For communications professionals in the southern Asian region

SOUTH ASIAN WIRELESS COMMUNICATIONS

Q1 2018 Volume 11 Number 1

- Ka-band: the best option for broadband via satellite?
- A network on wheels – the ultimate in mobile deployments
- How to avoid a 'dim' network and boost QoE

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Singtel

KADIUM

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South Asia shows the way with IoT and mobile tech from Ericsson

With 2018 barely under way, Ericsson has already notched up several milestone deployments for South Asian operators.

At the start of March, the company announced that it had worked with Sri Lanka's Dialog Axiata to roll out what's claimed to be the region's first commercial "Massive" IoT network supporting both Cat-M1 and NB-IoT technologies. This latest development follows the operator launching an NB-IoT network across the country last year (*see News, Q417 issue*).

Deployed across Dialog's network in Sri Lanka, Ericsson has delivered Cat-M1 (LTE-M) and NB-IoT support as a software activation to the operator's existing LTE RAN. The vendor claims its Massive IoT solutions offer "great advantages" such as low-cost, low-power consumption, deep coverage, massive connections, as well as more secure and reliable transmission.

Meanwhile, in a different deployment but staying with the IoT, Singtel has worked with Ericsson to launch what's said to be Singapore's first commercially available NB-IoT network. Announced at the end of February, Singtel says it will also harness its cyber security expertise to help enterprises in implementing "secure and reliable" IoT solutions.

Since 2016, Singtel has been conducting IoT trials with several partners, including bike-sharing company Mobike which launched in Singapore in 2017.

Like Dialog's network, the deployment in Singapore also supports Cat-M1 and NB-IoT devices. In addition, it offers a universal connected life management application that enables any device or service to interact with one another regardless of the service provider or technology. Ericsson says this open connectivity platform allows for easy and manageable data sharing among family and friends, including on-the-go tracking for safety and security.

Since 2016, Singtel has been exploring IoT usage with local companies and large corporations across a diverse range of applications. It has been conducting trials with several partners, including bike-sharing company Mobike (*see World News, Q417 issue*), smart metering solutions provider EDMI and modem chip maker SIMCom Wireless Solutions.

More recently, the operator signed an agreement with Ericsson to establish the Singtel IoT Innovation Lab to facilitate IoT deployments and the development of a local ecosystem for enterprises and consumers. As more partners join the lab, Singtel's goal is to reduce the time to market for the introduction of new services, eliminate any technological barriers and redefine existing business models.

Earlier in February, Singtel claimed that it had achieved the world's first 1Gbps mobile peak speed using Ericsson's quad-band FDD/TDD carrier aggregation (CA) technology. The operator says this will enable it to optimise the usage of its recently acquired 2500MHz spectrum and enhance the consumer mobile experience.

Following the successful trial, Singtel will progressively roll out the technology at key high traffic locations such as Orchard Road, Raffles Place, Tanjong Pagar and Clarke Quay.

Handsets supporting gigabit speeds offered by quad-band FDD/TDD CA are expected to be available from 2Q18. In the meantime, it's claimed existing Singtel smartphones will be able to benefit from up to 20 per cent faster mobile broadband speeds on average, as the operator deploys Ericsson's intelligent technology *Bandwidth-Aware* CA feature. This is designed to enable cellcos to manage spectrum more efficiently and supports customers' smartphones to automatically select the best spectrum band combination available, enabling optimum speeds.

BTRC names winners of 4G spectrum licenses in Bangladesh

In mid-February, the Bangladesh Telecommunication Regulatory Commission (BTRC) granted 4G licenses to GrameenPhone, Robi Axiata, Banglalink and Teletalk.

Earlier this year, the commission had invited operators to apply for LTE concessions and spectrum. The BTRC approved applications for all of the operators above, although Teletalk decided not to take part in the frequency tender and will use its current spectrum for 4G services. Citycell – Bangladesh's oldest operator – had also expressed interest in participating but the CDMA operator had its spectrum suspended by the regulator in late 2016 for non-payment of outstanding fees (*see News, Q416 issue*).

Within minutes of receiving its license, Robi announced the official launch of its 4G services for both its and Airtel brand users in all 64 districts of Bangladesh (*Robi and Airtel merged in 2016 – see Wireless Business, Q116 issue*).

Within minutes of receiving its 4G license on 19 February, Robi officially launched 4G in 64 districts. Its lavish launch ceremony was attended by high ranking officials including telecoms and IT minister Mustafa Jabbar, BTRC chairman Dr. Shahjahan Mahmood, as well as special guests.

Speaking at the launch event, Robi MD and CEO Mahtab Uddin Ahmed called upon the government to cut levies. He said that in order to make 4G successful in the country, the government should cut taxes on 4G devices and equipment, introduce special incentives for rolling out LTE to rural areas, resolve all pending VAT disputes, and move to a unified licensing regime.

Also speaking at the launch ceremony, Bangladesh's minister for posts, telecommunications and IT Mustafa Jabbar said: "I will talk to finance minister about the SIM replacement tax on 4G SIM swapping. And once we can remove VAT from the internet, we will be able to create a revolution in the country."

The only operator that has so far published details of its license is Banglalink. As a result of the auction it will acquire 5.6MHz paired spectrum in the 1800MHz band, and 5MHz paired spectrum in the 2100MHz band. The operator adds that the spectrum is technology neutral and will mean it can double its 3G network capacity while the 4G/LTE license will enable it to launch a high-speed data network.

Banglalink will pay a total of USD308.6m for the spectrum excluding VAT. An upfront payment of 60 per cent for the spectrum will be payable in around 30 days with the remaining 40 per cent payable over four years. In addition, the company will pay USD35m to convert its existing spectrum holding in 900MHz and 1800MHz into technology neutral spectrum, and USD1.2m to acquire the LTE license.

According to the latest data from the BTRC, there were 147 million mobile subscribers in Bangladesh at the end of January 2018. Grameenphone, which is 55.8 per cent owned by Telenor, is the market leader with 65.8 million customers, followed by Axiata Group subsidiary Robi with 44.2 million, VEON/GTH's Banglalink (32.3 million), and state-owned Teletalk (4.5 million).

Hytera expands TETRA networks in Indonesia

Hytera is working on expanding TETRA networks in Indonesia under two separate deals.

In mid-February, the critical communications specialist announced that its subsidiary Teltronic will supply a complete communications system for the country's first light rail transit (LRT) project. The railway is being built in the city of Palembang and is expected to provide a vital transport link for the Asian Games which is due to be held in Indonesia later this year.

Partnering with local systems integrator Mobinet, Teltronic will provide a full solution that includes a switching control node, mast-mounted base stations, and *CeCo TRANS* which it describes as a "next-generation" command and control system tailored for the transportation market. The solution also includes the *STP9000* hand-held radios, *SRG3900* mobile radios from Teltronic sister company Sepura, and the railway-regulations-compliant *RTP-603* onboard units.

The vendor adds that its system supports future expansions for the user, including an upgrade to a hybrid TETRA-LTE solution.

Earlier this year in January, Hytera also announced that it had expanded the existing radio network of an unnamed Indonesian government agency. Working with with Rohde & Schwarz Indonesia, Hytera says the aim is to provide a reliable network for the use of hand-held radios, thereby simplifying workflows.

The company has also implemented its *PTTconnect* smartphone app to enable government employees to securely contact colleagues anywhere via the TETRA network. Hytera says the app connects the independent TETRA system to a mobile broadband network such as UMTS or LTE. It can be used on any *Android* device, and supports TETRA features such as individual and group calls, priority-setting, and emergency calls, etc.

Hytera says Motorola Solutions "anti-competitive" – Wireless Business, p14.

Hytera claims its PTTconnect app is ideal for use with radio systems in critical deployment environments.

LDCs on track to achieve universal internet connectivity

The ITU says that the nations classed by the UN as "Least Developed Countries" (LDCs) are now on track to meet the sustainable development goal on universal and affordable internet access by 2020.

According to the ITU, the LDCs comprise 47 developing countries around the world that suffer from "severe structural impediments to sustainable development". In Asia, they include Afghanistan, Bangladesh, Laos, Myanmar and Nepal.

In a report released towards the end of January 2018, the union says LDCs are recording "impressive" progress toward achieving the UN's sustainable development goal (SDG) 9.c on increasing access to ICTs. It notes that all 47 LDCs have launched 3G services and more than 60 per cent of their populations are covered by such networks. It adds that these countries are also on track to reach on average 97 per cent mobile broadband coverage and to make internet prices relatively affordable by 2020.

By the end of 2017, the report says that the number of mobile subscriptions in LDCs had increased to about 700 million with a penetration rate of 70 per cent. At the same time, more than 80 per cent of the population in these countries live within range of a mobile network.

The report also identifies key barriers to ICT and internet use in LDCs, including the lack of digital skills. It offers a number of key recommendations to help address these challenges.

For example, the report says stakeholders should address market concentration and foster competition in all building blocks of internet connectivity. It also advises them to build core internet infrastructure through control over a locally managed country code top level domain, IXPs, and the ability to host a root server to create more affordable and local content.

Satellite technology and broadband – Feature pp20-23.

Telkomsel 'cloudifies' air interface network with Huawei

Indonesia's Telkomsel has deployed new air interface technology that it co-developed with Huawei.

CloudAIR 2.0 is the result of a collaboration between the two companies that was aimed at reshaping the air interface with the concept of so-called 'cloudification' of spectrum and channel resources.

According to Huawei, spectrum cloudification realises the deployment of different radio access technologies (RAT) in the same spectrum. It says the solution can dynamically allocate and adjust spectrum resources according to the changes of traffic, and avoid the legacy RAT to occupy the "golden spectrum" in the long term to maximise spectrum efficiency.

Telkomsel and Huawei launched the CloudAIR 2.0 system and signed a cooperation framework for joint innovation at Mobile World Congress.

The firm goes on to explain that channel cloudification combines the advantages of larger downlink bandwidth of high frequencies with the better uplink coverage of low frequencies. Huawei says the high band is selected as the uplink at near point and midpoint for capacity, while the low band is selected as the uplink at the cell edge to compensate for the coverage limitation of high band.

The company claims the application of spectrum cloudification technology in Telkomsel's live network increased LTE user downlink speed throughput by 116 per cent from 50Mbps to 108Mbps. In addition, it says channel cloudification improved the carrier aggregation coverage for outdoor areas by 21.4 per cent while the user experience indoors was boosted two to three times.

Globe Telecom accelerates operations in Philippines

The operator says its engineers have now installed 1,700 LTE sites that use 700MHz across the country.

Globe Telecom is ramping up its mobile operations in the Philippines with a number of network expansion and enhancement deals.

Earlier this year, the cellco said that it had now installed almost 1,700 LTE sites across the country using its 700MHz spectrum license. Globe claimed that the "aggressive deployment" of its LTE 700 sites has led to an improvement in mobile speeds in the Philippines. It said Speedtest results for January showed that mobile download speed in the country improved to 12.55Mbps from 9.34Mbps in January 2017, with upload speed increasing to 5.86Mbps from 4.68Mbps a year earlier.

Aside from using 700MHz spectrum, Globe also has additional frequency allocation in the 2600MHz band following the acquisition of San Miguel's telecoms assets in 2016 (*see News, Q416 issue*), and the telco says it has also rolled out almost 2,000 sites on the 2600MHz and 1800MHz bands.

The majority of Globe's sites have been deployed in densely populated areas, mainly in the Manila, Cebu and Davao metro areas. The company claims it is now close to providing the entire metro Manila area with "seamless" LTE coverage.

In separate news, Globe has signed a multi-year services contract with Amdocs in a bid to add greater agility and flexibility to its operations in the Philippines. Under the agreement, Amdocs' *Intelligent Operations* platform will assist Globe in managing third-party systems and cloud management solutions. This includes modernising and running IT operations for multiple lines of businesses that cover pre-paid and post-paid mobile services, fixed-line broadband, and enterprise services.

Amdocs adds that the platform also enables Globe to embrace AI, chatbots, and machine learning technologies to increase business agility and flexibility. This follows Globe implementing a cloud-optimised machine learning and analytics platform from Cloudera last year (*see News, Q317 issue*). Amdocs says automation will enable faster resolution of issues and better customer experience.

In another development announced at the start of 2018, the operator will use Openet's *Digital Business Platform* to provide monetisation and customer engagement for all data services. Globe's aim is to provide flexible and personalised offers to its more than 60 million mobile customers and rapidly growing fixed line broadband subscriber base.

Openet says its platform will provide an adjunct charging capability to the operator's existing legacy, voice and SMS centric BSS. It adds that Globe will be able to solve business challenges and drive new revenues within days or weeks of deployment, in contrast to the multi-month cycle associated with traditional service development programmes.

Axiata claims lowest data roaming charges in Asia

Malaysia-based telco Axiata and its international group of mobile operating companies say they "drastically" lowered international data roaming fees with their *JustGo* mobile data roaming campaign.

JustGo was launched last August for a three-month period across Axiata's mobile operations which include: Celcom in Malaysia; XL Axiata in Indonesia; Dialog in Sri Lanka; Robi in Bangladesh; Smart in Cambodia; and Ncell in Nepal. Axiata also has interests in Indian MNO Idea and Singapore's M1.

JustGo offered a flat rate of USD1 per day or the local currency equivalent for data roaming. It was available to all customers, both pre- as well as post-paid. According to Axiata, it was the first deal of its kind in Asia, and also represented the lowest data roaming cost in the region's market.

During the campaign period, 125 million Axiata subscribers were able to automatically take advantage of *JustGo* benefits and immediately use all their mobile data services when travelling to Malaysia, Indonesia, Cambodia, Singapore, Sri Lanka, Bangladesh and Nepal. Robi customers were also able to use the service while travelling in India.

According to Axiata, more than two million mobile users travelled within its footprint countries as of the end of 2016. Dominic P Arena, the group's chief strategy and marketing officer, says: "As international data roaming is now a critical service for our consumer and enterprise customers alike, JustGo is a big step for the group towards abolishing data roaming fees and creating a unique free-trade zone within the Axiata footprint countries."

Axiata is one of Asia's largest telcos and currently has mobile operations in Malaysia, Indonesia, Sri Lanka, Bangladesh, Cambodia and Nepal. The Group also holds interests in MNOs in India and Singapore.

Arabsat and Talia promise low-cost broadband to help bridge digital divide

Talia plans to offer high-quality IP VSAT services to Afghanistan, Iraq and Kurdistan with the help of Arabsat.

In January, the UK-based satellite, voice, video and broadcast communications specialist signed a deal to lease multiple Ka-band transponders on Arabsat's *5C* high throughput satellite (HTS) which orbits at 20°E.

To support its services, Talia has purchased an additional *Dialog* platform from Newtec. This utilises low-cost 75cm antennas, and it's claimed this will create a new lower price point for internet access in the region for both broadband users as well as enterprise and carrier-grade services that require much higher bandwidths.

Newtec adds that its platform features "innovative" setup guides that enable customers to self-install the terminals with a smartphone app. It reckons that this ease-of-access and reduced upfront cost will allow more users to take-up the new Ka-band HTS services.

Talia president and CEO Alan Afrasiab says his company has operated "high-quality" VSAT and terrestrial services across Afghanistan, Iraq and Kurdistan for the past 15 years.

He says: "These new Ka-band services complement our existing satellite coverage on Ku- and C-band. By using the Arabsat HTS Ka band platform we will bring new opportunities to the region with lower hardware costs and more affordable service fees. Utilising services such as this will give more people the opportunity to get online and help bridge the digital divide."

Talia CEO Alan Afrasiab (left) signs the deal to use more Ka-band capacity with Arabsat CEO Khalid Balkheyour.

Omantel Wholesale and DE-CIX partner for global peering

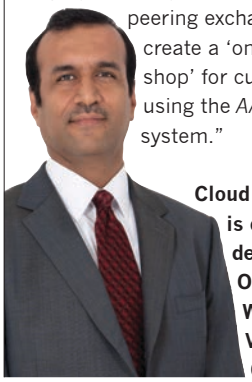
Omantel Wholesale has partnered with DE-CIX to simplify and accelerate the speed at which local, regional and global service providers connect to the latter's worldwide internet exchange points.

According to Omantel Wholesale, the partnership is part of its global strategy for enabling transformation and innovation with ultra-low latency networking. The company is a member of the *Asia Africa Europe-1* (*AAE-1*) cable consortium and offers connectivity from South East Asia to Europe via the Middle East. (*Also see News, Q417 issue.*)

Customers that connect to Omantel Wholesale's global network can use DE-CIX exchanges to peer, interconnect, and optimise cloud and content for end users. The partnership includes connectivity to DE-CIX IXPs in Marseille and Frankfurt, as well as Istanbul, Hamburg, Munich, Dusseldorf and New York through DE-CIX's *GlobePEER Remote service*.

Omantel Wholesale claims its geographic location and more than 20 subsea cable relationships enable it to create solutions that directly impact upon how its customers and their clients experience cloud, content, and their applications and services.

The company's VP Sohail Qadir says: "Growth in cloud and content is driving demand for enhanced quality of experience for end users around the world. This partnership will enable service providers to simplify how they connect to peering exchanges and create a 'one-stop shop' for customers using the *AAE-1* cable system."



Cloud growth is driving demand, says Omantel Wholesale VP Sohail Qadir.

AWCC launches LTE in Farah City

The Afghan Wireless Communication Company (AWCC) says its LTE network service is now available to subscribers in Farah City in the western part of the country.

The city is said to be Afghanistan's sixteenth largest and has a population of around 54,000 people.

AWCC says it remains the nation's only provider of 4G and that the extension of its high-speed 4G mobile network to Farah reflects the rapidly growing demand from local businesses and consumers.

"Our launch of 4G LTE services in Farah illustrates that the demand from our subscribers for rapid, reliable and advanced communications services is strong, sustainable and will continue to grow rapidly," says AWCC MD Amin Ramin. "Afghan Wireless is committed to the expansion of our 4G LTE network, and to maintaining our historic position as the nation's most innovative developer of communications services which connect Afghans with one another, and the entire world."

AWCC's network services include 3.75G+, 3G and 2.5G, and the operator claims to reach more than five million subscribers located in all 34 provinces across Afghanistan.

The company also offers mobile financial services. In early February, it announced that its *My Money* mobile payments platform can now be used to pay electricity bills issued by Da Afghanistan Breshna Sherkat (DABS), Afghanistan's national utility firm.

In addition, both *My Money* subscribers and DABS customers without *My Money* accounts will also have the option of paying their bills by visiting a Kabul area AWCC shop and using a specialised PoS terminal to process DABS payment transactions.

Sigfox expands global Internet of Things network

Five new countries have joined Sigfox's global network, bringing the total number in the IoT service provider's international partnership to 45.

Among the new companies that will now become Sigfox's exclusive strategic partner is IoT connectivity specialist Xperanti. It will be responsible for deploying Sigfox's network in Malaysia, and developing the ecosystem and establishing strong support channels to address all verticals in the country.

According to Sigfox, its global network provides energy-efficient and cost-effective IoT connectivity, allowing companies to generate additional revenues by not only improving their performance but creating new business models too.

The company claims its network currently serves around 803 million people and covers 3.8 million sq. km. With these five latest additions (which also include companies in South Korea, UAE, Hungary and Switzerland), Sigfox says it remains on track to achieve its aim of extending the network across 60 countries and regions and reaching one billion people in 2018. Its other partners in South Asia include Platt Nera in Thailand and UnaBiz in Singapore.

"We have already started to collaborate with them to expand the power of the LPWAN and strengthen our ecosystem," says Rodolphe Baronnet-Frugès, Sigfox's EVP of operators. "These new partnerships take us a step closer to our goal of creating a worldwide network able to support business both locally and globally, thanks to an extensive network of business partners."

Zong launches plug and play connected car system

Zong has launched a new *Smart Car* system for its 4G mobile subscribers in Pakistan.

The MNO – which is a subsidiary of China Mobile – says its *OBD II* device offers three features: vehicle diagnostics, mobile hotspot capability, and real-time tracking.

Zong says *Smart Car* is an easy and quick to install plug and play solution for all models of Hondas and Toyotas manufactured after 2000. Using the devices with an app that is available for both *Android* and *iOS* smartphones, customers will be able to monitor their vehicle's onboard data such as RPM, speed, fuel level and mileage, all in real-time.

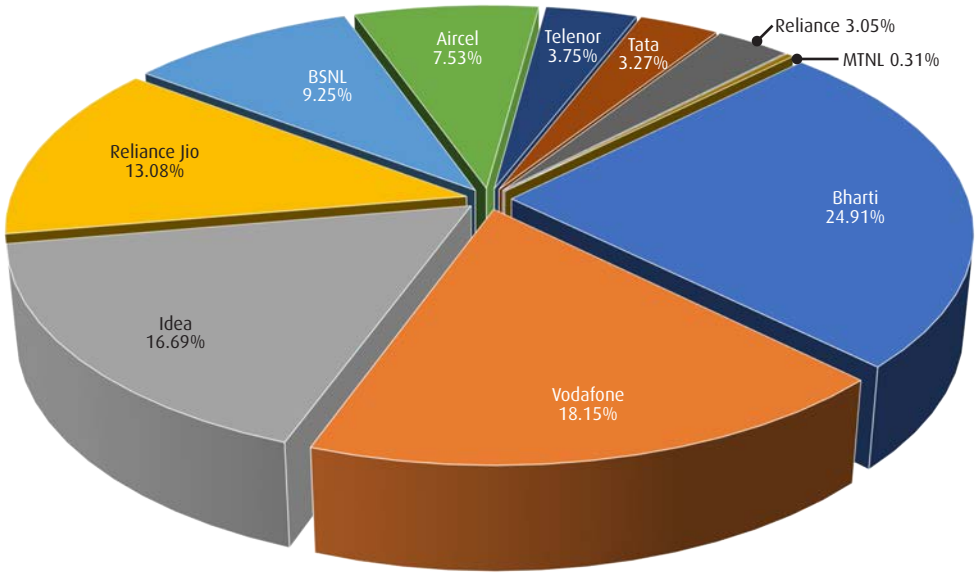
They will also be able to track their vehicles in real-time. The app enables users to set safe zones and receive notifications about the movement of vehicles in pre-defined geofenced zones.

The device also turns the subscriber's car into a Wi-Fi hotspot, and enables up to 10 smartphones and devices to connect to 4G mobile broadband.

In a separate development, Zong officially inaugurated its 4G Wireless Research Lab at the Lahore University of Management Sciences (LUMS) in December.

The lab is said to feature the latest broadband wireless equipment, including a commercial base station to support teaching and research into mobile and wireless networking systems. This includes a fully functioning separate 4G network along with exclusive SIMs that connect via the dedicated network.

Zong's OBD II device and mobile app offers car diagnostics, real-time tracking, and also turns the vehicle into a Wi-Fi hotspot.



As at the end of November, privately owned MNOs held 90.44 per cent of India's market whereas state-owned BSNL and MTNL only had 9.56 per cent between them. SOURCE: TRAI

India sees decrease in mobile subscriber numbers

The total number of mobile subscribers in India fell from 1,178.2 million at the end of October 2017 to 1,162.47 million at the end of November 2017, according to figures released by the Telecom Regulatory Authority of India (TRAI) in January 2018.

The 1.33 per cent monthly decline means that mobile density also fell from 91.1 to 89.81 during the period.

According to TRAI, wireless subscriptions in urban areas fell from 677.52 million to 664.94 million during October-November, while those in rural areas also slipped from 500.68 million to 497.53 million.

New market entrant Reliance Jio benefitted from gaining the most subscribers during November, with net additions of 6,117,260 customers. Bharti, Idea, Vodafone and BSNL also saw their net subscriber numbers increase. But Aircel, Telenor, Tata, Sistema and Reliance Com all lost customers, with the latter suffering the highest churn as 25,753,913 subscribers left (note, Sistema and Reliance Com have merged).

The country's market leader remains Bharti with a 24.91 per cent slice, followed by Vodafone and Idea in second and third place respectively (*see chart above*).

As per the reports received from the service providers, TRAI says the number of broadband subscribers grew from 340.16 million to 350.7 million from October-November, representing a monthly growth rate of 3.10 per cent. The top five wireless broadband service providers as at the end of the period were: Reliance Jio Infocomm (152.08 million), Bharti Airtel (67.24 million), Vodafone (50.15 million), Idea Cellular (32.90 million) and BSNL (11.94 million).

Samsung to help Jio boost 4G and IoT

Reliance Jio Infocomm will use equipment from Samsung to boost LTE network coverage and capacity, and roll out a next-generation cellular IoT network across India.

Earlier this year in February, the two companies announced their continued partnership to bring LTE coverage to 99 per cent of the Indian population and said that they plan to "significantly" improve network capacity across the country. "Making sure that everyone benefits from mobile broadband that is both available and affordable to all is our top priority," said Reliance Jio Infocomm president Jyotindra Thacker.

Further details of how the two partners are aiming to execute their plan have yet to be revealed.

In the meantime, the companies have already established a commercial NB-IoT network in Mumbai and say this will soon impact other parts of the country.

According to Samsung, the NB-IoT network not only utilises Jio's existing spectrum, but has also been enabled through a "simple" software upgrade of the operators already installed base stations. A new and dedicated cellular IoT virtualised core has also been deployed to further support the network.

The two companies will now work together on implementing what's said to be India's first nationwide cellular IoT network. They say this will support a variety of consumer and enterprise use cases such as vehicle tracking, smart appliances, smart metering, security, surveillance, and more.

"Jio's LTE network will unlock the potential of IoT and promise a much more convenient and safe environment for users," said Youngky Kim, president and head of networks business, Samsung Electronics.

DMN uses AMOS-4 to bring broadcast services to Nepal

Dish Media Network (DMN) has extended its long-term connection on the *AMOS-4* satellite with a contract for more capacity.

DMN owns DTH operator Dishhome whose distribution network covers all of Nepal. The company plans to expand its service offerings, adding more HD channels as well as bringing UHD to viewers.

"The significant growth of our broadcast operations is directly related to our long-term partnership with Spacecom and the capabilities of its *AMOS-4* satellite," says DMN CEO Sudeep Acharya. "Dishhome is now able to offer better quality content as well as higher quality broadcast to improve our customers' viewing experience and propel us to substantial growth."

Operated by Spacecom, *AMOS-4* was launched to 65°E in August 2013 from where it provides a wide array of satellite services to customers from South Asia to East Africa. Dishhome's capacity is contracted for the satellite's expected lifetime of 15 years.

According to Spacecom, *AMOS-4*'s eight Ku-band transponders of 108MHz and four high-power Ka-band transponders of 216MHz, each with steerable beams, create a "powerful platform" for Asian, African and Middle Eastern broadcasters and telecom providers.

AMOS-4 was launched from Kazakhstan in 2013 and has an expected service life of 15 years.

Offering a wide range of cross-region, cross-band and cross-beam connectivity options, it says that the satellite provides "extensive" broadcast and broadband satellite services capabilities including DTH, DBS, video distribution, VSAT communications and broadband.

Spacecom president and CEO David Pollack says: "Our continuing and growing relationship with Dishhome is a testament to the satellite's technical prowess and our team's service-oriented approach. From *AMOS-4*'s 65°E position, Spacecom is able to meet their current and future needs for powerful and clear satellite signals upon which they can increase their services and subscriber base."

Is Ka-band the best technology for broadband via satellite? Feature pp20-23.

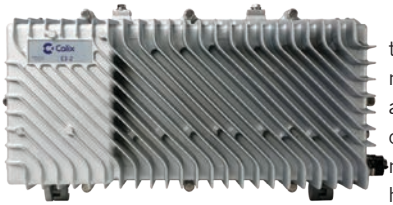
SKY Cable to migrate to always-on SDN

SKY Cable, the largest cable operator in the Philippines, will leverage end-to-end solutions from Calix to drive an expansive network transformation.

With plans to serve the greater metropolitan areas of Manila and Rizal, as well as the regions of Cavite and Laguna, SKY Cable will use the *AXOS E3-2* intelligent PON node to seamlessly transition from its traditional cable plant to an always-on SDN.

It will also deploy *AXOS DPx* which is claimed to be the industry's first virtualised DOCSIS connector, as well as Calix Wi-Fi enabled *GigaHubs* at subscriber premises.

Calix reckons its nodes provide SKY Cable with "extraordinary" deployment flexibility, including the ability to be mounted virtually anywhere to deliver services to subscribers in accelerated timeframes.



Calix's AXOS E3-2 PON node will enable the operator to migrate to an always-on software defined network.

Additionally, it says SKY Cable's fibre network will be built end-to-end on AXOS which is claimed to be the world's only software defined access platform. Calix says this will deliver always-on capabilities, eliminate the need for maintenance windows, and provide a simple, fast and cost-effective way to pivot to a SDN with no impact to workflows and operations.

According to Michael Weening, the vendor's EVP of sales and marketing, cable operators globally are increasingly seeing the benefits of fibre but struggling with how to make the transition from traditional hybrid-fibre coax to FTTH.

He says: "Through fast and simple software integration and systems installation as well as a clear path to emerging SDN architectures, *AXOS* provides the advantage SKY Cable needs to be ready to rapidly embrace new technologies and services in the future, regardless of the PHY."

SKY Cable adds that with *AXOS* solutions at the heart of its network, it will be able to roll out new services faster and deliver the highest quality of experience to subscribers.

Networks must capitalise on quality as well as quantity feature pp28-29.

Fast fibre in the Philippines

PLDT says its fibre passed four million homes across the Philippines at the end of 2017, up nearly 43 per cent from the previous year. The telco says it is deploying connectivity through the installation of FTTH facilities and the "fibrization" of its existing copper-based network through hybrid technologies such as VVDSL and G.fast which are used extensively in Germany and South Korea, respectively. FTTH can deliver speeds of up to 1Gbps while hybrid fibre can provide speeds ranging from 100Mbps (for VVDSL) up to 500Mbps (for G.fast) over copper lines.

SIMs to be deactivated

The Bangladesh Telecommunication Regulatory Commission (BTRC) plans to cut off three million mobile users which it says exceed the number of SIMs that can be registered using a single national ID card. According to the regulator, around 500,000 ID cards have more than the limit of 15 SIMs registered to them. Towards the end of 2017, the BTRC announced that subscribers had two months to voluntarily deactivate any excess SIMs but very few subscribers are said to have acted on this.

Thaicom 9 plan aborted

Thaicom will no longer build a new "national satellite" as previously reported (*see Wireless Business, Q317 issue*). According to local reports, the satellite – which was originally dubbed *Thaicom 9* – has fallen victim to a dispute between Thaicom and the government regarding the structure of its operating costs. Decreasing demand for transponder capacity has also been blamed. The uncertainty has also led to Softbank withdrawing from its agreement to rent 30 per cent of the satellite's transponder capacity. According to reports, Thaicom no longer plans to build any new satellites over the next three years.

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Qualcomm rejection of Broadcom's proposal leads to bitter dispute

A war of words is raging between semiconductor device makers Qualcomm and Singapore's Broadcom following the latter's takeover bid that was announced last year and could be the biggest merger ever in the tech sector.

In early November 2017, Broadcom proposed to acquire Qualcomm in a transaction valued at USD130bn. Under the proposal, Qualcomm stockholders would receive USD70 per share consisting of USD60 in cash and USD10 per share in Broadcom stock.

Around two weeks later, Qualcomm's board unanimously rejected the offer, describing it as an "unsolicited proposal". Tom Horton, the company's presiding director, said: "After a comprehensive review, conducted in consultation with our financial and legal advisors, the board has concluded that Broadcom's proposal dramatically undervalues Qualcomm and comes with significant regulatory uncertainty."

In December, Broadcom notified Qualcomm of its intention to nominate 11 independent individuals for election to Qualcomm's board. Broadcom president and CEO Hock Tan said: "We have repeatedly attempted to engage with Qualcomm, and despite stockholder and customer support for the transaction, Qualcomm has ignored those opportunities. The nominations give Qualcomm stockholders an opportunity to voice their disappointment with Qualcomm's directors and their refusal to engage in discussions with us."

However, Qualcomm rejected the 11 nominees and described Broadcom's action as a "blatant attempt" to seize control of its board. The company also expressed concerns about the regulatory issues surrounding the proposal, and what it said were the absence of commitments by Broadcom to resolve those issues, its lack of committed financing, and the uncertainty surrounding its transition from Singapore to the US.

Broadcom reacted to this in an online statement issued in January 2018: "Qualcomm has once again made intentionally vague statements regarding 'regulatory challenges' that are simply unfounded, misleading, and a disservice to Qualcomm stockholders. Qualcomm's rhetoric is vague for a reason – because it is not grounded in reality."

The company went on to say that there were no antitrust issues concerning the proposed transaction, and that it had "extensive experience" of completing complex acquisitions and had begun the process of gaining regulatory approvals as well as "redomiciling" to the US by May 2018.

In early February, Broadcom improved its offer. Qualcomm stockholders would now receive an aggregate of USD82 per share consisting of USD60 in cash and the remainder in Broadcom shares. This was also rejected by Qualcomm. It said the proposal "materially undervalues" Qualcomm and falls "well short" of the solid regulatory commitment the board would demand given the significant downside risk of a failed transaction.

At a meeting between the two companies that took place on 14 February, Qualcomm continued to express concerns regarding the potential risks of the proposed transaction, despite Broadcom including an USD8bn regulatory reverse termination fee and six per cent per annum of net dividends in the event of a failed transaction.

By now, Broadcom was seeking the election of six rather than 11 nominees to Qualcomm's board and wrote to stockholders urging them to vote for this at Qualcomm's annual shareholders' meeting that was due to take place on 6 March 2018.

But two days before this, Broadcom claimed it discovered that the meeting would be delayed. According to the company, Qualcomm had "secretly filed" a request with the Committee on Foreign Investment in the United States (CFIUS) at the end of January 2018 to initiate an investigation. "It should be clear to everyone that this is part of an unprecedented effort by Qualcomm to disenfranchise its own stockholders," claimed Broadcom.

In its response, Qualcomm said: "CFIUS has determined that there are national security risks to the United States as a result of and in connection with the transaction proposed by Broadcom.

"Broadcom's dismissive rhetoric notwithstanding, this is a very serious matter for both Qualcomm and Broadcom. Broadcom's claims that the CFIUS inquiry was a surprise to them has no basis in fact. Broadcom has been interacting with CFIUS for weeks and made two written submissions to CFIUS."

In compliance with the committee's order, Qualcomm said its shareholders' meeting and election of directors would be delayed for at least 30 days pending a full investigation into Broadcom acquisition proposal.

As we went to press in mid-March, US president Donald Trump intervened in the row and ordered Qualcomm to immediately and permanently abandon the proposed takeover saying that it could threaten US national security. According to reports, US officials also fear that the takeover could result in Chinese companies such as Huawei stealing a march in the development of 5G.

Asia and developing markets to spearhead mobile growth

The mobile industry signed up its five billionth unique mobile subscriber last year and is forecast to add almost another billion by 2025, according to GSMA Intelligence.

In its latest *Mobile Economy* report published in February, the association's research arm says there will be 5.9 billion subscribers over the next seven years, which is equivalent to 71 per cent of the world's expected population by that point. The GSMA believes growth will be driven by developing countries, particularly Bangladesh, China, India, Indonesia and Pakistan, as well as markets across sub-Saharan Africa and Latin America.

The report also says that in under a decade since the first commercial 4G networks were launched, LTE is on track to become the world's leading mobile network technology by next year and to account for 53 per cent of global connections by 2025.

According to GSMA Intelligence, the mobile ecosystem accounted for 4.5 per cent of global GDP globally in 2017, a contribution equivalent to USD3.6tn in economic value added. It says this contribution is forecast to reach USD4.6tn or five per cent of GDP by 2022 as countries around the world increasingly benefit from the improvements in productivity and efficiency brought about by increased take-up of mobile services and M2M/IoT solutions.

Furthermore, the report says that in 2017, the wider mobile ecosystem supported 29 million jobs (directly and indirectly) and made a substantial contribution to the funding of the public sector; almost USD500bn was raised through general taxation while spectrum auctions brought in USD25bn.

Aircel files for bankruptcy

Following the earlier closure of its operations in six circles (*see News, Q417 issue*), Indian MNO Aircel has now filed for bankruptcy.

According to reports, the company is considering various options to minimise its opex as it seeks interim funding, but in the meantime it has sought protection under India's Insolvency and Bankruptcy Code, 2016.

Local reports cited unnamed sources which stressed that bankruptcy protection was a "resolution process" rather than "liquidation", and that once Aircel had admitted its resolution process at the National Company Law Tribunal (NCLT), an insolvency resolution professional (IRP) will be appointed to raise the interim funding. The IRP will work with creditors to finalise a plan that will include future business strategies and identify which circles should be kept running or closed.

As a result, Aircel intends to cut back, rather than shut down, services across Punjab, Delhi, Mumbai and parts of West Bengal to avoid handing back its spectrum. The operator is said to be looking at building data businesses across the Tamil Nadu, Karnataka, Andhra Pradesh, the North-East, Assam, Kolkata, Jammu

and Kashmir, Odisha, Bihar and Rajasthan circles in an effort to boost its fortunes. It is also reportedly talking to rival operators Bharti Airtel and Reliance Jio about intra-circle roaming agreements.

Majority-owned by Malaysian telco Maxis, Aircel currently has around 4,000 employees and debts of about INR15,500 crore (USD2.37bn). The arrival of Reliance Jio Infocomm in India's market two years ago led to the cellco losing subscribers and revenues.

Hytera sues Motorola Solutions for alleged anti-competitive practices

The ongoing legal dispute between Hytera Communications and Motorola Solutions (*see Wireless Business, Q317 issue*) is continuing with the Chinese company filing a new lawsuit against its Chicago-based rival.

In a complaint submitted to a US federal district court in New Jersey on 4 December 2017, Hytera alleged that Motorola Solutions is preventing it from competing in the US marketplace with its critical communications products. Hytera said: "Motorola Solutions is engaging in anti-competitive practices that are unlawful under the Sherman and Clayton Acts by deliberately and actively foreclosing competition in LMR communications systems, in order to reap billions of dollars on sales at inflated prices to US customers."

The Chinese company, together with its subsidiaries that include US-based PowerTrunk and UK firm Sepura, allege that by

INVESTMENTS, MERGERS, ACQUISITIONS

Date	Buyer	Seller	Item	Price	Notes
13/12/17	Flexenclosure	European Investment Bank	Loan	EUR10m	Backed by the European Fund for Strategic Investments, EIB's investment loan will support Flexenclosure's growth strategy as well as R&D activities in its *eCentre* & *eSite* products.
29/12/17	Reliance Jio	RCOM	Wireless assets	c.INR240bn*	According to reports, Anil Ambani's Reliance Communications (RCOM) will sell all its spectrum, tower, fibre & other telecoms infrastructure assets to Jio, which is owned by Reliance Industries & controlled by Anil Ambani's elder brother Mukesh, India's richest person. *The value of the transaction has not been disclosed but reports quoting sources close to the matter state a figure of around USD3.75bn.
12/1/18	Thales	Gemalto	Proposed acquisition	EUR51 per share/ dividend	In a joint statement issued online, the companies said they're making "good progress" in respect of the intended all-cash offer by Thales for all the issued & outstanding ordinary shares in Gemalto's capital. The transaction is expected to close shortly after Thales has secured all customary regulatory approvals and clearances, which is anticipated in the second half of 2018.
17/1/18	Baylin Technologies	Advantech Wireless	RF, microwave divisions & terrestrial antenna divisions	USD49m	Canada-based Baylin Technologies is the corporate head office of specialist antenna maker Galtronics. The company's purchase price for Advantech Wireless includes USD48m & USD1m in Baylin common shares at USD3.24 per share.
23/1/18	Digi International	Accelerated Concepts	Company	USD17m	Accelerated Concepts specialises in secure, enterprise-grade, LTE networking equipment for primary & backup connectivity applications. Digi says the upfront cash transaction expands its market reach & range of industrial, M2M cellular routers & network server product lines.
5/2/18	Singtel International Investments	Bharti Telecom	85,450,000 new equity shares	INR310 per equity share	The deal, which is subject to shareholder approval, will increase Singtel's stake in Bharti Telecom by up to 1.7% for an aggregate consideration of around INR26.5bn or SGD555.6m. Singtel's economic interest in Airtel will increase by 0.9 percentage point to 39.5%. Bharti Telecom retains around 50.1% of Airtel's share capital of Airtel.
28/2/18	EXFO	Astellia	Company	EUR25.9m	Canada-headquartered EXFO is acquiring 97.44% of Astellia's share capital & at least 95.07% of the voting rights. It reckons the purchase of the French company creates "a new global force in network test, monitoring & analytics".

NEW APPOINTMENTS

Date	Name	New employer	New position	Previous employer	Previous position
4/1/18	Asri Hassan Sabri	Axiata Group	CEO of Xpand, the group's business services division	Axiata Group	Chief business operations officer
4/1/18	Abid Abdul Adam	Axiata Group	Group CISO & group head of privacy	Old Mutual	CISO & deputy information protection officer
11/1/18	Vikram Sinha	Ooredoo Myanmar	CEO	Ooredoo Maldives	CEO
12/1/18	Tengku Dato' Sri Azmil Zahruddin bin Raja Abdul Aziz	Khazanah National Berhad	Deputy MD	Khazanah National Berhad	Executive director of investments
23/1/18	Derek Hosty	Openet	Head of actionable data solutions business unit	Telenor Group	Director of technology strategy, data & analytics
24/1/18	Arthur Wong	Singtel	CEO of global cyber security	DXC Technology	SVP & GM of cyber security business
31/1/18	Åsa Tamsons	Ericsson	SVP & head of business area emerging business	McKinsey & Company	Partner, Stockholm office
1/2/18	Vikram V. Shanbhag	Coriant	MD for Asia Pacific South	Teya Ventures	Founder & director
1/2/18	Jan Karlsson	Ericsson	Acting head of business area digital services	Ericsson	Head of solution area BSS
5/2/18	Medhat El Husseiny	Robi Axiata	CTO	Axiata Group	Head of technology project, South Asia
5/2/18	A.K.M. Morshed	Robi Axiata	Chief supply chain & programme officer	Robi Axiata	CTO
12/2/18	Steve Collar	SES	President & CEO	SES Networks	Replaces Karim Michel Sabbagh who will step down in April 2018 to "spend time with his family & pursue new interests".
12/2/18	Andrew Browne	SES	CFO	O3b Networks	Replaces Padraig McCarthy who has announced his retirement & will step down in April 2018.
13/2/18	Jeff Garte	Globecomm	CFO	Hibernia Networks	SVP of corporate development
15/2/18	Aamir Hafeez Ibrahim	VEON	Head of emerging markets	VEON	Jon Eddy, VEON's previous head of emerging markets, is stepping down. Ibrahim will now oversee the company's businesses in Algeria, Bangladesh & Pakistan while remaining CEO of Jazz in Pakistan.

"foreclosing" competition from Hytera's DMR and TETRA solutions, Motorola Solutions is able to maintain "inflated" pricing in the US on its products that use P25, the standard for public safety communications that is widely used in the country. According to Hytera, TETRA offers similar functionality and features to P25 equipment, and can be "significantly less expensive". It claims this makes TETRA a "compelling option" for commercial users in the US.

Hytera further claims that Motorola Solutions is leveraging its dominance of the US public safety market to "impede adoption of newer, less expensive technologies", and forcing LMR dealers to drop its products.

"Motorola Solutions is forcing US customers to pay artificially high prices for critical communications," says Tom Wineland, director of sales for Hytera Communications America (West). "It can do this because of its long-standing monopoly.

"Customers want a choice, as reflected by the demand by public safety customers and other US customers for DMR, a robust LMR alternative at a fraction of the cost of P25."

Hytera goes on to accuse Motorola Solutions of engaging in a series of "sham" litigation and regulatory actions. It says this includes suing Hytera for patent infringement on a set of standard essential technologies that industry users have agreed to license on fair, reasonable, and non-discriminatory terms, and for which Hytera has already been paying Motorola Solutions to license.

In response to this latest action, Motorola Solutions has issued the following statement: "We believe Hytera's complaint is without merit and a clear attempt to shift attention away from the heart of the dispute – Hytera's brazen theft of our trade secrets and wilful infringement of our patents. We will continue to vigorously pursue our ongoing global efforts to stop Hytera's egregious behaviour and protect our intellectual property."

Sepura manufacturing milestone in Shenzhen

In January 2018, the first TETRA terminals bearing the Sepura brand rolled off the production line at Hytera's Longgang factory in Shenzhen, China. This followed Hytera completing its acquisition of UK-based Sepura in May 2017.

Project managers Neil Stafford and Robert Hall receive the very first box of completed Sepura-branded products.

The first radios were manufactured in December after the closure of Sepura's production facility in Malaysia in October 2017. The devices included the *STP9000* Series hand-portables and *SRG3900* mobile terminals. During 2018, Sepura says the project will expand to include both the *SC20* and the *SC21* hand-portables, whilst European manufacturing will be focused at Teltronic in Spain, maintaining a major European base for production.

The terminals manufactured in Shenzhen will be supplied to public safety forces and organisations with critical communications requirements in the Asia region.

It's claimed that one of the key advantages to the company in bringing manufacturing within the wider Hytera group is to ensure that Sepura can maintain strict controls on quality and production, whilst being able to flexibly respond to global demand.

Volaris Group acquires Sicap

The Canadian Volaris Group has bought all the shares of Sicap, including its international branch entities. The value of the transaction has not been disclosed. Sicap will continue to operate its own brand and serve its international customers from its current offices in Europe and India.

Volaris is an operating unit of parent holding company Constellation Software which is listed on the Toronto Stock Exchange. The company believes Sicap offers a "great opportunity" for it to expand its presence in the communications vertical, reinforce a strong position in the mobile market globally, and to acquire competency and experience in secure and scalable mobile applications.

David Nyland, portfolio leader and president, media and communications vertical at Volaris, says: "The acquisition of Sicap enables us to capture the full market opportunity of future high-growth market trends including e-SIM, IoT, and 5G networks, which require many more devices and increase the complexity for our operator customers to support these devices."

For Sicap – which originally began as a subsidiary of Swisscom – the acquisition will mean a creation of growth opportunities in innovation areas such as AI and the IoT, as well as an easier access to investment capital.

The company's current CEO, Markus Doetsch, will retain his position, and all of Sicap's employees have been taken over.

Doetsch says: "With Volaris, we have found a partner that not only has a deep understanding of our industry, but also shows a continuous track record in constantly growing companies they had acquired through best practice sharing and targeted investments into their growth areas."

In future, Sicap will become a part of the Volaris Communications Vertical business portfolio which includes technology brands such as Incognito Software, Netadmin Systems, Active Broadband OSS, Tarantula Global Holdings, Telepin Software and WDS Mobile.

Rohde & Schwarz, Unigroup Spreadtrum & RDA to set up joint test lab

Rohde & Schwarz and fabless semiconductor company Unigroup Spreadtrum & RDA are to establish a joint operator test laboratory in China as part of an MoU signed in February.

The two companies say they will focus on wireless communications and test concepts to better serve their common customers, including the three Chinese network operators and other global operators that Rohde & Schwarz (R&S) has been serving for many years.

R&S will provide technical consultancy and product support in the test lab. It will then collaborate with Unigroup Spreadtrum & RDA on testing for network operators around the world. The partners say their common goal is to enable chipset solutions that better fit global operators' requirements.

Unigroup Spreadtrum & RDA had already been working with R&S for 2G, 3G and 4G. R&S will now support Unigroup in 5G sub-6GHz and mmWave chipset design and development. The companies say this will ultimately accelerate 5G chip prototyping, and will further optimise 5G manufacturing and hasten the technology's time to market.

Further cooperation between the partners will look at automotive electronics and cellular and non-cellular IoT applications.

LATEST COMPANY RESULTS

Date	Company	Country	Period	Currency	Sales (m)	EBITDA (m)	EPS (units)	Notes
18/1/18	Bharti Airtel	India	3Q17	INR	20,319 (crore)	7,587 (crore)	NA	Consolidated total revenues at INR20,319cr., down 8.4% YoY on an underlying basis. Africa revenues up 5.3% YoY (constant currency). Africa EBITDA margin at 35.5%, up 10.8% YoY.
19/1/18	Jio	India	3Q18	INR	6,879 (crore)	2,628 (crore)	NA	Earnings up 11.9% from previous quarter with ARPU reported at INR154 per month. Net subscriber additions for quarter were 21.5m compared to 15.3m for 2Q18.
23/1/18	M1	Singapore	FY17	SGD	828.1	302.4	0.6	Service revenue continued its quarterly growth trend to close 2017 2.8% higher YoY. EBITDA decreased 3.1% mainly due to higher handset loss. Net profit after tax declined 11.5% YoY to SGD132.5m as a result of increased depreciation & amortisation expenses, plus higher interest costs.
31/1/18	Ericsson	Sweden	FY17	SEK	201.3 (bn)	NA	-10.61	Reported sales decreased by -12%. Sales adjusted for comparable units & currency declined by -7% YoY, partly due to lower LTE sales in mainland China & earlier completion of larger mobile broadband projects in South East Asia, India, Middle East & Africa. As previously stated, write-down of assets was made in 4Q17, with a final impact on the result of -SEK14.5bn.
31/1/18	Qualcomm	US	1Q18	USD	6.1 (bn)	(27)	-4.03	Revenues up 1% compared to 1Q17 but negatively impacted by continued dispute with Apple & its contract manufacturers (who are Qualcomm licensees), as well as penalties such as $6bn charge relating to enactment of new tax legislation in US, & $1.2bn fine imposed by European Commission.
31/1/18	Telenor	Norway	FY17	NOK	124,756	48 992	8.10	2017 saw 1% organic increase in revenues & total net cost reductions of NOK1.6bn, leading to increased profitability & cash flow of NOK25bn. For 2018, company expects organic subscription & traffic revenue growth of 1-2%, organic EBITDA growth of 1-3%, & capex (excluding licenses & spectrum) of NOK18-19bn.
1/2/18	Nokia	Finland	4Q17	EUR	6,668	NA	0.19	On a constant currency basis, non-IFRS net sales increased 5% & reported net sales increased 6%, with 2% growth in Networks business & 80% growth in Technologies.
5/2/18	Globe Telecom	Philippines	FY17	PHP	127.9 (bn)	53.3 (bn)	NA	Mobile revenues grew PHP98.5bn, 7% rise from PHP92.3bn reported for previous year. Data remains to be the biggest contributor to total mobile revenues, increasing contribution to 44% against 38% a year ago. Closed the year with a total subscriber base of 60.7m, down 3% from 62.8m in 2016.
8/2/18	Singtel	Singapore	3Q17	SGD	4.60 (bn)	1.29 (bn)	NA	Operating revenue for the quarter increased 4% while EBITDA rose 6%. But voice revenue declines, higher network depreciation & amortisation from increased infrastructure investments & overall lower earnings from associates impacted group's results. Net profit was down 9% to SGD890m while underlying net profit declined 8% to SGD898m.
11/2/18	Ooredoo	Qatar	FY17	QAR	32,735	13,783	NA	FY earnings increased, driven by "strong" contributions from Indonesia, Iraq, Kuwait, Maldives, & excluding forex issues, revenues increased by 2% compared to the reported 1% increase. Ooredoo Myanmar reported positive EBITDA for the first time on a full-year basis.
16/2/18	Eutelsat	France	1H17-18	EUR	696.6	544.6	NA	Earnings down 7.7% compared to six months for December 2016. CEO Rodolphe Belmer says: "First half results were in line with our expectations, with the decline in revenues mostly reflecting, as in the first quarter, an unfavourable comparison basis in FY 2017."
22/2/18	Axiata Group	Malaysia	FY17	MYR	24.4 (bn)	9.2 (bn)	0.85	Revenue improved 13.2% with EBITDA up 15.2% – both the highest in company's history, in spite of losses from Idea of MYR450m. Celcom Turnaround & XL Transformation Agenda executed as planned.
22/2/18	VEON	Amsterdam	FY17	USD	9,474	3,587	NA	Group revenue for 2017 increased 6.6% , partially driven by consolidation of Warid in Pakistan and positive effect from the RUB appreciation against the USD. Reported EBITDA increased 11% while underlying EBITDA decreased 0.4% organically to USD3,675m. The FY 2017 underlying EBITDA margin was 38.8%, a decrease of 0.9 percentage points YoY, missing the FY17 target of flat to low single digit accretion, due to margin pressure in Russia, Algeria & Bangladesh.
23/2/18	SES	Luxembourg	FY17	EUR	2,035.0	1,324.2	0.80	Reported revenue down 1.6% (-5.2% YoY). Outgoing CEO Karim Michel Sabbagh said 2017 was a year of transformation as the company established two market-focused units, SES Video & SES Networks. He added : "Business performance was below our expectations as the market remained challenging throughout 2017, compounded by some fleet health issues."
26/2/17	Intelsat	US	FY17	USD	2,149	1,629	NA	Net loss of USD178.7m. CEO Stephen Spengler said 2018 targets are to capitalise on better performance & economics associated with the services delivered by the *Epic* high-throughput fleet which will be completed later this year with the launch of the Asia Pacific-oriented *Horizons 3e*. Company also plans to launch *Intelsat 38* in 2Q18.
28/2/17	Sri Lanka Telecom	Sri Lanka	FY17	SLR	75.7 (bn)	21.2 (bn)	NA	Reported revenues grew 2.6% YoY, despite challenges on mobile revenue due to indirect taxes levied on mobile usages. As a result of several initiatives, the operational costs were reported at SLR54.5bn with a YoY increase of 1.6%.

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Cambium offers the capacity to connect more subscribers

With up to 1.36G throughput capacity, Cambium Networks says its *PTP 550* (*pictured right*) point-to-point backhaul radio enables operators to connect more subscribers and reach new market opportunities.

With spectrum being a precious commodity, the company says the *PTP 550*'s non-adjacent asymmetric channel aggregation capabilities "efficiently" consolidates limited blocks of bandwidth to deliver the capacity demanded by advanced network service providers.

The radio can be set up using Cambium's *LINKPlanner* software. The firm says this provides free network planning tailored to the exact source and destination points on a *Google Earth* map.

It adds that onboard dynamic spectrum optimisation enables the link to monitor performance in real time and automatically make adjustments to maximise throughput.

Cambium has also unveiled the *ePMP Force 300* point-to-multipoint module. With a data rate of up to 500Mbps, the 802.11ac Wave2 device works in the unlicensed 5.1-5.9GHz band, and has a 25dBi reflector antenna for long-range connectivity.

The company adds that its ePMP platform can be used for cost effective high-speed connectivity for various point-to-point applications and eventually as a subscriber unit for a point-to-multipoint network.

www.cambiumnetworks.com

NITRO aims to cut costs and optimise performance

Working seamlessly across mobile, fibre, cable, cloud and enterprise networks, VIAVI Solutions reckons *NITRO* (*Network Integrated Test, Real-time analytics and Optimisation*) enables users to cost-effectively manage their migration from today's static network deployments to next-generation, policy-based, automated dynamic networks.

Built on a common development platform that accesses and analyses data throughout the network, VIAVI says the platform addresses the challenges of the increasingly complex service lifecycle across physical, virtualised and hybrid networks. The firm claims *NITRO* will help cut costs and deliver new revenue streams for service providers and enterprises while optimising performance.

It will feature four toolsets: *Mobile* for network intelligence, assurance and optimisation; *vNet* for virtual service activation and performance; *Enterprise* for business and cloud network performance; and *TechFlow* for automated technician workflow.

VIAVI adds that *NITRO* allows networks to be managed with less manual intervention and reduced skill sets by increasing the automation of workflows and lifecycles.

By feeding real-time data from physical instruments and software virtual agents into a single presentation layer, it says the platform helps reduce complexity and increase automation, both of which are said to be needed to "confidently evolve" to future networks.

www.viavisolutions.com

RAN optimisation service with pinpoint geolocation

Network and subscriber intelligence specialist Astellia has added new features for customer experience-based optimisation and increased operational efficiency to its *Nova RAN* platform.

The firm says *Nova RAN* produces round-the-clock network performance maps (i.e. RF coverage, traffic, quality, etc.), from nationwide coverage down to a 50 x 50m precision. To facilitate investigation, the platform generates radio health scores which provide an aggregated view of RF weaknesses per area.

According to Astellia, *Nova RAN*'s classification algorithms distinguish indoor/outdoor and static/mobility calls. The firm claims it precisely locates capacity hotspots, coverage holes, pilot pollution and VIP areas.

This is said to enable mobile operators to get a clear picture of the customer experience and hence target and prioritise network operations such as new site or feature introductions, small cell planning and tuning of parameters.

Astellia also says that with the enhanced version of the platform, radio engineers will benefit from faster investigations thanks to the automation of massive and recurring tasks like the detection of missing neighbour relations, cell overshooting or crossed-sectors.

It adds that *Nova RAN* also offers the possibility to export geolocation data into the operators' Big Data pool to implement additional use cases on top of the existing ones proposed by the solution.

www.astellia.com

Rohde & Schwarz "pioneers" NB-IoT field measurements

Rohde & Schwarz (R&S) says it has come up with the world's first accurate LTE/NB-IoT coverage measurement solution.

The company says the new solution is based on its "field proven" *ROMES* drive test software for measuring network quality with scanners and test mobiles in all mobile technologies. It can be used in combination with the vendor's *TSMW*, *TSMA* and *TSME* scanners.

In tests, R&S says it was able to demonstrate the verification of device/network interworking by connecting NB-IoT user equipment to *ROMES*. Apart from RF tests, it says this setup provided further metrics such as downlink and uplink latency and throughput, and protocol behaviour.

According to the firm, using a scanner is the only viable solution for accurate and comprehensive measurement results. Unlike testing with NB-IoT user equipment, it claims scanner-based testing is passive and captures the measurement data directly from the RF air interface, including receive power levels and CINR (carrier-to-interference-and-noise-ratio).

Another difference between NB-IoT and LTE user equipment concerns cell reselection. R&S says NB-IoT user equipment supports this mechanism only in idle mode, and this affects the abilities of the equipment to perform continuous and accurate RF coverage measurements.

www.rohde-schwarz.com

OneAccess routers offer fibre speed performance

OneAccess (now part of EKINOPS) says its new *ONE* series of routers enable operators to deliver up to 300Mbps symmetric services "without the cost, disruption and delay of introducing fibre".

The devices integrate Broadcom's latest *BCM63138SE* chipset, and also feature especially designed software from OneAccess to support the latest evolutions of VDSL2 technology.

For instance, VDSL2+ (Profile 35b) offers downstream rates up to 300Mbps over distances less than 250m and upstream rates up to 100Mbs over a single copper wire pair. Meanwhile, bonded VDSL combines two or more classical VDSL2 line pairs and, over a given distance, multiplies the available bandwidth by the number of bonded pairs.

The product range also includes options to deliver fibre connectivity to support fibre with copper backup deployments, as well as deliver high-speed FTTP at up to 1Gbps.

The new line-up includes the *ONE521* and *ONE531*, the first OneAccess products to run on *OneOS6*, the company's recently launched NETCONF-ready operating system.
www.oneaccess-net.com

Motorola promises uninterrupted radio coverage to keep teams connected

Motorola Solutions claims its *SLR 1000* repeater enables service providers to easily extend their network through dead zones and across remote locations so that everyone is within reach.

Unlike traditional repeaters, the firm says its new radio can be deployed outdoors or indoors and offers the flexibility to be used in places such as parking garages, subway tunnels, and other potentially damp and wet locations. It is IP65 rated for dust and water protection, and its "compact" dimensions of 279.4 x 228.6 x 101.6mm are said to add to the ease of installation. Operating temperature is specified at -30° to 60°C.

Wherever the device is deployed, Motorola reckons users can put their "maintenance and repair worries aside", as a fanless design means less noise, less particulate intrusion, fewer components and all while delivering more coverage.

The *SLR 1000* has been designed to work with both conventional and trunking systems that support voice and data, and has a frequency range of 400-527MHz.

The vendor says additional functionality is possible using optionally available accessories, such as a small mountable antenna, duplexer, or antenna switch for Extended Range Direct Mode. The latter also enables the use of the repeater in conventional systems.
www.motorolasolutions.com

PCCW launches Restoration On Demand

PCCW Global has launched a new service that enables users to rapidly re-route their connections to an alternate network path in the event of an undersea cable failure.

Restoration On Demand leverages PCCW's SDN capabilities and "extensive" fibre network to enhance resilience and service performance in order to meet the needs of enterprises worldwide.

The service is charged for on a daily-usage basis and can be accessed via an online portal. Once activated, PCCW says the backup capability allows capacity to be provisioned automatically by its systems in near real-time and with no human intervention required. Link setup, traffic restoration and billing are automatically activated.

Once the primary circuit has been repaired, customers can revert to their original cable service whenever they choose.

PCCW Global adds that *Restoration On Demand* complements its existing always-on protected *International Private Lease Circuit* service by offering customers a quick-to-deploy and cost-effective business continuity service alternative.
www.pccwglobal.com

Also look out for...

Lasers used to alter optical properties

Scientists say they are one step closer to technology that could result in electrons being replaced with photons, solving the looming 'speed limit' for electronic gadgets.

According to researchers at Heriot-Watt University in Scotland, electronics have had such long-term success mainly due to how much smaller devices have become and how robust they are, even when made from a very limited number of fundamental materials. These last two features have traditionally been seen as weaknesses in photonics.

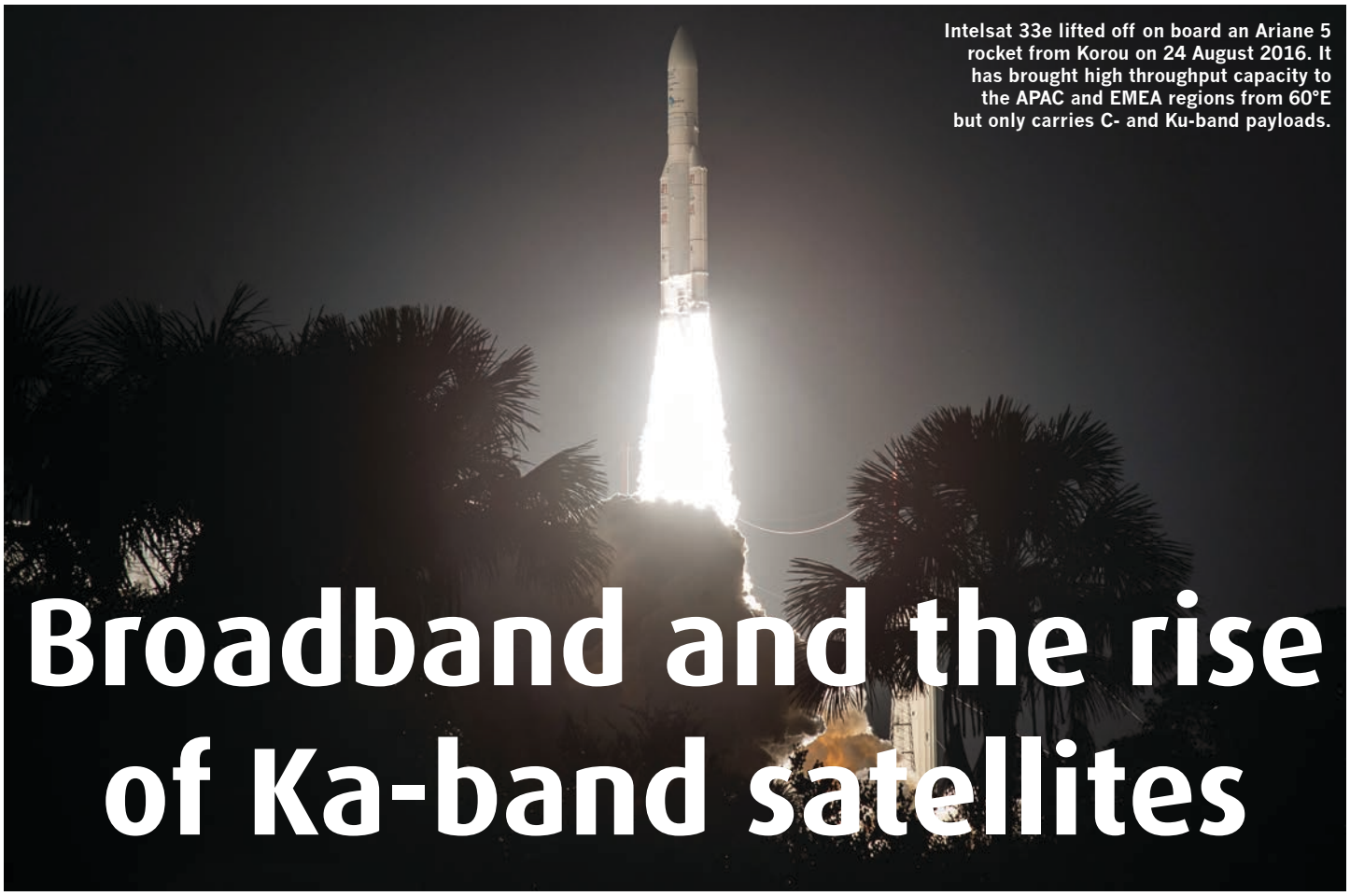
But for the first time, nanophotonics researchers have now shown how aluminium zinc oxide (AZO) reacts to light when simultaneously shined with ultra-fast laser pulses of different colours. Since AZO is a compound used in touchscreen technology, the discovery could have an immediate impact for the fabrication of novel photonic components.

The team used one laser beam to explore the optical properties of thin films of AZO, while two different trains of ultra-fast light pulsed at two distinct frequencies (or 'colours') were shone on the material. The experiments were conducted first by using one colour at a time, and afterwards with the combined use of the two laser sources.

It's claimed the recorded effects – which last for a 10,000th of a billionth of a second – revealed that it was possible to "drastically" and reversibly alter the optical properties of the material by using laser light with different colours.

"Each colour can induce strong and ultra-fast alteration on both the transparency of the material and the speed at which light propagates into it," says assistant professor Dr. Marcello Ferrera. "Electronics have almost reached their capacity and potential; our findings represent a remarkable step towards the full miniaturisation of photonic components."

It's claimed this could have "striking" consequences for the design and fabrication of optical computing and telecom devices.



Intelsat 33e lifted off on board an Ariane 5 rocket from Korou on 24 August 2016. It has brought high throughput capacity to the APAC and EMEA regions from 60°E but only carries C- and Ku-band payloads.

Broadband and the rise of Ka-band satellites

With many of the latest satellites specifically carrying Ka-band payloads, DR. NICOLA DAVIES and RAHIEL NASIR find out if that's the best option for enabling broadband connectivity from space.

With many of the latest satellites specifically carrying Ka-band payloads, DR. NICOLA DAVIES and RAHIEL NASIR find out if that's the best option for enabling broadband connectivity from space.

At the World Economic Forum held in Davos in January 2018, the UN's Broadband Commission launched yet more targets to bring online the world's 3.8 billion people who are still not connected to the internet. It has set what it describes as seven "ambitious yet achievable" targets in support of Connecting the Other Half of the global population over the next few years.

By 2025, the commission says:

- All countries should have a funded national broadband plan or strategy, or include broadband in their universal access and services definition.
- Entry-level broadband services should be made affordable in developing countries, at less than two per cent of monthly gross national income per capita.
- Broadband/internet user penetration should reach 75 per cent worldwide, 65 per cent in developing countries, and 35 per cent in least developed countries.
- Other targets include ensuring more people have sustainable digital skills, boosting connectivity for small businesses, and achieving gender equality across all targets.

None of this will sound particularly new – the UN has been setting similar targets since the turn of the century, first with its millennium development goals which were then followed up in 2015 with the sustainable development goals.

And yet, according to the UN's own statistics, billions of people around the world still lack any kind of internet access. Out of the 47 nations currently defined as "least developed countries" by the ITU, most are in Africa but five are in Asia (*see News, p6*) while the others are mainly island states or in the Middle East.

Of course, resources are scarce in these countries. And as is well documented, severe weather and terrain often further inhibit the installation of the infrastructure needed to advance a developing nation. But there are technical solutions to help both overcome these challenge as well as support targets for universal broadband connectivity. And arguably, the best possible solution involves the use of satellites.

The world is a "connected village"

With the demand for affordable broadband connectivity increasing, many operators have been focusing on developing and launching satellites that feature Ka-band payloads.

K-band frequencies as specified by the IEEE, operate in the 18 to 27GHz spectrum range. As is well documented, these frequencies are susceptible to rain fade and have therefore not been used for long-distance applications. As a result, the K band has been split into three bands – K, K-above (Ka) and K-under (Ku).

Ka operates in the upper part of the K-band (26.5-40GHz) which allows for greater bandwidth than C-, L-band or Ku-bands. While Ku also operates at a higher speed, much of the bandwidth is already taken up, leaving little

access to the average consumer.

Ka utilises smaller and cheaper equipment, making it an ideal choice for consumer internet use. While airlines have leveraged Ku-band (the lower part of the K spectrum, 12 to 18GHz) for several years, they are beginning to harness technology that also supports Ka in order to give passengers internet access during flights.

While C-band frequencies (which operate within 4-8GHz) are less focused this makes them less susceptible to weather changes. A less-focused signal also lends itself to greater coverage. However, while broadband via satellite using C has been available for many years, the dish is much larger, making it awkward to transport and install in remote areas. These dishes are also somewhat more expensive.

Nonetheless, although Ka may be regarded more popular at the moment, Patrick Van Niftrik, SES' EMEA VP of spectrum management and development, says that we would not be where we are today as a society without C-band. In a blog posted in 2015, he wrote: "The world became a connected village first and foremost thanks to satellite, and it started with C-band."

Martin Jarrold, chief of international programme development at the Global VSAT Forum (GVF), adds that C-band continues to serve an extremely important purpose, and points out that UN organisations use the spectrum for vital public safety functions, disaster relief efforts, humanitarian and development programmes.

Furthermore, Ka frequencies have often been dismissed due to the potential of fading in stormy weather. Eran Shapiro, director of business and technology ventures for Spacecom, says: "C-band remains the band of choice due to its greater effectiveness in relation to rain fade and greater geographic reach."

Researchers continue to work towards addressing the rain fade issue, and one such advancement involves the use of adaptive coding modulation (ACM). By automatically strengthening and adjusting the coding and modulation of the satellite and therefore providing 'uninterrupted service', rain fade becomes less of a problem, according to frequency control specialist Bliley Technologies.

While one of the advantages of leveraging Ka is the use of a smaller antenna, researchers have also found success in using larger antennas to combat rain fade in certain situations. Additionally, satcom services provider Link Communications Systems says rain fade can be avoided by using antennas in pairs as part of the ground infrastructure (but it also notes that interestingly, rain fade doesn't continue to decrease with the addition of more than two antennas).

Compared to other spectra used by satellites, Ka frequencies have only been available for a relatively short amount of time. The GVF suggests that the band wasn't even utilised for commercial purposes until the 1970s.

Superbird A1 was the first satellite to support Ka-band technology. It was developed by Sky Perfect JSAT and was launched in December 1992 to cover Japan. *Superbird A1* has since been retired. It was not until September 1999 that a commercial communications satellite that used Ka was orbited. Originally launched by South Korea's KT Corp, *KOREASAT-3* was subsequently purchased by Asia Broadcast Satellite and re-named *ABS-7*. The satellite orbits at 116.1°E and features Ku and Ka transponders. Its Ka-band beam covers Afghanistan and Pakistan and is claimed to be "highly suitable" for government applications, while a high-powered Ku-band beam targets Pakistan, Afghanistan and North West India, and can be used for DTH and CATV video distribution.

Since then, all of the mainstream satellite operators have launched spacecraft with Ka-band missions, and there have also been several relative newcomers who develop, build and launch satellites that exclusively use the spectrum.

The view from JUPITER

Hughes has developed its JUPITER technology which it uses as the foundation of its own Ka-band systems to support a wide range of applications and markets. DAVE REHBEHN shares the company's wisdom and experience about how Ka could be king.

Hughes claims to be the world's largest Ka-band system operator. The company – which is also credited with inventing commercial-use VSATs in the mid-1980s – says that as booming demand for HDTV and broadband in many regions exceeded Ku-band capacity limits, the industry moved into the much higher frequency Ka-band. But the early generation Ka satellites traded coverage for capacity and could only generally support only a few Gbps total capacity if used for data communications.

"Consider a typical satellite that supports a payload of 24 C-band transponders (36MHz each) and 24 Ku-band transponders (36MHz each)," says Hughes. "The total of 48 transponders means that the satellite supports a total of 1.7GHz of capacity. Assuming that a 36MHz transponder translates to about 70Mbps of data, then this 1.7GHz of capacity would achieve a little over 3Gbps of capacity when used for data communications."

Enter the high throughput satellite (HTS). According to Hughes, these achieve greater capacity through the implementation of multiple spot beams such that frequency can be reused. These spot beams are separated from one another by a combination of frequency and polarisation and are also smaller. This then enables a greater overall number of beams and thus a higher level of frequency reuse.

As an example, the company describes an HTS design that employs 60 spot or user beams. "If each of these beams has 500MHz of forward channel capacity and 500MHz of return channel capacity (a typical Ka-band allocation), then the satellite is able to deliver 60GHz of capacity throughout the footprint of these 60 beams. As can be seen, through frequency reuse, an HTS design is able to achieve considerably more GHz as compared to a conventional satellite without frequency reuse, in this particular case more than 30 times the amount of spectrum."

Hughes continues by saying that many HTSs utilise Ka-band frequencies for the simple reason that the orbital slot allocation for other bands has long been exhausted. It says that while it's extremely difficult to obtain commercially viable Ku-band slots from the ITU, Ka-band slots are generally under-used.

The company adds that another important benefit of Ka is the availability of greater amounts of spectrum versus Ku. It says that while a typical Ku satellite might operate across 750MHz of spectrum, a Ka satellite might operate across 1500MHz or more of spectrum for the gateway feeder beams alone.

But Hughes goes on to state that just because the industry can make 100+ Gbps satellites does not mean that every operator should be planning to deploy such large capacity spacecraft. The company believes that a partial payload or even a dedicated Ka-band payload but with a smaller satellite mass (and thus lower capacity) may be attractive to service providers for a variety of reasons. These including: a small geographic coverage area; anticipated slow fill rate, thereby reducing the need for immediate deployment of a lot of capacity; and lower capex compared to the cost to launch a dedicated satellite.

On the issue of rain fade, Hughes points out that this was also an issue when Ku-band was first popularised. As a result, the company says its *JUPITER* technologies have been developed with a "rich" set of features to mitigate attenuation due to atmospheric moisture. These include forward and return channel mitigation techniques that offer a number of features such as: uplink power control at the gateway stations; satellite automatic level control; adaptive coding and modulation of the forward channel; use of larger antenna to generate higher EIRP; dynamic symbol shifting; amongst others.

"It should be noted that Ka-band has already been widely and successfully deployed in high rain areas," says Hughes. "[Our] experience has been that Ka-band availability in the range of 99.7per cent can be achieved, even in high rain fade areas, such as Florida."

Dave Rehbehn is vice president of international sales and marketing at Hughes Network Systems. The above article contains extracts from his white paper "The View from JUPITER: High-Throughput Satellite Systems" which was first published at www.hughes.com in 2013. All information used with kind permission from Hughes Networks Systems.

The future of Ka

Around 48 satellites are presently scheduled to launch around the world between 2018 and 2020. Of these, 24 support Ka-band, and include dedicated birds for the region such as those orbited by Yahsat. The UAE-based operator's first satellite, *Al Yah 1*, was successfully launched in April 2011 and was followed by *Al Yah 3* one year later. They both use Ka to offer *YahClick*, Yahsat's broadband satellite service which covers 28 countries across MEA and Asia, including Afghanistan and Pakistan.

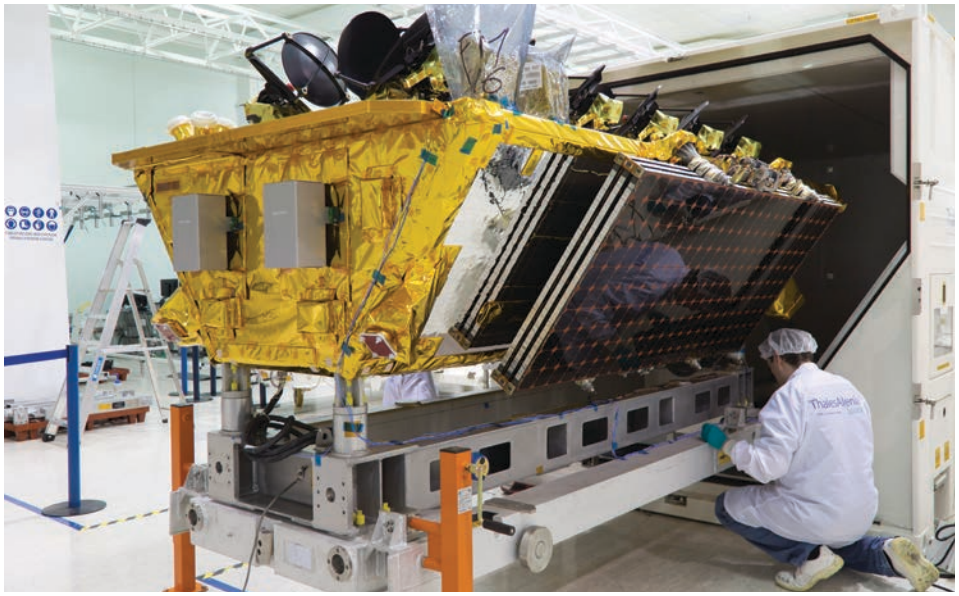
Last October, the company claimed a regional first with an in-flight connectivity test of 50Mbps that it said would "change the way passengers experience air travel". Using *Al Yah 2* and the latest generation Ka technology, the test simulated the environment found on an Airbus *A320*. Yahsat says it achieved a new level of performance for in-flight connectivity to enable passengers to enjoy an in-flight browsing experience similar to their home or office. The company is now working with its partners – mobile operator du, Etihad Airways Engineering, Hughes Network Systems and Carlisle Interconnect – to roll out the solution to commercial airliners this year.

Meanwhile, Yahsat confirmed the successful launch on 25 January 2018 of its third satellite, *Al Yah 3*. It said that the mission experienced some challenges during the launch stages, which resulted in the satellite being inserted into an orbit that differed from the flight plan. But Yahsat pointed out that the satellite is "healthy and operating nominally," and that a revised flight plan will be executed in order to achieve the operational orbit and the original mission. *Al Yah 3* will expand Ka-band coverage across Africa as well as establish a presence for Yahsat in Latin America. It is due to begin delivering commercial services later in 2018.

Towards the end of January 2018, O3b – which is now a wholly owned subsidiary of SES – announced that its next four MEO (medium Earth orbit) satellites had arrived in Korou in preparation for their launch in March 2018. Its claimed that the new Ka-band spacecraft, which will augment O3b's current fleet of 12, offer improved connectivity, capabilities and increased performance. SES plans to launch another four satellites in 2019 to bring the total number of O3b satellites to 20.

Martin Jarrold, Chief of international programme development, Global VSAT Forum

"HTS offers enormous advantages to many of the world's developing regions, including Africa and South Asia, in terms of meeting consumer broadband service demand."



Thales Alenia Space is building eight more satellites for O3b. Four are due for launch in March while the next quartet will go up in 2019 to bring the company's total number of orbiters to 20.

SES itself currently has around nine satellites from its extensive fleet that point at the Asia and APAC region (this number rises to 12 if the recently launched *GovSat-1* is included; this is a joint venture between SES and the Luxembourg government. In another joint venture called 'YahLive', SES is also working with Yahsat to operate *Yahsat 1A*).

While SES' new missions in recent years have focused on the Americas, the company is due to launch *SES-12* in 2Q18. The satellite will provide DTH, VSAT, mobility and high throughput satellite (HTS) data connectivity services in the Middle East and APAC region, including rapidly growing markets such as India and Indonesia. It will replace *NSS-6* at 95°E and will be co-located with *SES-8*. And while the new bird will use K frequencies, its payload will feature 54 Ku-band transponders.

Intelsat has spent the last few years launching satellites that use its *EpicNG* HTS platform. These include *Intelsat 33e* which was launched in August 2016 to cover the EMEA and Asia regions. This was the second of seven planned spacecraft that use the company's high throughput platform, and during the second half of 2018 Intelsat is planning to complete its global *EpicNG* network with the launch of *Horizons 3e* to 169°E. The satellite has been developed as part of a new, equally shared joint venture between Intelsat and Japan's SKY Perfect JSAT which is said to be Asia's largest satellite operator with a fleet of 16. *Horizons 3e* is the fourth satellite JSAT will jointly own with Intelsat, following *Horizons-1* which launched in 2003, *Horizons-2* (2007) and *Intelsat 15/JCSAT-85* (2009).

The partners claim *Horizons 3e* will feature the most advanced digital payload on a commercial orbiter, as well as bandwidth flexibility and power portability. Speaking last year, Intelsat CEO Stephen Spengler said: "The scalability, power and flexibility of *EpicNG* will provide commercial and governmental aeronautical and maritime services with unprecedented seamless, contiguous broadband coverage over the most widely trafficked routes from the Atlantic to the Pacific. In addition, the higher performance and improved economics will enable fixed and mobile network operators to expand their networks and provide much needed broadband connectivity to the more remote communities of the region."

However, not all of Intelsat's *EpicNG* satellites – including *Horizons 3e* – feature Ka-band payloads. Instead, many use high throughput Ku-band capacity as well as optimised C-band. In a blog published on Intelsat's website in May 2017, the company's senior principal marketing manager Melvyn Chen, wrote: "As a high-throughput satellite platform, [*EpicNG*] stood out from the rest of the industry with its focus on providing carrier grade services by using the more reliable C-band and Ku-band frequencies. Comparatively, other HTS operators in the industry favoured using Ka-band frequencies which tend to be more suited for consumer grade applications."

Hughes Network Systems adds that high throughput satellites are often assumed to be only Ka-band, but the same design principles of smaller beams along with frequency reuse can be applied to Ku-band as well. (*Also see The view from JUPITER, p21.*)

Going low

So while one possible future of broadband using satellite centres around leveraging Ka-band, where does that leave a new generation of companies that plan to put hundreds of low Earth orbit micro satellites into space to create a clustered, mesh network that will cover the planet?

Since one of the major purposes of utilising LEO satellites is to enable remote connectivity, the ground equipment needed to pick up lower

frequencies such as those in C-band will need to be large. This is likely to make such equipment difficult and expensive to install in remote areas.

Although forthcoming LEO missions from the likes of Leosat, OneWeb, and Sky Space and Global have a lot to offer, the GVF's Jarrold says several factors need to be considered for their success.

Firstly, and as highlighted above, he reiterates that Ka-band may not be fast enough for online games or interactive programmes. Secondly, while LEO satellites require less power and are less expensive to produce, more of them must be deployed to create and support a reliable network. Thirdly, he points out that when a LEO satellite moves over the ocean or across an unpopulated area, the opportunity to generate revenue diminishes.

Another factor to consider is that because so many satellites are required, the process of synchronising them could present an issue. Furthermore, engineers will need to focus their energies on utilising those satellites already in orbit in addition to developing new satellites to add to the network.

Ultimately however, while LEO satellites have the potential to change the market landscape, the GVF says the technology will be "complementary" to traditional (GEO) HTS systems. Jarrold says: "Each has advantages over the other, with innovation in both of these space-based technologies continuing as the demand for availability and quality of services delivered to customers grows."

Eran Shapiro, Spacecom's director of business and technology ventures, is likely to support this when he says: "We should not base our businesses on one technology, rather, we should spread our risks."

Spacecom currently runs a fleet of three satellites and is planning to launch a fourth next year. Of these, *AMOS-4* covers Asia and Africa from 65°E using multiple Ku- and Ka-band transponders.

As technology continues to evolve and when satellites are developed, Shapiro says they need to be versatile enough to support any advances that take place from construction to launch. And they need to be upgradable as well. Like others within the industry, he believes that if engineers focus on making a variety of bandwidths faster and more reliable through their satellite technology, there will be more options for the consumer.

Jarrold is quick to point out that frequency should not be the only factor considered when it comes to delivering broadband via satellite. "In this respect, HTS offers enormous advantages to many of the world's developing regions, including Africa and South Asia, in terms of meeting consumer broadband service demand," he says.

The cost of engineering HTS systems has come down, and the product reliability continues to increase. Furthermore, satellite companies will continue engineering structures to serve a variety of consumers, including the military, humanitarian organisations, as well as the average consumer. Consequently, the technology will continue to improve to support all bands.

At the end of the day, the choice of high frequency spectra like Ka- or Ku-band, or a lower frequency like C, is going to depend on the needs of the consumer. At this point, the pros and cons to each spectrum are dependent on how they are utilised. As Shapiro concludes: "Those who have the means and can afford to invest in a new ground terminal and technology, may likely go for a DTH Ka-band-based satellite broadband service. Enterprise and service operators who need to quickly expand their business and assure high service availability will continue with C-band." ■

Creating a truly mobile network

Connectivity to cell towers – which can be few and far between in remote areas – could be further hindered by any number of things, ranging from distance to rugged terrain or extreme weather conditions.

DAVA BAUMANN discusses how connectivity can be re-imagined using portable cell towers and kinetic mesh network architecture.

With the number of connected devices, sensors and 'smart' technologies on the rise, industry leaders are in a unique position to modernise their working environments and gain a number of never-before accessible skills, including real-time visibility into the status of people, equipment, and operations of their organisations.

However, with this new toolbox of skills and technologies, organisations find themselves faced with another dilemma: the need for a robust, reliable and mobile network that can keep up with these demands 24/7.

It is the operators of large worksites that are often forced to watch productivity slow to a halt as cellular and other 'make-to-break' traditional networks struggle to keep up with such new and dynamic operations. Connectivity to cell towers – which can be few and far between in remote areas – could be further hindered by any number of things, ranging from distance to rugged terrain or extreme weather conditions. Reliable connectivity issues can leave operators feeling trapped and their fleet stranded, limiting productivity and putting organisations in difficult positions.

What operators need in this day and age is a completely mobile network – a 'cell tower on wheels', to synonymously move or have the ability to become one with the fleet.

Instant connectivity with total mobility and scalability

Operators in remote and/or sprawling industrial environments don't always have enough existing cell towers (or any towers at all) located within their range, and it can take an enormous effort to have one installed in a new location.

But what if, instead of being statically tied to one site, the cell tower had the ability to get up and drive directly to the place you needed it, moving with ease to rapidly expand coverage to that area across the entire fleet and area of operation?

These cell towers on wheels could also spread as far and wide as a site requires, flexibly augmenting or creating infrastructure *ad hoc* to provide ubiquitous coverage across growing operations – no matter how far out they span.

And as more connected people, devices and machines are added to the expanding site, new cell towers would simply roll in to provide the increased network support required, as well as work with the nodes installed on the numerous moving assets the organisations have.

With the roving connectivity of a cell tower on wheels, the many moving assets that make up an industrial site – from equipment to vehicles to people – could take robust connectivity with them as they travelled. The tower would simply follow along, dodging line-of-sight issues caused by rugged terrain and seamlessly connecting hot zones to allow operators to maintain unwavering connectivity to, communications with, and control over all the 'things' that power more efficient and productive operations.

Giving the network the ability of 'wheels' means that even outer-edge communications would be completely reliable and provide a previously impossible connection directly to a control centre.

Kinetic mesh: the key to IIoT and digital transformation

Industrial operators can kickstart their organisation's journey to digitisation by deploying a kinetic mesh network topology. This type of network allows for multiple nodes to connect, broaden and strengthen the network where necessary. With the nodes essentially acting as compact, rugged, transportable, mini cell towers, virtually anything in the organisation's infrastructure can be turned into networking equipment.

In comparison to a regular cellular network, which has limited cross communication, a kinetic mesh network can communicate peer-to-peer seamlessly via numerous instantaneous connections. These form an adaptable, dynamic network that has the ability to provide reliable wide-range communications practically anywhere.

Without the need to trade-off one feature for another, kinetic mesh networks provide unwavering bandwidth at high-speed, complete mobility, true mission critical reliability and scalability – a true future-ready network.

Building a reliable network starts with reliable hardware, and with the introduction of IIoT applications, they need more from their networks and they need it now. From rising bandwidth demands to an increase of cyber security concerns, the need for unwavering communications are at an all-time high. For example, devices connected via Wi-Fi experience a three to five second disconnect as they move between access points.[1] This slight break in transmission can make or break mission critical situations, with essential data being lost

or interrupted. The potential benefits that kinetic mesh networks bring when it comes to digitising industrial organisations are limitless, and due to the nature of the mesh network topology, there are numerous ways it can be used to transform a company's daily operations.

For example, kinetic mesh's 'predictive maintenance' feature gives companies the ability to visualise a problem and respond before it happens, minimising maintenance costs by up to 30 per cent and eliminating complete breakdowns of equipment by nearly 70 per cent, significantly reducing capex and opex. Furthermore, automation of machinery or other previously manual processes and monitoring equipment and methods can boost productivity by as much as 30 per cent.[2]

Organisations are catching on

Oil and gas field environments are already tempestuous and unpredictable enough, even before throwing network and connectivity issues into the mix. Rapid developments in technology are disrupting organisations' current operating models and pushing for change, forcing companies to update their thinking when it comes to technology. Changing the way organisations think when it comes to realising new tech and shifting the focus from simply implementing a gadget or wearable here and there to a total overhaul of network infrastructure should be viewed as a necessity, not a burden.

Today's oilfield operators must manage remote wells across hundreds of square miles of rugged terrain, manually retrieving information from each individual wellhead and reporting back to the command centre weekly. This process is long, tedious and potentially unsafe for employees, and furthermore, the data collected on each weekly trip is virtually redundant once it reaches the command centre.

Digital technology adoption is offering a way forward, helping industry leaders move from caution to optimism in the coming years. According to Deloitte,[3] 77 per cent of oil and gas organisations surveyed in 2017 are either exploring or designing their organisations with the future in mind. The fastest growth areas of digital investment in the sector are predicted to be in AI, robotics, drones, and wearables. And it is with this growth that organisations can expect increases in production by at least 20 per cent, with features such as remote wellhead monitoring installed.[4]

With 89 per cent of oil and gas professionals believing mobility will revolutionise their operating environments,[3] kinetic mesh networks give operators the unwavering and secure connectivity needed to access and act on ever-increasing volumes of data, thus ensuring that productivity is maximised throughout inevitable market swings. Automation of processes and machinery, precision drilling, wellhead communications, automated drilling and pumping, drones for surveillance and inspection, together with production control and reporting are the key areas of interest for a successful transition into the digital age.

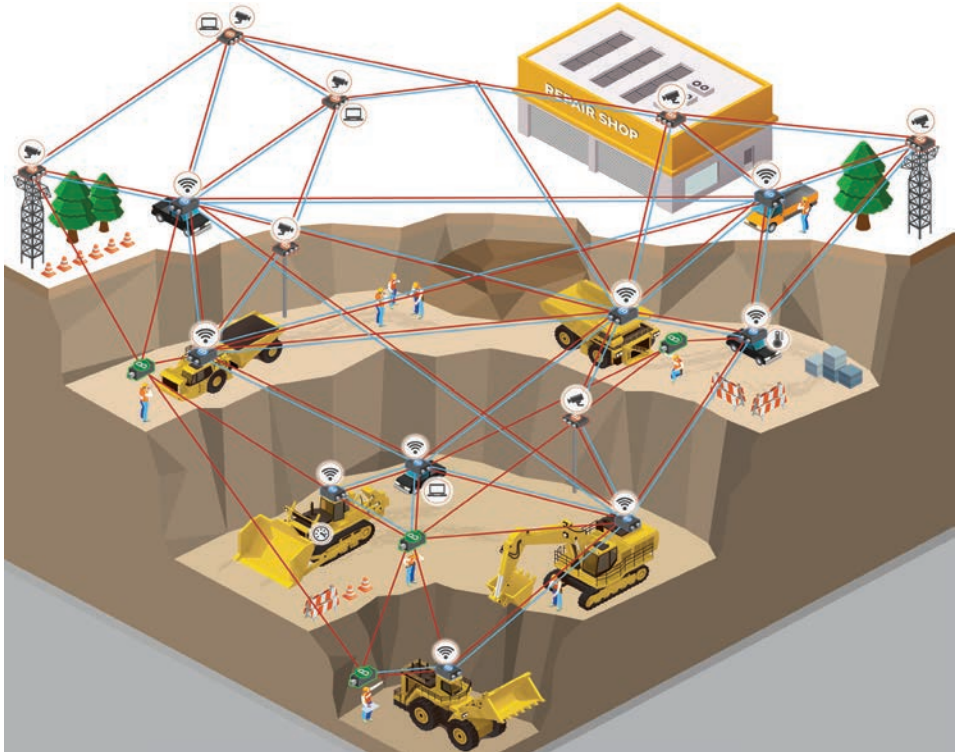
Like oil and gas organisations, mining companies can also reap the benefits of kinetic mesh in their impending digital transformations.

In an industry where short periods of operational downtime can cause millions of dollars in losses, mining operators must be empowered to continuously monitor, manage and control their fleets of high-value equipment, vehicles and personnel wherever they roam. Kinetic mesh networks are proven to stand up to the extremes of mine environments, and effectively connect sprawling open pit and underground mining operations.

For example, an industry model for an open pit mine producing 80,000 tons of ore per day estimates the cost of the required machinery to be in excess of USD47.5m.[5] These high-value assets must be carefully managed to ensure uptime is always optimised, which in turn will maximise production. By placing nodes directly on these vehicles, shovels and pumps, the organisation can seamlessly link them together – gaining real-time information from each asset's applications on status, efficiency, maintenance needs, and more, even as they move across the rugged landscape.

In 2017, fleet automation and optimisation were the key trends in the mining industry, with Deloitte estimating in its annual trend report that approximately 35 per cent of current mining positions in South Africa will be completely automated by 2037.[6] By analysing real-time data with analytical engines, mines can often improve their processed mineral yields by three to 10 per cent within months. Using self-driving technology in mines can result in a 15 to 20 per cent increase in production, as well as reduced costs in fuel and maintenance.[4]

Autonomous equipment, aerial surveillance and inspection, automated positioning systems, M2M communications, and production reporting are only some of the potential applications that kinetic mesh networks could support in mines across the world. They have already been implemented in some of the largest mining operations around the world to reliably cover people and assets across all remote sites. And so far there is no sign of any slowdown – globally, 69 per cent of mining firms say they are looking at remote operation and monitoring centres, 29 per cent at robotics, and 27 per cent at unmanned drones.[6] ■



A kinetic mesh network topology features multiple nodes that basically act as transportable mini cell towers. Virtually anything in the organisation's infrastructure can be turned into networking equipment. Giving the network the ability of 'wheels' means that even outer-edge communications would be completely reliable and provide a previously impossible connection directly to a control centre.

[1] https://www.mbtmag.com/article/2016/07/your-network-infrastructure-ready-iiot
[2] Industrial IoT Survey 2017, MindBrowser & The IoT Magazine
[3] https://www2.deloitte.com/content/dam/Deloitte/us/Documents/human-capital/us-cons-og-hc-trends-industry-report.pdf
[4] https://www.rajant.com/moving-assets/
[5] https://www.rajant.com/applications/mining/
[6] https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-tracking-the-trends-2017.pdf

New Mega Technology Event ConnecTechAsia Addresses Role of Accelerated Digital Change in Asia's Growing Economy

ConnecTechAsia, combining the strengths of industry stalwarts CommunicAsia, BroadcastAsia, and newly launched NXTAsia, is the region's latest Mega Technology event, and will stage its inaugural edition from 26-28 June 2018, in Singapore.

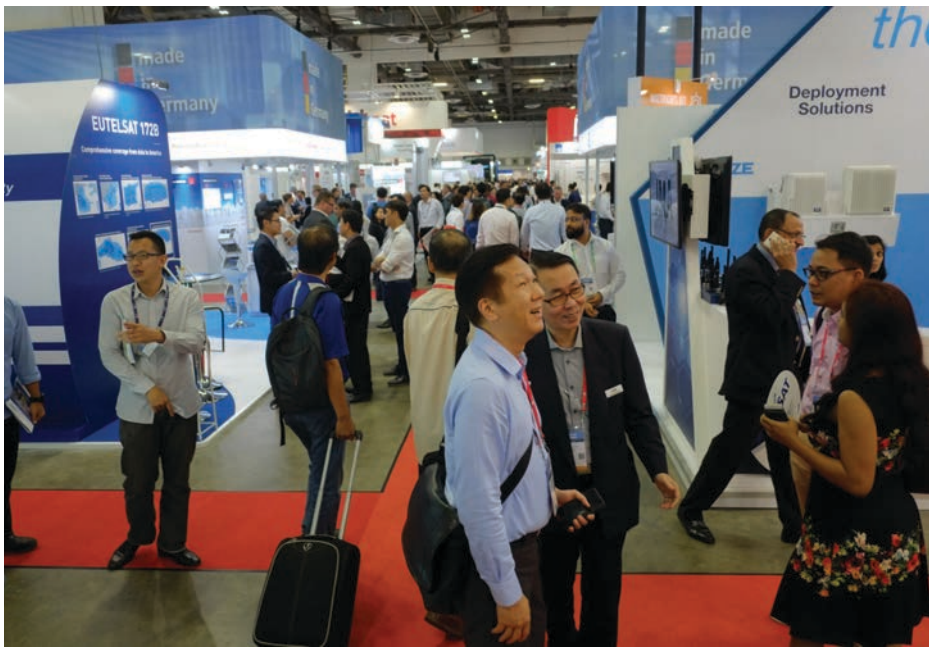
With legacy events CommunicAsia and BroadcastAsia having served the telecommunications and broadcast media sectors respectively for nearly 40 years, the new NXTAsia builds upon this to bring new technologies that are shaping Asia's increasingly innovation-driven economy. With the advent of the Industry 4.0, ConnecTechAsia will present a holistic ecosystem of infrastructure, technology, and services that businesses and governments in Asia need to thrive in this new era.

"As Asia pursues digital transformation at an accelerated pace, it is critical that the event evolves alongside the dramatic shifts happening in the spaces we serve," said Mr Victor Wong, Project Director, UBM, organiser of ConnecTechAsia. "The new event reflects the pulse of Asia today, and is the only business platform covering the converging ecosystems of communications, broadcasting and emerging technologies connecting the physical and digital worlds."

At NXTAsia, industry professionals will catch the newest innovations and thought-leadership in areas such as Artificial Intelligence (AI), Augmented and Virtual Reality (AR/VR), Cyber Security, IoT, Robotics, Cloud and Data among others. NXTAsia will host promising start-ups, and the Singapore-leg of renowned start-up competition SeedStars, at tech showcase Disrupt+.

CommunicAsia, Asia's most established international industry event for the telecommunications sector, will focus on Network Infrastructure/FTTx, satellite communications and telecom software and services – the latest technologies to help companies and governments in Asia prepare for the coming of 5G and maintain a competitive edge in the communications and digital world.

With on-demand and streaming services surging in popularity, BroadcastAsia will shine a spotlight on the future of broadcasting, exploring how we have consumed news and entertainment over the past decade, and the challenges and opportunities this creates for traditional broadcasters and OTT players. BroadcastAsia will highlight technologies that are reshaping the value chain, such as the latest innovations in UHD/HDR, IP Broadcasting, Live Production, Content Media Security, OTT and Alternative Content Platforms.



ConnecTechAsia Summit – Digital Business Transformation

The ConnecTechAsia Summit this year centres on Digital Business Transformation, covering the hottest trends across ICT, broadcasting industries and enterprises to enable a digitalised future. The three-day summit comprises three tracks – NetworkComms, BroadcastMedia and EmergingTech – that will drive business growth and sustainability.

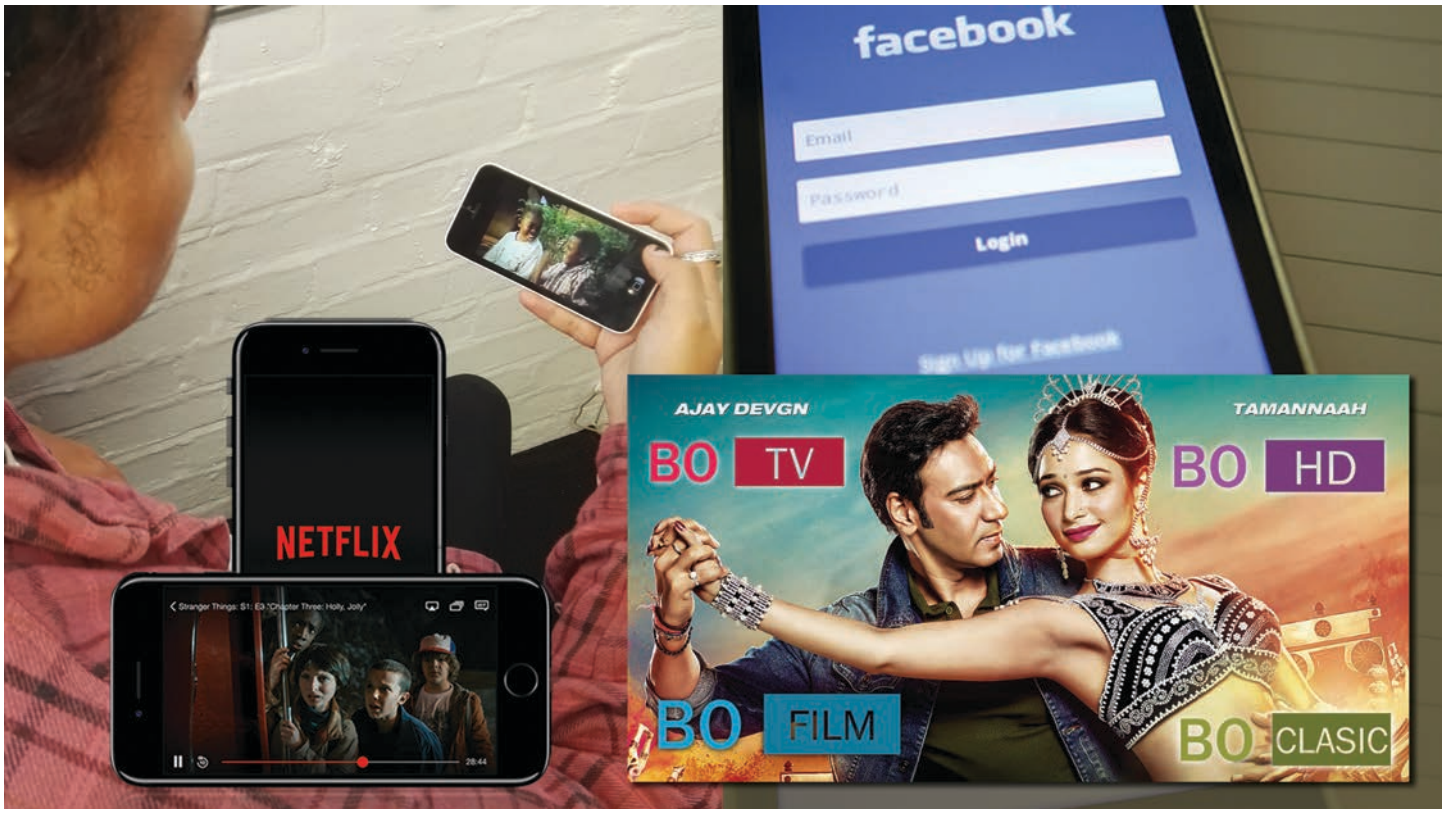
5G, Network Virtualisation, Satellite Communications and Network Slicing will be the main topics in the NetworkComms track, while The Future of Television, Monetisation Strategies, Social Video, IP Broadcasting, 4K, AI and Immersive technologies for broadcasting will feature in the BroadcastMedia track. Topics of the EmergingTech track will include: Artificial Intelligence/Machine Learning, Blockchain Technology, Cybersecurity, IoT, Data Analytics, Seamless Commerce/ Digital Payments, Connected Industries, IoT, Augmented, Virtual and Mixed Reality, and Smart Cities.

Key speakers include:

- Professor Howard Michel, CTO, **UBTech**
- Jassem Nasser, Chief Strategy Officer, **Thuraya Telecommunications Company**
- Ajey Gore, Group Chief Technology Officer, **Go-Jek**
- Geert Warlop, Chief Operating Officer, **TrueMoney International**
- Rene Werner, Chief Customer Service & Customer Experience Officer, **Celcom Axiata Berhad**
- Leah Camilla R. Besa-Jimenez, Chief Data Privacy Officer, **PLDT**
- Ian Yip, Chief Technology Officer – Asia Pacific, **McAfee**
- Arvind Mathur, Chief Information Technology Officer, **Prudential Assurance**
- Bill Chang, Chief Executive Officer – Group Enterprise , **Singtel**
- Parminder Singh, Chief Commercial and Digital Officer, **Mediacorp**
- Sanjay Aurora, Managing Director – Asia Pacific, **Darktrace**

"Presenting a holistic ecosystem of digital convergence and a platform for the discovery and understanding of new frontiers of innovation to elevate the global standing of Asian business and governments sits at the heart of what ConnecTechAsia stands for," adds Mr Wong. "Continuing the 40 year legacy of CommunicAsia and BroadcastAsia, the new ConnecTechAsia will continue to serve Asia as we embark on the journey of the Fourth Industrial Revolution."

For more information on ConnecTechAsia, please visit www.connectechasia.com.



According to forecasts from industry experts such as Cisco in its latest Visual Network Index, mobile data is expected to rise dramatically over the next five years across developing regions such as Asia Pacific where it is predicted to grow by 49 per cent.

Quality *and* quantity

The challenge for MNOs to drive data revenues and manage subscriber Quality of Experience has never been greater. And yet MATT HALLIGAN says many operators are building out infrastructure based on an incomplete picture of the mobile data trends that are actually taking place.

As the old saying goes, 'You can't please all of the people all of the time...' Yet if you are a mobile operator, that is exactly what you need to do in order to prevent subscriber churn.

Of course, this task just keeps getting more difficult with mobile data traffic growing at a phenomenal rate. In fact, according to Cisco's latest *Visual Network Index* forecasts, mobile data is expected to rise at a CAGR of 65 per cent over the next five years in the Middle East and Africa. This is the strongest mobile data traffic growth of any region worldwide, and is followed by Asia Pacific at 49 per cent.

A key reason for this growth is the exploding popularity of mobile video. In 2017 alone, the number of new television serials being produced was roughly 500. What's more, it's estimated that 300,000 hours' worth of videos are uploaded online every minute. And all this video content is not being watched just on TVs or desktop PCs; increasingly, it is being streamed on smartphones and other mobile devices. It seems that mobile subscribers can't get enough *Netflix*, *Hulu* and *YouTube* content, not to mention Facebook videos.

This is compounded by the fact that, according to Openwave Mobility's Mobile Video Index, nearly 40 per cent of all mobile video traffic was HD last year requiring 3 to 4 times more bandwidth than standard video. This figure is likely to reach at least 50 per cent of total video traffic by the end of 2018, due to several factors:

- Greater dependence on smartphones as the primary device for viewing video
- A proliferation of new and more efficient codecs (i.e. VP9), and video hardware acceleration in mobile devices
- Bigger and higher quality displays and mobile camera
- Extensive social media sharing services

Of course, all this increased traffic load adds extra stress on today's already burdened mobile networks. Operators are struggling to cope as

some networks are stretched to the breaking point, resulting in subscribers experiencing buffering, stuttering and other video quality issues.

Unfortunately, customers don't have the patience for poor video performance. Our research shows they will only put up with six seconds of buffering, on average, before abandoning a video. This contributes to overall poor subscriber QoE, and the blame is typically placed squarely on the shoulders of mobile operators, not OTT content providers.

A world growing dim

In addition to an increasing volume of data traffic, mobile video content is also contributing to traffic management challenges related to poor network visibility. Operators are grappling with a sharp increase in the amount of traffic flowing through their networks that is encrypted. According to our index, as much as 75 per cent of all mobile traffic is now encrypted.

Much of this encrypted traffic growth is due to video content as OTT content providers strive to protect copyrighted material. In addition, Google's QUIC protocol has grown at a jaw-dropping rate of 284 per cent in just two years. (The search giant developed 'Quick UDP Internet Connections' as a transport layer that offered less latency compared to TCP.)

And with the need to secure customer e-commerce transactions, plus the new encryption protocol recently introduced by Facebook known as 'Zero Protocol' (0-RTT), the pace of encrypted traffic growth is not likely to slow down anytime soon. On the contrary.

What's more, there are additional factors that have not even impacted the mobile industry yet. For example, there's the continuing uptake of smart video-capable devices (even in developing markets), and the trend towards video as the default content type versus text and images (particularly for advertising). Based on these trends, our research indicates that the percentage of encrypted mobile traffic could reach 90 per cent by the end of this year.

The spread of all this encrypted content is effectively darkening the network, further complicating mobile operators' challenges to manage subscriber QoE. Operators cannot gain visibility into encrypted mobile traffic, which means they are unable to troubleshoot subscriber quality issues. According to our consumer surveys that were carried out independently towards the end of last year, subscribers find buffering and poor video quality to be even more frustrating than a dropped call. But if they cannot 'see' the traffic on their network, it is nearly impossible for operators to manage subscriber QoE, particularly with conventional mobile optimisation tools.

What's an operator to do?

Given the massive growth in mobile data (particularly encrypted OTT video content) and the network management difficulties that this has created, one might wonder if operators have any options at all. Can they take proactive steps to address this growing issue? Or are they destined to be just 'dump pipes' and suffer subscriber churn due to poor QoE?

In order to stay one step ahead of OTT players, cellcos need the capability to make informed decisions about their networks. Success will be defined by how well they manage their data, and whether or not they can monetise their networks. Forward looking operators have started to fight back to take control of their networks and their subscribers.

Operators require technology that delivers insight into the precise type of data travelling on the network, even when the traffic is encrypted. With accurate video streaming analytics an operator can determine key factors about video traffic, enabling more effective troubleshooting. For example, is a video from Netflix, Amazon or YouTube? Is it standard definition at 480p resolution or Ultra HD? Is the video being live streamed or downloaded?

Determining the codec being used to deliver the video is also important, as this has a bearing on the bitrate at which the content is being delivered. Furthermore, a fundamental factor involved in troubleshooting user QoE is knowing the type of device to which the video is being delivered.

Gathering all of this crucial analysis is not only complicated by encryption, but also by a dramatic shift to the cloud, with an increasing amount of network traffic being delivered via network functions virtualisation (NFV). In fact, experts predict that 92 per cent of network traffic will be delivered via the cloud by 2020. This is where traffic management tools uniquely designed for encrypted cloud-based data traffic can make a crucial difference.

Conventional, appliance-based DPI and traffic management technologies were never designed for encrypted video streaming, and nor are they capable of spanning physical and virtual infrastructures. Operators need pure software solutions that manage streaming video. They need to look for platforms that are evolved to be agile, with heuristics designed for encrypted video and virtualised so they can be easily deployed in the cloud.

Additionally, operators require the flexibility to not just manage the encryption protocols of today, but to anticipate and manage future data traffic as well. Mobile operators will soon begin deploying 5G networks, which will consist of edge computing capabilities, virtualised elements, slicing platforms and centralised orchestration. In most cases, 5G will be implemented alongside legacy network technologies, further compounding management challenges and the need for complete visibility into traffic.

Money to burn

The sad fact is that while mobile operators are faced with the challenges of managing OTT encrypted content, the OTT content providers are busy raking in profits. Therefore, in addition to getting a handle on encrypted traffic

management to optimise subscriber QoE, MNOs also need to find new ways to monetise data in order to grow revenues.

In saturated markets, the best and most likely path for revenue growth is by monetising mega-consumers of video. Once operators have solutions in place to better manage encrypted data traffic, they can implement a pricing plan that encourages these users to consume more video. In addition to these video mega-consumers, another likely target group are sports fans who are often the most dedicated video users. Thus, streaming of live events is another great opportunity for operators to generate new revenue.

Mobile video has already transformed viewing habits, with at least half of YouTube's 1.5 billion visitors accessing services on mobile. Netflix now has 100 million total subscribers across the world, many of which also watch content on mobile devices, while Amazon claims just over 76 million users for its *Prime Video* service. In Africa, companies such as Nigeria-based iROKO TV (which bills itself as "the Netflix of Africa"), as well as more established regional broadcasters such as MultiChoice, have already geared-up for the continent's growing appetite for video on the go.

It's not far-fetched to think that mobile video could soon overtake traditional television. Now is the time for mobile operators to find innovative ways to share in the revenue stream, rather than just being passive conduits for OTT content.

QoE is in the eye of the user

Ultimately, the subscriber will decide if the Quality of Experience with their current service provider is good enough, and poor QoE eventually leads to churn. Typically, the operator will not be aware that a subscriber is unhappy until it's too late. Measuring and tracking key user experience parameters for data services like mobile video is therefore critical.

Encrypted traffic flow is now the predominant form for data transfer. While some operators are still struggling with new encryption protocols that negate their ability to manage subscriber QoE, others are taking decisive action.

Furthermore, proactive next-generation planning requires agility and willingness to embrace change, both from an NFV perspective as well as with regard to value-added services. With appropriate network visibility and intelligence, today's mobile operators can take back control of their networks and their subscribers. If your customers are not 100 per cent satisfied with the QoE on your network, you shouldn't be either. ■

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Vodafone to develop LTE network for Mission to the Moon in 2019

Vodafone plans to create the first 4G network on the Moon. Berlin-based PTScientists is working with the mobile operator's German division and car-maker Audi to achieve the first privately-funded lunar landing next year.

In collaboration with Nokia, Vodafone will create a network that will connect two Audi-designed lunar rovers to a base station in the Autonomous Landing and Navigation Module. Nokia Bell Labs says it will create a space-grade 'Ultra Compact Network' that will weigh less than one kilo, the same as a bag of sugar.

Vodafone displayed its 4G lunar base station at MWC 2018 in February.

The 4G network will enable the lunar vehicles to communicate and transfer scientific data and HD video while they carefully approach and study NASA's *Apollo 17* lunar roving vehicle that was used by the last astronauts to walk on the Moon in December 1972.

Vodafone testing indicates that the base station should be able to broadcast 4G using 1800MHz spectrum and send back the first ever live HD video feed of the Moon's surface. This will be broadcast to a global audience via a deep space link that interconnects with the PTScientists server in the Mission Control Centre in Berlin.

PTScientists CEO and founder Robert Böhme says: "This is a crucial first step for sustainable exploration of the solar system. In order for humanity to leave the cradle of Earth, we need to develop infrastructures beyond our home planet.

"The great thing about this LTE solution is that it saves so much power, and the less energy we use sending data, the more we have to do science."

The Mission to the Moon is due to launch in 2019 from Cape Canaveral on a SpaceX *Falcon 9* rocket in 2019.

HPE sends supercomputer to space station – p34

Arabsat's "new age" of affordable broadband

Arabsat Broadband Services has launched a new satellite broadband service and claims it unveils a "new age" of affordable satellite broadband for businesses and consumers across Africa, the Middle East and Europe.

The company's *Arabsat Expand* features Forsway's hybrid router, *ODIN*, at a total kit cost of around USD100 per station. It's claimed this will enable the satellite operator to launch affordable new broadband internet services for as little as USD5 per month, helping bridge the digital divide to new customers in remote rural communities, as well as providing new, more reliable, and lower-tariff services to urban users.

This is the first service offered by Arabsat's newly created business unit for broadband services. It will deliver *Arabsat Expand* through previously unused bandwidth on its satellites.

According to Forsway, a complete kit with its *ODIN* router can be installed by anyone who can point a satellite TV dish, with no interaction from a NOC. It adds that because there's no satellite transmitter, there's no need for a VSAT transmit license.

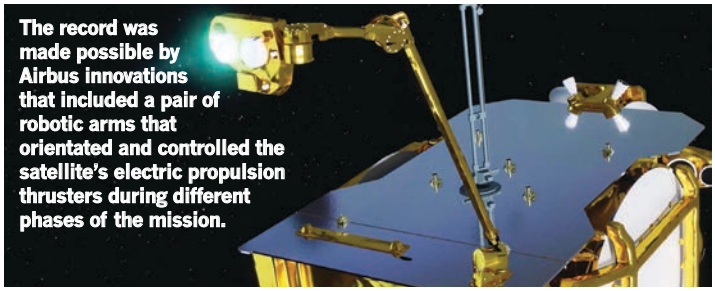
ODIN allows any type of narrow-band return channel to be linked to the high-throughput Ku/Ka bandwidth on Arabsat's *BADR-7* satellite in remote locations across almost the entire MEA region. Up to 10Gb of internet connectivity will then be routed through the satellite to support the new services from these locations.

Eutelsat sets orbit raising record for electric satellite

Eutelsat's latest satellite for Asia has now entered commercial service after claiming to break the record for the fastest satellite electric orbit raising (EOR).

EUTELSAT 172B was launched from Kourou on 1 June. After the solar array and electric propulsion arms had been deployed and initial testing had been completed, the EOR phase began on 8 June. Eutelsat says that during this stage the satellite consumed almost six-times less propellant mass than a spacecraft with chemical propulsion.

EUTELSAT 172B took just four-months to reach its orbital slot of 172°E before going live in November.



The record was made possible by Airbus innovations that included a pair of robotic arms that orientated and controlled the satellite's electric propulsion thrusters during different phases of the mission.

The satellite was built using the latest EOR version of the Airbus' *Eurostar E3000* platform and had a launch mass of only 3,550kg.

"We are the first company to demonstrate full electric propulsion for satellites of this size and capacity, enabling their launch in the most cost-efficient manner," said Airbus' head of space systems, Nicolas Chamussy. "Furthermore, with our system design, operation strategy and the plasma thruster technology we implement, we have completed the fastest electric orbit raising ever from transfer to geostationary orbit, which will allow Eutelsat to put their electric satellite in service in a record time."

EUTELSAT 172B has a triple mission that includes: a trans-Pacific C-band payload to help reach new growth markets in South East Asia and for delivering increased power and broader coverage to enhance the service previously provided via *EUTELSAT 172A*; a regular Ku-band payload which doubles capacity at 172°E and connects North Pacific, North East Asia, South East Pacific, South West Pacific and South Pacific; and a high throughput Ku-band payload designed for in-flight broadband with multiple user spots optimised to serve densely-used Asian and trans-Pacific flight paths.

IIC and oneM2M partner on Industrial IoT

The Industrial Internet Consortium (IIC) and IoT standards body oneM2M have agreed to work together to contribute to the creation and development of the "Industrial Internet".

The two organisations say they will promote the digital economy by harmonising various aspects and "preventing fragmentation" in the IIoT.

Their joint activities will include: collaboration, review and two-way feedback pertaining to IoT use cases, requirements and reference architectures; feedback to oneM2M standards from IIC testbeds and interoperability events; feedback from oneM2M to IIC reference architecture; and joint workshops, showcases and interoperability events.

"The Industrial IoT brings a whole new set of specific requirements in comparison to consumer IoT," says oneM2M's technical plenary chair Dr. Omar Elloumi. "Deriving those specific requirements from market-driven use cases as well as lessons learnt from operational driven testbeds, such as those developed by IIC, is the only viable option to develop the set of standards needed for IIoT."

IIC's agreement with oneM2M is one of a number made by its Liaison Working Group. The consortium says this group is its gateway for formal relationships with standards and open-source organisations, alliances, certification and testing bodies and government entities/agencies.

Group chair Wael William Diab says: "Horizontal technologies that enable scalability across a variety of industrial verticals are essential to the widespread adoption of IIoT."

oneM2M's Dr. Omar Elloumi says the Industrial IoT brings an entirely new set of specific requirements compared to consumer IoT.

'Roam Like At Home' not paying off for EU cellcos

More than three quarters of European mobile operators do not believe there are enough revenues to make up for traffic increases since mobile roaming charges were abolished throughout the European Union earlier this year.

EU Regulation IV came into effect on 15 June 2017 and enables member state citizens to 'Roam Like At Home' (RLAH) when using their mobiles across the union.

After receiving 46 responses from an undisclosed number of operators across the EU, telecoms analytics specialist Mobileum found that 87 per cent reported a 'strong' or 'very strong' increase in data traffic, while 71 per cent highlighted an increase in voice traffic. Responses on SMS usage were split, with half of respondents saying there was no change.

According to Mobileum, the significant increase in data traffic aligns with how several plans are now being sold in EU countries.

But it adds that some operators have called for a potential increase in rates to compensate for the increased costs. Its research reveals that 76 per cent of those surveyed do not believe there is enough additional income to compensate for the extra traffic now being carried.

"The EU commission stated that domestic retail rates shouldn't rise to make up for this additional cost, but there are reports of this happening in some EU countries," says Mobileum's SVP of product and offering, Tim Moran. "The temptation for operators is to add the increased costs to their plans once EU Regulation IV has had further time to bed in."

He adds that it will be interesting to see if these costs have been moved to retail plans when the EU Commission publishes its interim report on the effects of the new roaming in December 2018.

Meeting the growing demand for IoT-SMS

Sparkle has teamed-up with Telarix to expand IoT-related SMS services with the launch of a new SMS management solution. The company, which is the international services arm of Italy's TIM Group, says Telarix's solution will reduce overhead and manage SMS-specific network complexities.

As an international voice carrier, Sparkle offers SMS as a retail service in addition to its wholesale business. Stefano Olivieri, the company's EVP voice and mobile business, says: "The new solution allows us to consolidate our entire SMS business onto one comprehensive platform that provides buying, selling, billing, auditing, alerting and reporting functions, plus the translation and application of routing commands to the SMSC or the SMS hub."

Telarix adds that there are some "inherent complexities" in SMS handling that its new solution addresses, and that it simplifies the end-to-end SMS management and automation.

Citing figures from the Mobile Ecosystem Forum, Sparkle says messaging traffic is expected to increase by more than 350 per cent over the next five years. It says A2P messaging is leading the growth and is set to become a fundamental delivery mechanism for IoT devices.

Telarix specialises in solutions that simplify, automate and optimise the way carriers do business together. The US-headquartered company claims it hosts the only industry-wide B2B portal offering carriers a secure and collaborative environment in which to conduct business.

Atech to use ND SatCom control system

The Atech corporation is deploying a new command and control system from its Arkhe subsidiary using ND SatCom's *SKYWAN* satellite routers.

Known as a Brazilian "system house", Atech develops various systems for command and control, air traffic control, cyber security, amongst others, and is also certified as a Strategic Defense Company by the Brazilian government. The company is a subsidiary of the Embraer group which is headquartered in Brazil with local presences in several countries.

Arkhe's *C4I* command and control system is being deployed in an unspecified country. The platform comprises a central hub, remote sites with fixed and transportable antennas. Phase one of the project installation is now under way, with the complete network expected to go live in early 2018.

ND Satcom says its *SKYWAN 5G* technology was selected because it was the "most competitive" offering.

Atech says the project gives it new opportunities for expanding its Arkhe solutions whenever satellite interconnection is needed. ND Satcom says its *SKYWAN 5G* technology was selected because it was the "most competitive" offering, and that the *SKYWAN 7000/1070* product family has a link encryption feature which was also a mandatory requirement.

"With *SKYWAN* and the secured transmission, we get a powerful technology to implement this sensitive network," says Jorge Peter dos Santos, engineering coordinator, Atech. "ND SatCom has installed VSAT technology extensively in other governmental networks that perfectly fits to new Arkhe command and control solutions."

Liquid and KETRACO to build East Africa fibre network

KETRACO MD Fernandes Barasa (left) says the two partners will take fibre to ''where it has never been before''. Also pictured is Liquid Telecom Kenya CEO Adil Youssefi.

Liquid Telecom will operate the Kenya Electricity Transmission Company's (KETRACO) optical ground wire (OPGW) fibre cable and expand the internet network across East Africa.

KETRACO operates as a national long haulier of fibre that Liquid Telecom Kenya will now commercialise to meet the rising demand for high-bandwidth, video and internet services for businesses and individual consumers across the country and East African region.

In 2014, KETRACO was granted a Network Facility Provider Tier 2 license by the Communication Authority of Kenya. Since then, it has developed the specification and run a tender process for the management and development of the combined network, which has now resulted in a 10-year deal with Liquid Telecom Kenya.

KETRACO currently runs a 1,791.5km electricity transmission network within Kenya and by 2020, the company will have completed construction of more than 8,000km of high voltage transmission lines with concurrent fibre connectivity.

Liquid will begin by upgrading fibre connections to Kenyan areas already connected to the national grid with high voltage lines of 132kV and above. These include Garissa, Isiolo, Garsen, Lamu, Rabai, Namanga, Meru, Machakos, Makueni, Wote, Sultan Hamud, Mwingi, Konza, Kitale, Eldoret, Kisii and Kisumu.

It will then extend fibre connections to remote parts of the country as well as neighbouring nations such as Ethiopia, South Sudan, Uganda, Tanzania, Rwanda, Eastern Congo and Burundi.

"With KETRACO and Liquid Telecom coming together, we are now taking fibre to where it has never been before whilst diversifying our company's revenue base," says KETRACO MD Fernandes Barasa.

According to Liquid, KETRACO's overhead fibre cable is a technology that is "far superior" to buried fibre or microwave connectivity. George Kuria, Liquid Telecom's infrastructure build and deployment GM (East Africa), says: "This new backbone fibre cable will significantly expand our network and add resilience to our internet connectivity with a limitless capacity to carry any amounts of data bandwidth.

KETRACO will continue to use two per cent of its optical fibre for its own communication. At the same time, Liquid will install connectivity equipment in all the power terminating points along KETRACO's network, complementing the ISP's own underground cable network running from Mombasa to Nairobi and across most major towns in Kenya.

MTN trials 5G in Africa

South African mobile operator MTN and Ericsson are claiming a first in Africa with the trial of 5G technology and applications. The demo took place at the cellco's HQ in Johannesburg in January 2018 following an MoU signed between the two companies last November. The trial was based on 5G prototype radios and commercially available baseband hardware, with 5G mobility supported. According to Ericsson, it saw throughput rates of more than 20Gbps with less than 5ms latency which is claimed to be the highest achieved on an African mobile network.

Ice connects the Arctic

Ice Wireless has worked with Parallel Wireless to expand broadband services to Canada's most remote Arctic communities. It has deployed a multi-technology macro solution based on Parallel's all IP virtualised RAN. The vendor claims its system makes implementing cellular networks "as easy and as cost-effective as Wi-Fi". Parallel says the self-configuring and self-optimising technology combines its *HetNet Gateway* with its *Converged Wireless System* base stations. The platform features SDR which has enabled Ice to incorporate both 3G and LTE into an integrated solution.

High flyaway antenna

C-COM's *iNetVu FLY-981* mobile antenna has been installed in the Andes mountains of southern Peru at an elevation of 14,900ft. The firm reckons this may be the highest altitude flyaway antenna unit currently in operation. The *FLY-981* is packaged in three transportable cases each weighing less than 28kg, and according to C-COM the antenna can be assembled in less than 10 minutes without any tools. It adds that the system automatically finds a satellite in under two minutes with just the press of a button.

HPE supercomputer sent to International Space Station

On 14 August 2017, SpaceX successfully launched its *Dragon* spacecraft to deliver critical cargo to and from the International Space Station (ISS) for NASA. Part of the *Dragon*'s payload was a supercomputer from Hewlett Packard Enterprise (HPE).

The *Spaceborne Computer* will be used to support a year-long experiment conducted by HPE and NASA to run a high performance commercial off-the-shelf computer system in space. This has never been done before, and the aim is for the system to operate seamlessly in the harsh conditions of space for one year – roughly the amount of time it will take to travel to Mars.

SpaceX's *Dragon* spacecraft is used to deliver cargo to the International Space Station for NASA.

HPE says many of the calculations needed for space research projects are still done on Earth due to the limited computing systems available on board orbiting vessels. As well as creating a challenge when transceiving data, this approach only works when astronauts are in near real-time communication with Earth. Therefore, once they travel farther out and closer to Mars, they will experience longer latencies.

The *Spaceborne Computer* includes HPE's *Apollo 40* class systems with a high-speed HPC interconnect running an open-source Linux OS. Although there are no hardware modifications to these components, HPE says it created a "unique" water-cooled enclosure and developed purpose-built 'ruggedised' software to address the reliability requirements in space.

Worldwide ocean observation programme

Orange Marine is now providing technical resources to launch free-drifting oceanographic data collection floats along routes taken by its fleet of six cable ships. The firm, Orange's submarine telecoms division, has signed a partnership with Euro-Argo, the European branch of the Argo consortium.

Founded in 2000 by UNESCO and the World Meteorological Organisation, the Argo programme involves more than 30 countries. It is the first global network *in situ* for studying the state of the world's oceans and better understand their influence on climate change. The network is gradually expanding and currently includes nearly 4,000 active floats, with an average of 1,000 deployed each year worldwide.

Argo's floats have an average lifespan of four years and gather data on ocean temperature and salinity from the surface down to a depth of 2,000m. These data are sent in real-time via satellite to a platform open to researchers from around the world.

The consortium aims to provide uniform network coverage across the globe. Euro-Argo plans to develop the capacity to maintain a quarter of the worldwide network, which means deploying around 250 floats per year. Navigation in European waters is also needed for pilot research programmes.

In September, Orange's cable ship *Pierre de Fermat* launched the first float North off Cape Finisterre (Spain) during a maintenance operation in September. A second float was launched 500 nautical miles away in the Azores region, and in early October, the company said a third was still on board awaiting deployment.

ProRail turns to Intracom Telecom for security network

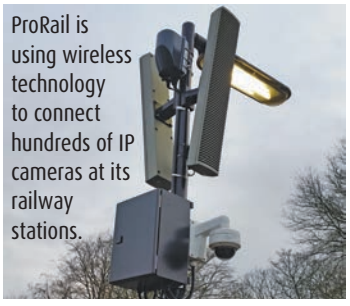
ProRail, the Dutch national railway infrastructure operator, is using Intracom Telecom's radios to backhaul its network of CCTV and security/surveillance systems.

Utrecht-based ProRail manages around 7,000km of track, 404 stations, 15 tunnels, and more than a thousand viaducts and bridges.

It claims the Netherlands has Europe's busiest rail network, and says more than 3.3 million journeys were made using the nation's tracks in 2015.

As part of its commitment to provide secure transportation services while dealing with high passenger flows, ProRail has installed what's described as an "advanced" CCTV solution incorporating Intracom Telecom's *StreetNode* wireless transmission equipment at 26GHz. The solution includes point-to-point/multipoint SDRs which are claimed to offer quick installation, high reliability, and "massive" capacity for HD video surveillance.

The first phase of the project has seen the deployment of 21 hubs and 78 terminals. These have been installed at 16 railway stations throughout the Netherlands, from Groningen to Maastricht.



ProRail is using wireless technology to connect hundreds of IP cameras at its railway stations.

ProRail is using the technology as the transmission infrastructure in and on the station platforms and surrounding areas as a complement to fibre. The system is used to connect hundreds of IP cameras. The units relay all the collected video, data and alarm signals from the CCTV cameras to each of the station control rooms while preserving HD picture quality at all times.

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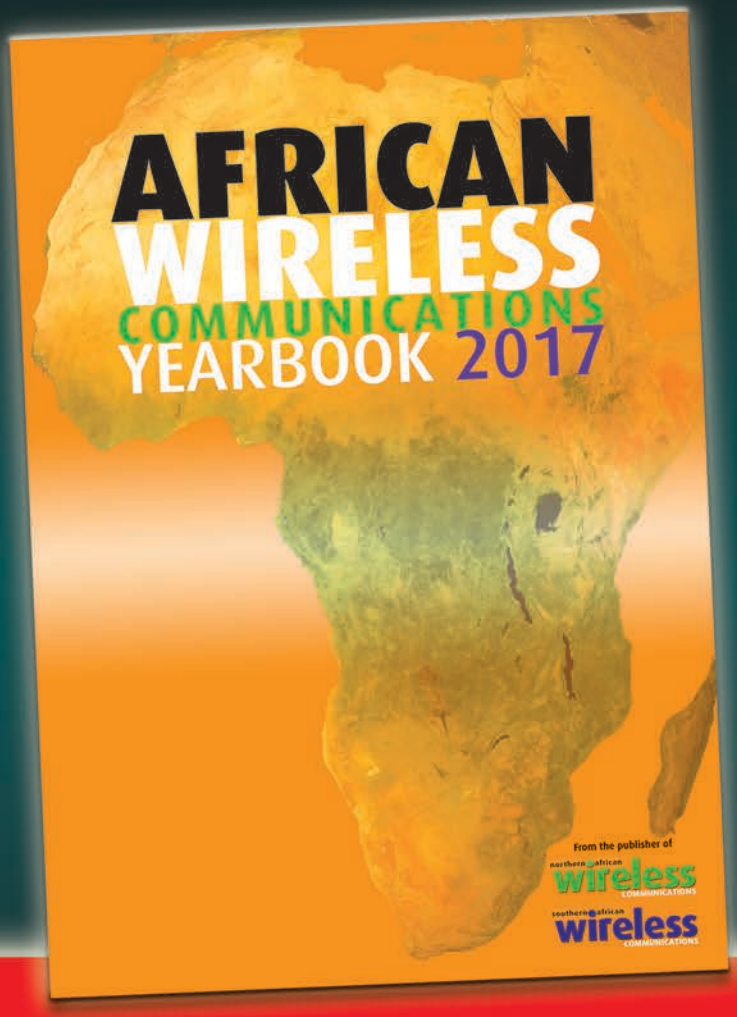

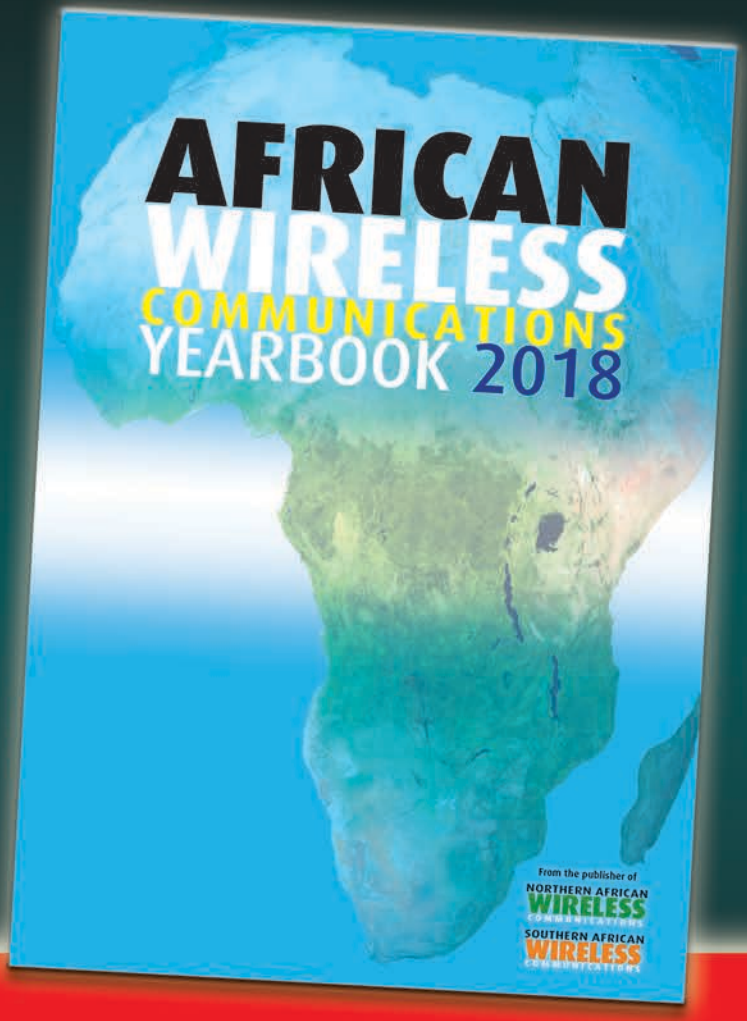

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