a commercial network.

The operator says it achieved peak data download speeds of 979Mbps. Using FDD, it aggregated two 20MHz carrier at 2600MHz and one 20MHz at 1800MHz, and also used 256 QAM and 4x4 MIMO technologies.

The test was conducted using Sony's *Xperia XZ Premium* smartphone which features Qualcomm's *Snapdragon X16* LTE modem and is said to be Europe's first commercial mobile device to support Gigabit LTE. Nokia's *Flexi Multiradio* modules were used as the base station as these are installed in most sites across MegaFon's Moscow branch.

The Moscow branch is a subdivision of MegaFon and is currently home to more than 30,000 of the company's multi-standard base stations. It has more than 13.5 million subscribers in the region and claims that they benefit from Russia's fastest mobile internet speeds using an LTE-A network that supports speeds of up to 300Mbps. At last year's Ice Hockey World Championships, MegaFon says its mobile internet network reached 450Mbps.

The operator adds that the Moscow branch plans to be among the first in Russia that will commission 5G. Nokia's *AirScale* system module is already in place at its branch sites in order to support the path to the next-generation technology.

According to Qualcomm, Gigabit LTE is about more than peak speeds. The firm says: "It is also about delivering more network capacity, to benefit all users in the network, not only those users with Gigabit LTE devices. A Gigabit LTE device will complete downloads significantly faster."

Bike thieves beware – Sherlock is on your case

Cycle thieves are being hit by a new IoT device designed to be hidden in the handlebars.

And now the maker, a Turin-based company called Sherlock, has signed a three-year deal with Orange Business Services (OBS). The cellco's SIM cards will be embedded inside the firm's anti-theft device, a 120cm tube fitted with a GPS module for localisation, another module for GPRS internet connectivity, as well as low-energy Bluetooth for activation.

Once installed, it's claimed the device is "virtually impossible" for a thief to detect. If the bike is moved without permission, an alert is sent to the owner's smartphone who will be able to see its location at any time.

It also works as a unique identifier for the bicycle thanks to its 'bike passport'. This is a digital document that was designed in conjunction with the Turin City Police and is said to contain all the elements needed to prove ownership of the bike.

OBS says the worldwide connectivity it provides means that the device works straight away, roaming different networks for a suitable connection.

Sherlock adds that the device's battery life is two weeks and can be recharged using a micro USB cable.

The company's development was aided by two incubators: iP3, part of the Polytechnic University of Turin; and SETsquared which is run by four UK universities: Bath, Somerset, Southampton and Surrey.

The device features modules for GPS, GPRS and Bluetooth connectivity to send theft alerts to the user's smartphone.

Real world 5G tests

The RAPID 5G consortium has conducted 5G tests to examine the possibilities of running extremely high-speed data transfer rates of up to 10Gbps at very low latency to a large number of devices. The trial was led by Polish telco Exatel in a Warsaw shopping centre, which broadcast 4K and 8K video streams from 5G antennas to a computer fitted with VR goggles at speeds of 800Mbps. This tested the interoperability of the network infrastructure, focusing on the conversion of the video transmissions from back-end fibre networks to the 5G mobile spectrum in use.

China-UK HTS research

China and the UK will work together on research into high throughput satellite capacity and 5G mobile satellite systems. This follows the signing of a two-year research contract between China Academy of Space Technology and the UK's University of Surrey's Institute for Communications Systems. "The collaboration will include training and advanced radio and networking research," says ICS director Professor Rahim Tafazolli, adding that the lab will cement the relationship between China and the UK in the strategic area of satellite communication networks.

Gfast council launched

The US-based Broadband Forum has launched the Gfast Council to help facilitate the rapid deployment of the new gigabit broadband access technology. The council provide a centralised source of expertise and will inform the market through events, white papers, use cases and other resources. It will also promote a certification programme for interoperable products. According to the Broadband Forum, Gfast means faster deployments by extending fibre to existing wiring infrastructure.

Telkom 1 no longer in service following anomaly

On 25 August, state-owned Telkom Indonesia announced an "anomaly" on its Telkom 1 satellite. It said the glitch caused a shift in the direction of the satellite's antenna and consequently disrupted all transponder services.

As a precautionary measure, Telkom began recovering services by transferring a number of customers to Telkom 2, Telkom 3S and other third-party satellites. Working with Telkom 1's manufacturer, Lockheed Martin, the operator suggested that it had expected to complete this sooner rather than later. But by the afternoon of the following day, the recovery process was still ongoing.

Telkom then setup a 24/7 crisis centre staffed by more than 1,000 technicians from across the group. The company's president director, Alex J. Sinaga, said the whole operational team needed to focus on accelerating the customer migration process, both in terms of preparing the replacement transponders and repointing the ground segment antennas.

By 10 September, Telkom announced that it had successfully completed recovery for all of Telkom 1's 63 subscribers, eight of which are VSAT providers with 12,030 sites, bringing the total ground segment to 15,091 sites.

Telkom established a 24/7 crisis centre that was personally supervised by the company's directors, including president director Alex J. Sinaga (centre).

But in a press statement previously issued on its website at the end of August, the operator said that following an intensive investigation carried out with Lockheed Martin, Telkom 1 will no longer be in operation. It said: "Based on in-depth analysis, the satellite was not functioning as normal. Lockheed Martin recommended to shut down the operation to prevent interference with other satellites."

Some reports have suggested that Telkom 1 may actually be breaking up. ExoAnalytic Solutions is a US-based firm that runs a global network of 165 telescopes to provide real-time tracking and monitoring of objects in geostationary orbit. According to arstechnica.co.uk, one of ExoAnalytic's telescopes in Eastern Australia seemed to have captured images showing the satellite in fragments.

In mid-September, a Lockheed Martin spokesperson said: "At this time we cannot verify the accuracy of recent news reports speculating about potential debris. We are working diligently to understand the facts and support PT-Telkom's recovery efforts. We will provide updates as they are available."

The spokesperson added that engineers from the two companies are in contact with Telkom 1 and reviewing data about its operational status to understand the nature of the anomaly and determine next steps. "The satellite is functioning and responding to commands, although the anomaly has affected its operational status."

When it was launched to 108°E in August 1999, Telkom 1 was expected to have a 15-year life, but recent assessments showed that it was in good condition had enough power to carry on operating until at least 2019. However, Telkom had already been planning to replace the orbiter in mid-2018 with Telkom 4 which will feature 60 C-band transponders and offers greater capacity than Telkom 1 which carried 24 C-band and 12 extended C-band transponders.

KBR and Cambium connect *Tour of Britain*

Cambium Networks and Wi-Fi specialist KBR helped to keep thousands of people online during the recent *Tour of Britain* cycling event.

KBR used 16 of Cambium's *cnPilot e500s* outdoor access points for the nationwide event which ran from 3-9 September. As well as providing Wi-Fi coverage to spectators, staff and media at the finishing line of each of the tour's eight stages, the APs also enabled internet access for the event's hospitality suites, public viewing spots and the sponsors' exhibition. In addition, the network was used by staff to collect race statistics and information, as well as provide them with reliable communications and connectivity to the service vehicles.

KBR has provided Wi-Fi at the annual *Tour of Britain* for the last four years. Speaking just before the event began at the end of August, the company's technical director Gareth Tomlin described Cambium's solution as "incredibly easy to deploy". He said this was crucial when setting up eight different Wi-Fi networks in eight different cities over eight successive days.

He added that depending on the size of the run down to the finish line, KBR could put up as many or as few APs as required and mesh them together quickly and efficiently.

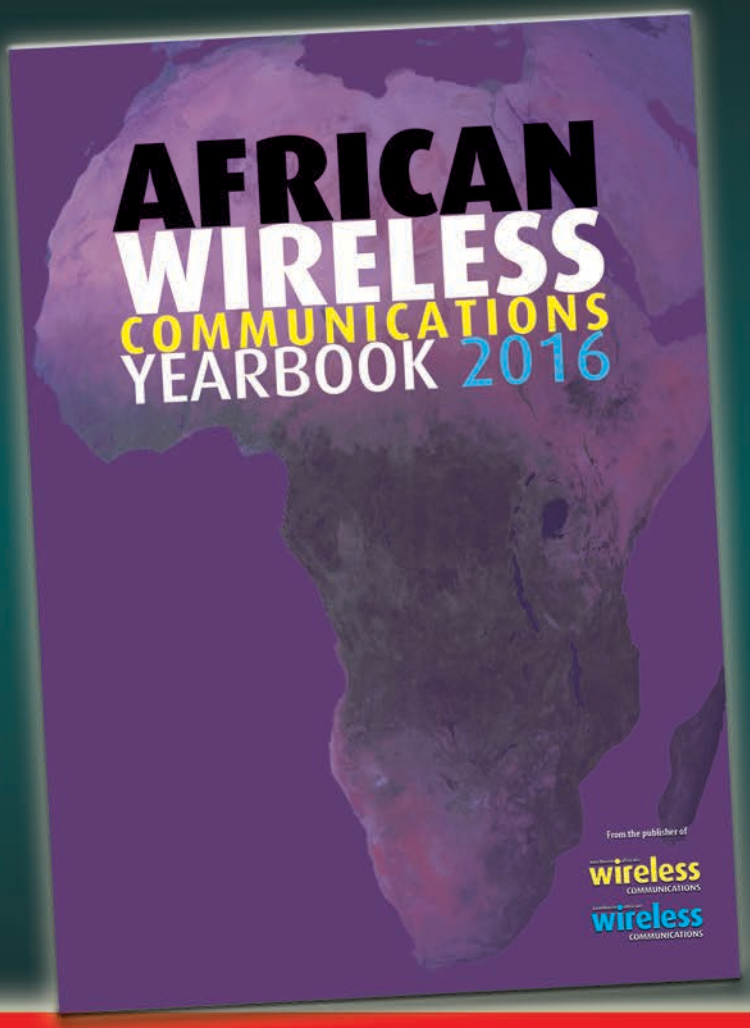
"This overcomes the complexities this situation presents, with potential challenges including the network's physical infrastructure, the number of people accessing the service simultaneously, and the Wi-Fi range," said Tomlin.

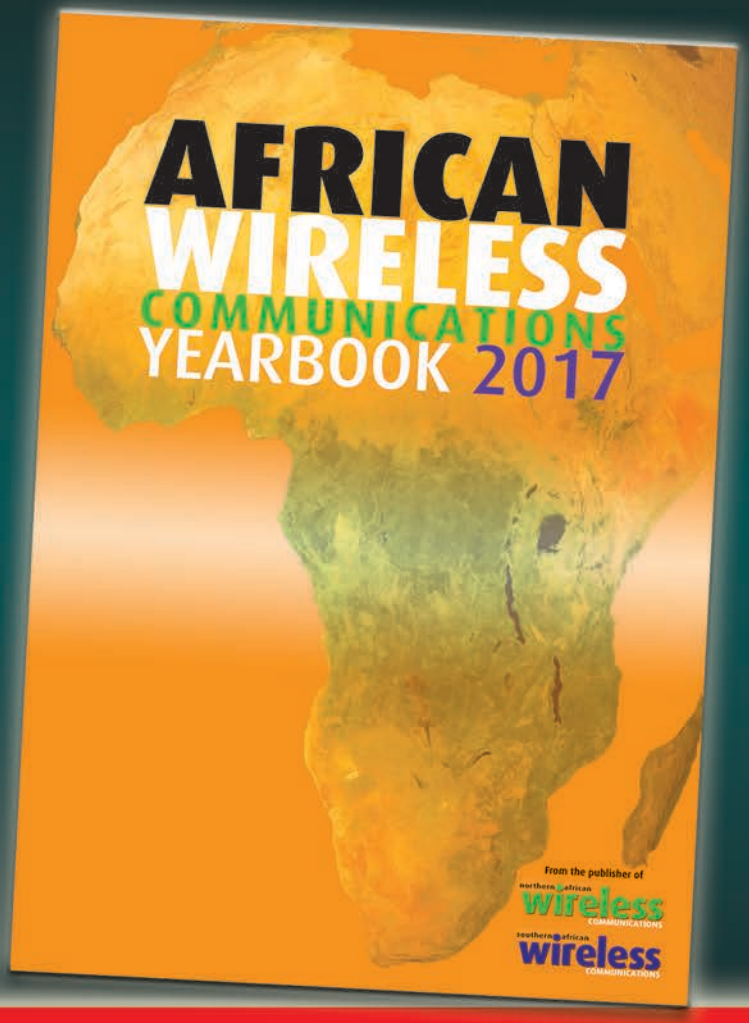
According to Cambium, the 802.11ac *e500*s provided KBR with faster meshing and high throughput, making the network easier to manage and configure. The company says its solution eliminated the need for a central Wi-Fi controller, and claims this meant there was no single point of failure and that the network was able to cope with the thousands of people potentially using the service at one time.

KBR used Cambium's outdoor APs to provide Wi-Fi coverage at the finishing line of each of the tour's eight stages.

Do you have your copies?

The African Wireless Communications Yearbook 2017 is essential for all wireless communications professionals. Contact us today to order your copy and extra copies for colleagues and other departments





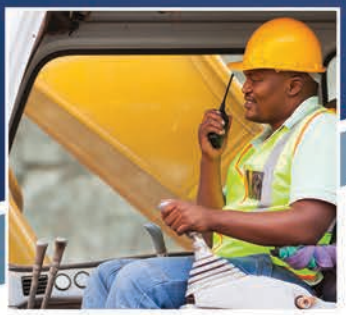
2017 edition out now

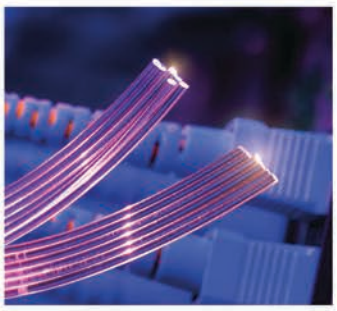
To order copies of the 2017 Edition, call Kadium Ltd +44 (0) 1932 886 537 or email your contact details to: suzannet@kadiumpublishing.com

ALTECH®
ALCOM MATOMO
Communications Anywhere

TURNKEY COMMUNICATION

SYSTEM INTEGRATOR OFFERING:



- A wide range of digital voice and data solutions
- Wireless and fibre technology solutions
- Mission critical converged Public Protection and Disaster Relief

Altech Alcom Matomo

Supports public safety, electrical and water utility, transportation, communication, heavy industrial and oil and gas users.

EMail: sales@alcom.co.za | Tel (JHB): 011 235 7652
www.alcommatomo.co.za

altron.