For communications professionals in the southern Asian region

SOUTH ASIAN WIRELESS COMMUNICATIONS

Q3 2018 Volume 11 Number 3

- Are LEO satellites the best options for connectivity via space?
- How wireless tech is crucial in helping keep people safe
- Industry view: the top sectors driving the IIoT


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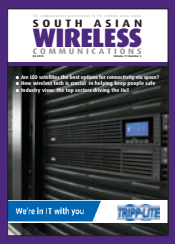

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PEACE project enters into cable and material manufacturing stage

The cable and material manufacturing stage has begun for the *PEACE* (*Pakistan & East Africa Connecting Europe*) subsea fibre system that will connect Asia, Africa and Europe.

PEACE is scheduled to go live during the first quarter of 2020. Once completed, the 200G, 16Tbps per fibre pair system will connect Pakistan, Djibouti and Kenya, with a northern expansion to Egypt and further southern expansion from Kenya to South Africa during a second phase.

The cable will facilitate connectivity from China to Pakistan via existing terrestrial cable networks, and it's claimed that it will create the shortest route from China to Europe via Africa. According to those behind the project, this network topology "substantially reduces" existing network lengths by up to 50 per cent, and will provide a "cost-effective", diverse route between the three continents. They also believe *PEACE*'s open access and carrier neutral data centres will have a "big impact" in the countries connected to the cable system.

PEACE is a subsidiary of Chinese technology and industrial giant, the Hengtong Group. It will cooperate with PCCW Global to steer the overall project which is backed by investors Tropic Science, China-ASEAN Information Harbor, China Construction Bank, and Huawei Marine. They will use cables and materials from Hengtong Marine Cable Systems whose products have also been used in recent global projects such as *FOA* in Chile, *NaSCOM* in the Maldives, *IGW* in Peru, among others.

Hengtong and its backers say Africa has the fastest-growing youth population in the world and is a market "particularly ripe for investment" because of the rapidly growing number of internet users and increasing demand for connectivity to and across the continent. PCCW Global adds that the project also paves the way for it to collaborate with Hengtong on other regional connectivity projects as well as the establishment of smart cities across multiple continents.

PEACE is scheduled to go live in early 2020. Once completed, the 200G, 16Tbps per fibre pair system will connect Asia, Africa and Europe.

Towards the end of October, Orange announced that it will work with PCCW Global to land *PEACE* in France. The mobile operator said the cable will give it additional capacity between Marseille and Mombasa, therefore providing – together with the existing *EASSy* and *LION* subsea cables – boosted resilience to its voice and broadband traffic in the Indian Ocean, particularly for the islands of Réunion and Mayotte.

Globe Telecom introduces eSIMs in Philippines

Globe Telecom has introduced embedded SIMs to the Philippines.

Hailing it as a "breakthrough" in mobile technology, the operator says the eSIM is a virtual module that cannot be removed and represents a viable alternative to the physical, plastic card for many upcoming smartphones that are due to be released.

eSIMs are pre-installed in mobile and wearable devices, and are equipped with automatic activation without the need for a physical card. Globe says their digital management capability and automatic syncing features also enable customers to use and manage multiple devices.

Globe is currently testing eSIM technology with a number of devices including Huawei smart watches.

Globe is currently running technology tests with select eSIM-enabled devices including Apple devices such as its Watch and latest *iPhone X* series, as well as Huawei's new smart watch which will be available soon. Before the year ends, customers with eSIM-enabled devices will be able to get QR cards at Globe Stores and scan it using their phone to activate their eSIMs.

The operator adds that transitioning to eSIM, which removes the need for extra plastic and paper packaging, strengthens its commitment to support a circular economy by reducing solid waste and avoiding single use plastics getting into landfill sites.

At present, eSIM is only available in 10 countries including the Canada, Singapore, the UK and the US. Globe says it is working towards the full digitalisation of the technology as the industry foresees the arrival of more eSIM-enabled devices in the near future.

Fastest LTE speeds in Asia using five-carrier aggregation

Singtel and Ericsson claim they have achieved peak LTE speed of up to 1.5Gbps in a lab environment using five-carrier aggregation (CA) in Singapore. The companies said this is the fastest speed achieved in a network of this type in Asia, and 50 per cent quicker than the prevailing 1Gbps record they set earlier this year in February.

According to Ericsson, the demonstration was the first time CA technology was utilised across five carriers. It combined two 1800MHz frequencies, together with 2100MHz, 2600MHz and TDD 2500MHz spectrum bands. Achieved in a lab environment on a Viavi Solutions and Stellent Networks' TM500 test system, the two companies also harnessed technologies such as FDD and TDD, 256 QAM and 4x4 MIMO to achieve the peak speed of 1.5Gbps.

Singtel will gradually deploy the new speed across Singapore as more spectrum bands are allocated to its LTE network. Smartphones supporting 1.5Gbps speeds are scheduled to be launched in 2019.

Ericsson said that when introduced in the live network, such capability improves user experience and enhances network capacity. For instance, it said customers can download a two-hour 4K video in eight minutes.

Following the success of the test, the two companies plan to launch a pilot 5G network on the island during the coming months.

TETRA network in Thailand to support over 200,000 users

CAT Telecom operates Thailand's telecoms infrastructure. It will provide government agencies and other critical comms users with access to the TETRA network provided by Motorola Solutions.

Motorola Solutions is supporting the installation of a nationwide digital communications network in Thailand.

State-owned CAT Telecom operates the country's telecoms infrastructure and will provide government agencies, emergency services and other critical enterprises with access to the mission-critical TETRA network.

The shared operator system is described as "highly scalable", and when complete, it will have capacity to serve more than 200,000 users.

Deployment is said to be well underway with CAT utilising Motorola Solutions' broadband enabled push-to-talk platform. The vendor reckons this will enable seamless communication between radio users and other workers via smartphones, tablets, desktop computers and other devices.

Motorola says its system will also deliver next-generation capabilities including location services to pinpoint radio users and other resources in the field, providing improved response to large scale events.

"Any country experiencing significant growth in infrastructure, innovation, education and skills requires an advanced communications system," says Marcel Verdonk, Motorola Solutions GM for emerging Asia. "This TETRA system will support Thailand's continuing investment in infrastructure modernisation as well as job creation through its construction."

Successful launch for Horizons 3e

Intelsat and SKY Perfect JSAT have successfully launched a joint satellite, *Horizons 3e*. The spacecraft left Earth on board an *Ariane 5* launch vehicle from the Kourou space centre in French Guiana on 25 September.

Built by Boeing, it's claimed *Horizons 3e* offers the first global C- and Ku-band high-throughput satellite (HTS) platform. It is based on Intelsat's *EpicNG* design and aims to bring HTS solutions to remote as well as developed parts of the APAC region from its orbital slot at 169°E.

Horizons 3e is expected to start service in 1Q19. It completes Intelsat's global coverage of satellites that use *EpicNG*, and is the first of the company's satellite that use the platform to feature a multiport amplifier that enables power portability across all Ku-band spot beams. According to Intelsat, this means power can be adjusted to each beam to meet customer throughput demands. It adds that this "enhanced, advanced" digital payload features full beam interconnectivity in three commercial bands, and "significant upgrades" on power, efficiency and coverage flexibility.

"By matching satellite power usage to traffic demands, aeronautical and maritime mobility, fixed and wireless network operators, corporate enterprise and government customers can leverage the additional efficiency improvements to expand their network and applications across the Asia Pacific region," states the company.

Commenting on the launch, Intelsat CEO Stephen Spengler said the demand for broadband connectivity has never been greater, and claimed that *EpicNG*'s technology has enabled affordable and sustainable broadband connectivity to underserved communities around the world.

"It has delivered high quality and resilient connectivity to businesses in urban and remote regions, provided airline and cruise passengers with simple, high speed connectivity for their entertainment and business needs; and ensured secure, resilient connectivity for government customers," said Spengler.

Covering Asia and the Pacific Ocean, the new satellite promises to bring fast and efficient broadband connectivity to both developed and remote areas.

First 4G TDD network for mass commercial use in Thailand

Dtac is deploying the first commercial 4G TDD network in Thailand. Once completed, faster mobile broadband speeds will be available to customers who subscribe to the mobile operator's *TURBO* service which uses 2300MHz spectrum and is operated in cooperation with state-owned telco, TOT.

The network is being deployed in the northeast, north and south regions of Thailand, including major provinces such as Khon Kaen, Chiang Mai and Phuket.

According to Dtac, which is a subsidiary of Norway's Telenor, the deployment uses technology that creates an evolutionary path to 5G. The company is leveraging techniques such as 4x4 MIMO, beamforming, 3CC carrier aggregation, and 256 QAM.

Dtac is using Nokia's RAN solutions for its TDD deployment in the three regions. The vendor is providing products from its *AirScale* range and claims this will enable the operator service to add "agility and flexibility" to the network as well as accelerate its journey towards 5G.

They include massive MIMO adaptive antennas which, says Nokia, deliver up to five times more network capacity, high peak downlink throughput, significantly improved uplink, and greater coverage.

Dtac will also use the company's 4-transmit-4-receiver (4T4R), a wireless MIMO technology that doubles the number of antennas for enhanced coverage and improved maximum downlink data rates.

Nokia adds that its *NetAct* virtualised network management software will also be deployed to provide "robust" capabilities for troubleshooting, assurance, administration, software management and configuration.

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DAMM TETRA helps secure airport

DAMM Cellular Systems will provide a mission-critical secure communication system at Kannur International Airport Ltd. (KIAL) in India.

KIAL will be the second greenfield airport in the southern Indian state of Kerala. Covering an area of 2,000 acres, it will be the largest airport in Kerala which will become the only Indian state to have four international airports.

The facility is said to be being built with "state-of-art" infrastructure and is due to become operational in 2018. During its first year of commercial operation, KIAL is expected to be used by around 1.65m international and 160,000 domestic passengers.

Kannur International will be the largest airport in Kerala which will become the only Indian state to have four international airports.

Consort Digital is DAMM's regional partner in India and will be supporting the delivery of the entire project to the airport. It will deploy the Denmark-based PMR specialist's *TetraFlex* voice and data radio communication system which will be used by all airport operations and maintenance users to safeguard passenger safety.

According to DAMM, its platform offers a fully IP-based solution and decentralised architecture. It says compliance with the open TETRA standard ensures multi-vendor subscriber terminal support, while there is also provision to integrate into smartphones for designated users using the *DAMM TetraFlex* push-to-talk application.

Other key features of *TetraFlex* are said to include integrated voice and data logging solution for storage and playback, gateways for interconnection to PBX and conventional networks, and "easy" integration, installation and commissioning.

R&S continues to help Thai regulator to monitor spectrum

Thailand's regulatory authority will use solutions from Rohde & Schwarz (R&S) to monitor radio spectrum in the country.

Spectrum monitoring systems enable public authorities to effectively support spectrum management, verification of license data, and simplify the planning and allocation of new transmitters. They also allow identification and elimination of radio interference sources.

Since 2010, Thailand's National Broadcasting and Telecommunications Commission (NBTC) has been using nine mobile measuring stations from R&S. It now plans to install 15 stationary monitoring stations later this year. Each one will be equipped with an R&S *ESMD* wideband receiver for spectrum monitoring, a set of antennas, and a computer running the vendor's *ARGUS* software.

R&S said its software performs a variety of manual and automatic measurements. For example, operators can configure automatic measurements to start and stop as needed. In the case of long-term measurements for monitoring technical transmission parameters, data can be recorded and warnings triggered when the readings are outside predefined reference values. R&S said this allows the authority to verify compliance with the technical parameters and guidelines for transmitter systems, and identify and follow-up any violations or radio interference sources.

Rohde & Schwarz spectrum monitoring antennas are part of an ITU-compliant installation in Thailand.

Hughes JUPITER to power Bank Rakyat's satellite network

Indonesia's largest bank, state-owned BRI (Bank Rakyat Indonesia), will use Hughes' *JUPITER* high-throughput platform to power services over its satellite.

The bank is the first to own and operate its own satellite which was launched by Arianespace in 2016. Orbiting at 150.5°E, *BRIsat* offers C- and Ku-band services across Indonesia, South East and North East Asia. It is part of BRI's strategic plan to strengthen supporting infrastructure for future digital services and banking technology across the Indonesian archipelago.

BRIsat was launched in 2016. Hughes' JUPITER system will now be used to enable reliable connectivity for banking applications across Indonesia.

PHOTO: ARIANEPSACE

JUPITER provides the bank with an enterprise grade WAN to connect tens of thousands of sites. Hughes says its gateway provides a single platform that is compatible with both C- and Ku-band satellite capacity, resulting in what it claims is "enhanced" operational efficiencies and bandwidth utilisation.

The firm adds that its solution also incorporates redundant primary and secondary gateways to deliver 99.9 per cent availability, ensuring BRI can serve more customers in Indonesia with the reliability and quality necessary for critical banking needs.

Following a competitive bidding process, Hughes says it was selected by BRI for having the highest performing terminals supporting up to 300Mbps of throughput, along with the multi-service capabilities necessary for future scalability.

"We required a solution with high reliability, efficiency and scalability to enable branch- and mobile-based business and consumer banking applications across Indonesia," says Meiditomo Sutyarjoko, head of BRI's satellite and terrestrial division. "Hughes will connect BRI sites and more than 50 million customers throughout Indonesia."

The vendor expects to fulfil the initial order for two gateways and several hundred sites by the end of this year.

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Tripp Lite: Your Key Partner for Infrastructure Solutions

Outstanding product reliability and exceptional service have been Tripp Lite trademarks for over 95 years. Tripp Lite manufactures more than 4,000 products to power and connect the servers, networking equipment, and electronic devices that form the foundation of our connected world. At Tripp Lite, "We're in IT with you" is more than just a slogan—it is our philosophy. Not only are we dedicated to manufacturing quality IT solutions, we strive to provide you with exceptional sales support to meet your needs now and into the future. Headquartered in Chicago, Tripp Lite maintains a global presence with offices and partners worldwide, including a robust presence throughout Africa.

Enabling Latency-Sensitive IoT Applications

The growth of the Internet of Things has reached a tipping point. Costs are lower, technology has matured, devices are smaller, and our ability to capitalise on collected data has increased. IoT is no longer just a buzzword – it is a significant business driver.

Management consulting firm McKinsey & Company estimates that IoT will have a yearly economic impact up to ZAR 158 trillion (USD 11 trillion) by 2025 – more than 10 percent of the world economy. The average consumer may think of smart home devices when considering IoT, but home applications account for less than three percent of that estimate. Commerce, industry, government, transportation, and applications outside the home account for the majority.

For home applications, IoT devices typically communicate with the cloud over a wireless LAN and the public Internet. For mission-critical commercial and industrial applications, however, the cloud or core data centre may be too far away from the point of data generation. The response time of the cloud seems fast to human beings, but latency can cause poor performance or make an application unworkable.

The most feasible and cost-effective solution for reducing latency to acceptable levels is usually to install essential data processing resources in an edge node, either on-site or nearby. This edge node, also called a fog node, might be one server in a wall-mount rack or an entire self-contained micro data centre. The edge node still communicates with the core data centre, but time-sensitive data processing takes place closer to the point of data collection, and latency remains within tolerance.

Tripp Lite's Edge

Tripp Lite is a leader in providing edge computing infrastructure, with a strong presence in more than 80 percent of Fortune 500 companies. IT and communications professionals worldwide choose Tripp Lite for reliable and cost-effective IT infrastructure solutions in installations of all sizes. Key Tripp Lite infrastructure solutions for edge nodes include racks, PDUs, UPS systems, KVMs, cables, and cooling.

Working with an experienced partner is essential to optimising an edge installation. Edge sites typically have a small footprint available, so solutions must maximise server density without compromising reliability. Edge nodes may also be located in rugged industrial locations not originally intended for IT equipment, requiring special rack cabinets and other measures. Tripp Lite can even customise rack solutions to fit the site, the application, and the environment's specific challenges.

In addition, remember that edge nodes are not near the core data centre by definition. IT staff are less likely to be on-site, so remote management is important to ensure reliable operation and avoid downtime. In the case of a PDU, being able to monitor loads over the network is a tremendous time- and cost-saver. Even better, some PDUs allow remote outlet control, so an IT manager can reboot an unresponsive server without making a trip.

When you choose Tripp Lite to provide infrastructure for mission-critical applications, our experienced application specialists can help customize a solution to fit your unique requirements. We evaluate the environments and provide actionable recommendations to ensure solutions provide the availability, manageability, efficiency, and affordability you need to meet technology goals on schedule and within budget. Our experience providing solutions to micro data centre and small data centre clients makes it the perfect source for any infrastructure.

As a world-leading manufacturer of power and connectivity solutions, we are introducing our award-winning portfolio of data centre solutions to rapidly growing markets in Southeast Asia, including Indonesia, Malaysia, the Philippines, Vietnam, Thailand and Singapore. We have been recognised as a top infrastructure provider in the CRN Data Centre 100 for several years running, most recently in 2018.

Kok Meng Ng, a sales and marketing professional and engineer with over 25 years of high-level managerial experience in the IT power sector, will lead Tripp Lite's sales effort in Southeast Asia. He is based in Singapore, where he recently represented Tripp Lite at Data Centre World.

"Tripp Lite has a sterling reputation for reliability and service, and data centre customers will appreciate working with such a dependable partner," said Ng. "I also see many opportunities for digital signage, healthcare and industrial applications, to name just a few."

"Enterprise IT spending in Southeast Asia is forecast to reach USD 62 billion in 2018*, with nearly 20 percent growth since 2015," said Bryn Morgan, Tripp Lite Vice President of International Sales. "This dynamic region is an ideal market for Tripp Lite's data centre solutions, and we look forward to building partnerships and serving customers there." [*Source: Gartner, Inc.]

Learn how Tripp Lite can help you with your next project!

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WPON debuts in Indonesia

Nokia has helped Indonesia's XL Axiata to successfully deploy the country's first wireless passive optical network (WPON) as part of a technology trial. Combining PONs with the WiGig 60GHz standard (802.11ad), XL was able to extend the reach of its fibre network by connecting to WPON access points which in turn linked endpoints with wireless drops. Beamforming was used to bring connections of up to 1Gbps to end users. The operator now plans to leverage the fixed wireless access technology to bring new ultra-broadband services to other residential areas in major cities.

IP backbone widened

Sparkle, the international services arm of Italy's TIM Group, has expanded its global IP backbone in Asia with a new PoP in Ho Chi Minh City, Vietnam. Opened in partnership with local operator CMC Telecom, the PoP aims to provide high performing IP transit and Ethernet services to the country's ISPs and content providers. It is interconnected with Seabone, Sparkle's global IP transmission network, along with access to major submarine cables connecting Asia to Europe, such as SEA-ME-WE 5.

Wateen uses SES backhaul

SES is providing Pakistani satellite and fibre operator Wateen Telecom with access to high-powered C-band capacity on its NSS-12 satellite that orbits at 57°E. Wateen is using the capacity to provide 2G and 3G backhaul services to the country's leading mobile network operators. This will enable them to deliver reliable and enhanced voice and data signals in the country's remote mountainous northern regions, as well as its inaccessible areas in the south.

Integrating TETRA and rail comms systems

State-owned LEN Industri, a provider of electronic infrastructure solutions specialising in transportation systems, will work with Teltronic to explore how it can integrate TETRA and/or LTE systems with its ETCS (European Train Control System) and CBTC (Communications Based Train Control) signalling platform in Indonesia.

Under an MoU signed at the InnoTrans event held in Germany in September, the companies said they will work together to enhance and consolidate their respective abilities, resources and expertise. They intend to cooperate with each other not only to look at the feasibility of joint technical development, but also as a potential commercial cooperation scheme in the transport sector. Both companies signed during InnoTrans a Memorandum of Understanding to enhance and consolidate the parties' abilities, resources and expertise

LEN Industri's Linus Andor Mulana Sidjabat (left) and Teltronic's transport business development director Felipe Sanjuán signed the MoU during InnoTrans.

Teltronic claims it has accumulated "wide experience" of integrating TETRA with rail signalling systems, with a number of global references that have "proven the efficiency" of the technology for these services. The company said it offers an end-to-end platform that integrates all the elements of the communications system, including equipment for backhaul infrastructure, specialised EN50155/EN45545 on-board radios and user interfaces, and its control centre specifically designed for the transport environment, *CeCo-TRANS*.

Felipe Sanjuán, Teltronic's transport business development director, said: "We have the expertise of developing rail signalling projects with TETRA, not only with tests and essays but with actual references that are currently in operation and that demonstrate that we are a valid partner regarding signalling applications."

He added that the agreement with LEN Industri will enable Teltronic to explore new applications even in high speed trains.

Google Station to use Ruckus WiFi technology to power hotspot rollouts

Google will use Ruckus' technology for its Wi-Fi hotspot initiatives in India and Indonesia as well as Mexico.

Google Station is claimed to be a high-speed, high-quality public platform for service providers. It aims to give service providers an easy set of tools to roll out Wi-Fi hotspots in public places and high-traffic locations such as airports, malls, universities, railways and mass transit stations.

The platform is offered to providers free of charge with a revenue share based on their ability to monetise the service.

Google says its uses smart, data-backed tools to choose where networks should be designed and deployed. The company adds that it also provides operations and quality assurance support to reduce deployment and operations costs, as well as analytics to improve and enhance services.

Google Station supports select APs from major vendors and industry-standard network architectures. It has already been implemented in locations in Nigeria and Thailand, and is now being rolled out in India, Indonesia and Mexico where it will be supported by Ruckus.

Google Station enables service providers to roll out public Wi-Fi hotspots in high-traffic locations such as railway stations.

Under the terms of the deal, the wireless infrastructure vendor will provide devices and technologies enabling carrier-grade networks at the hotspots. It will supply its *SmartZone* controller which can manage both virtual deployments of *SmartZone* as well as indoor and outdoor Wi-Fi access points.

Ruckus reckons these hotspots will deliver high-performance Wi-Fi using its patented adaptive antenna *BeamFlex* technology for increased connectivity performance and range, better signals and maximised power efficiency.

"Deploying *Google Stations* with Ruckus technologies is an important step to connecting the next billion users," says David Shapiro, chief business officer of the *Next Billion Users Initiative* at Google. "Ruckus networks are simple to install and operationally cost efficient, enabling us to be up-and-running in no time."

ITC to review ruling against Hytera in Motorola Solutions patents row

The US International Trade Commission (ITC) has agreed to review its determination in favour of Motorola Solutions in an ongoing dispute about patents with Hytera.

On 3 July, the ITC announced that Hytera Communications had infringed four of Motorola Solutions' patents. The ITC's Notice of Initial Determination (ID) follows its lengthy investigation of the patent infringement complaint filed by Motorola on 29 March 2017 against Hytera (*also see Wireless Business, Q118 issue*).

In the complaint, Motorola alleged that Hytera is unlawfully importing and selling two-way radio equipment and systems and related software and components that infringe four of its patents.

As part of the ruling, administrative law judge Mary Joan McNamara found that all four of Motorola's patents are valid, Hytera has infringed them, and that Motorola met the legal requirement of showing a "technical domestic industry" on three of the four patents (US patent numbers 7,369,869, 7,729,701 and 8,279,991).

The judge recommended an exclusion order preventing Hytera from importing "certain infringing products" into the US, and a cease-and-desist order preventing further sale and marketing of such products.

The commission is scheduled to issue a Final Determination by 6 November 2018.

Mark Hacker, Motorola Solutions' general counsel and chief administrative officer, said: "Judge McNamara's ruling validates our allegations, upholds the integrity of our intellectual property, and rebukes Hytera for its unscrupulous and unlawful behaviour in wilfully infringing Motorola Solutions' patents. While we consider the Initial Determination an important step, it is only one component of our global efforts to address Hytera's systematic, brazen and egregious theft and infringement of our intellectual property."

In a statement issued online, Hytera said that Motorola Solutions had originally asserted seven patents in its complaint but later withdrew three of them. It also said that McNamara only found a "limited" number of claimed infringements in the four remaining patents.

According to Hytera, the judge also determined that none of Motorola Solutions' products have used one of the four remaining patents. As a result, it said that its US rival does not satisfy the "industry requirement" as to that patent, and that Judge McNamara did not therefore find a violation of the statute.

In another statement issued on 17 July, Hytera said that during proceedings in the case, before the period for factual discovery ended, it had presented documents and source code related to several new designs for the court to consider.

Tom Wineland, VP of Hytera Communications America (West), said: "Hytera is confident that our designs for our next-generation DMR product portfolio do not infringe any of the asserted patents of MSI [Motorola Solutions, Inc.]. MSI did not oppose our new designs based on six of the asserted patents."

On 5 September, the ITC agreed to review-in-part the ID it announced in early July.

The review includes orders that precluded Hytera from presenting its licensing defense and certain expert testimony at the evidentiary hearing.

Furthermore, the ITC will review the ID's finding that Hytera's redesigned products infringe claims in Motorola Solutions' US patent number 8,116,284, its application of an adverse inference with respect to Hytera's employees having individually chosen to exercise their Fifth Amendment rights, and its finding that insufficient record evidence exists to conclusively determine whether any of Hytera's redesigned products infringe claims in the other patents mentioned above.

Hytera adds: "Two of the patents asserted by MSI against Hytera were for technology that Hytera previously had licensed from MSI on FRAND [fair, reasonable, and non-discriminatory] terms."

The ITC will now postpone its final determination to 16 November 2018. While it conducts its review, there continues to be no ban on the importation into or sale in the US of any Hytera products.

SatADSL and Talia expand partnership to provide "ultra-low-cost" broadband

Talia and SatADSL plan to launch a low-cost satellite broadband service across Afghanistan following the expansion of their long-term partnership.

Under a current agreement, SatADSL links directly to Talia's teleport to provide services across the whole of Africa, with Talia's equipment claiming to provide high performance and low cost per megabit. Under the new deal, SatADSL will also be able to access Talia's new platform in Jordan Media City, enabling it to offer Ka-band services not only across Afghanistan but also in Iraq as well.

By connecting its *Cloud-based Service Delivery Platform* (*C-SDP*) to Talia's hub, SatADSL says it can offer a PaaS (Platform-as-a-Service) solution which enables operators to deliver a full range of satellite-based connectivity services without investing in physical infrastructure.

To enable connectivity, Talia uses capacity on the *ARABSAT-5C* Ka-band satellite which orbits at 20°E. Talia is offering its services based on Newtec's multiservice platform which features small VSAT antennas (75cm) on the remote site to create what's claimed to be a new "lower" price point for internet access and "innovative" setup guides for self-installation via a smartphone app.

SatADSL co-founder and COO Caroline De Vos says: "The use of Ka-band high throughput satellite capacity combined with Talia's equipment means the services we provide can be quickly and easily installed by users and offered at an extremely competitive price, taking a significant step towards bridging the digital divide."

VEON wants all of Jazz and Banglalink

VEON has submitted an offer to acquire Global Telecom Holding's (GTH's) assets in Pakistan (Jazz and its associated operations) and Bangladesh (Banglalink) for a gross consideration of USD2,550m.

GTH holds 85 per cent of Jazz and 100 per cent of Banglalink directly and indirectly through Telecoms Ventures of Malta together with a Luxembourg holding firm.

VEON expects to fund around USD1,600m of its proposed offer by discharging and taking on debt, including GTH group bonds. The remainder, which is anticipated to be approximately USD950m, is likely to be paid in cash and deferred consideration.

VEON owns 57.7 per cent of GTH and thus consolidates its debt. As a result, the total net cash outflow and deferred consideration is expected to be around USD400m, resulting in only a "minor impact" of approximately 0.1x on its pro-forma net leverage ratio. Following shareholder approval, the transaction is due to be completed during 4Q18.

VEON will continue to hold its stake in Algeria (Djezzy) through GTH.

The telco says these latest deals are part of its aim of making its corporate structure less complex. VEON executive chairman Ursula Burns says: "Our goal is to drive greater value for our shareholders through a more focused and optimised portfolio. To this end, the company has identified four immediate priorities: simplifying the group's structure, increasing our operational focus on emerging markets, strengthening the balance sheet, and supporting the company's current dividend policy."

US government lifts ZTE ban

The US Department of Commerce has lifted the trade ban it imposed on ZTE earlier this year.

On 13 July, secretary of commerce Wilbur Ross announced that the Chinese company has

placed USD400m in escrow at a US bank. Shortly after the deposit, the department lifted the denial order on ZTE pursuant to a June settlement agreement that included the harshest penalties and strictest compliance measures ever imposed in such a case (*see Wireless Business, Q218 issue*). The escrow funds are in addition to the USD1bn penalty that ZTE paid to the US Treasury in June.

"While we lifted the ban on ZTE, the department will remain vigilant as we closely monitor ZTE's actions to ensure compliance with all US laws and regulations," said Ross.

The firm will be required by the new agreement to retain a team of special compliance coordinators selected by and answerable to the department's Bureau of Industry and Security (BIS) for a period of 10 years. Their function will be to monitor, on a real-time basis, ZTE's compliance with US export control laws.

The new agreement once again imposes a denial order that is suspended, this time for 10 years, which BIS can activate in the event of additional violations during the probationary period. The USD1.4bn paid under the new settlement is in addition to the USD892m in penalties ZTE has already paid to the US government under a March 2017 agreement. The company said that it has also replaced its entire board of directors and senior leadership teams.

Idea and Vodafone become India's largest MNO following approved merger

India's Department of Telecommunications (DoT) has given the go ahead to the USD23bn merger between Idea Cellular, Vodafone India Limited and Vodafone Mobile Services Limited that was first announced last year (*see News, Q117*).

The combined firm – now known as Vodafone Idea – has become India's largest telco with a 39 per cent total market share and 440 million subscribers. Its income is forecasted to be in excess of USD10bn, giving it an estimated revenue market share of 37.5 per cent.

However, the merged firm is also saddled with a net debt of around on INR1.09tn, which is mainly made of spectrum-related costs owed to the state.

Former Vodafone India COO Balesh Sharma has been appointed as Vodafone Idea's CEO, with Kumar Mangalam Birla as chairman. Birla was chairman of the Aditya Birla Group (ABG) which previously owned Idea Cellular.

According to reports, ABG is in separate talks to purchase a 4.8 per cent stake in Vodafone Idea from the Vodafone Group. This will lead to Vodafone owning a 45.2 per cent stake in Vodafone Idea and ABG holding 26 per cent.

Meanwhile, Malaysia's Axiata Group says it will continue to invest in the combined operation. The company has been a strategic investor with an approximately 20 per cent stake in Idea Cellular over the last ten years. The merger dilutes the group's stake to below 10 per cent.

Axiata sells Multinet Pakistan stake for USD1

Axiata plans to divest its 89 per cent stake in Multinet Pakistan for just USD1. In a stock exchange filing in late July, the telco revealed that it will sell its shares on a cash- and debt-free basis to Adnan Asdar Ali, the

NEW APPOINTMENTS

Date	Name	New employer	New position	Previous employer	Previous position
19/6/18	Alexandra Reich	dtac	CEO	Telenor Group	CEO of Telenor Hungary & head of Telenor Group's Central Eastern Europe division. Reich replaces Lars Åke Norling, dtac's previous CEO, who has left the company.
19/6/18	Sharad Mehrotra	Telenor Myanmar	CEO	Telenor India	CEO
19/6/18	Lars Erik Tellmann	Telenor Group	Unspecified "senior position" in Emerging Asia cluster	Telenor Myanmar	CEO
19/6/18	Siri Birgitte Bang Berge	Telenor Group	General counsel	Telenor Group	Head of group legal
19/6/18	Severin Roald	–	–	Telenor Group	SVP & head of group communications – resigned
19/7/18	Wenche Agerup	Telenor Group	Head of group holdings unit	Telenor Group	EVP & chief corporate affairs officer
19/7/18	Anne Kvam	Telenor Group	EVP & chief corporate affairs officer	KLP Kapitalforvaltning	Head of responsible investments
19/7/18	Kjell Morten Johnsen	VEON	Group CEO	VEON	Head of major markets
19/7/18	Christopher Schlaeffer,	–	–	VEON	Group chief commercial & digital officer – resigned
19/7/18	Mark MacGann	–	–	VEON	Group chief corporate & public affairs officer – resigned
24/8/18	Mohamad Idham Nawawi	Celcom	CEO	Axiata Group	Chief corporate officer. Takes over from Michael Kuehner whose tenure as CEO of Celcom – Axiata's mobile subsidiary in Malaysia – came to an end on 31 August 2018.
4/9/18	James Frownfelter	ABS	CEO	ABS	Will also continue role as board chairman. Joined ABS in 2010 after serving as president & COO of Intelsat
4/9/18	Sam Wong	ABS	President & CFO	ABS	CFO
4/9/18	Dee Schwalb	ABS	COO	ABS	EVP of business development
4/9/18	Carmen Gonzalez-Sanfeliu	ABS	CCO	Intelsat	Regional VP of Latin America & Caribbean
4/9/18	Stephen Salem	ABS	General counsel	Aerojet Rocketdyne	Deputy general counsel
4/9/18	Ron Busch	ABS	EVP, network services	ABS	VP, network services
4/9/18	Justin Derksen	ABS	SVP, business development	Morgan Stanley	Executive director, media & communications investment banking team
4/9/18	Patrick French	ABS	SVP, global business development	ABS	VP, global business development
4/9/18	Jason Miller	ABS	VP, sales support & market research	Intelsat	Head of business development, Asia Pacific
10/9/18	Jean-François Fontaine-Boullé	Cambium Networks	Director of hospitality sales – EMEA	Quadriga Worldwide	Global accounts director

current shareholder of the remaining 11 per cent of Multinet's stock.

Multinet runs a fibre network across Pakistan and recorded accumulated losses of PKR754m (USD6.2m) in 2017. As a result, Axiata said that the unit's contribution to the group's financial and business performance was "immaterial".

The company does not expect its proposed divestment of Multinet, which is subject to approvals, to have any material effect on its consolidated net assets, net assets per share, gearing and consolidated earnings for the financial year ending 31 December 2018.

■ Japanese firm Mitsui Co. has acquired a further 10 per cent of Smart Cambodia from Axiata in a deal reportedly worth JPY100bn (around USD890m).

Mitsui now has a 20 per cent stake in the Cambodian operation. This follows a deal announced earlier this year which saw Axiata sell 10 per cent in Smart Cambodia to Mitsui for a total consideration of USD66m. At the time, Axiata said this sum was based on an equity value of USD724m after factoring additional cash received from dividends as part of the transaction structure.

Under the agreement, Axiata had granted Mitsui a call option to acquire an additional 10 per cent interest, exercisable within 12 months from the completion of the transaction.

CTN agrees to go low with SAS in Indonesia

Cendrawasih Teknologi Nusantara (CTN) will provide nanosatellite connectivity services in Indonesia following an agreement with Sky and Space (SAS) Global.

Jakarta-based CTN provides data connectivity services via satellite for Indonesia's cellular, banking, agriculture, energy, public and private sectors.

Under an MoU signed in early September, it will offer low Earth orbit (LEO) satellite services from SAS to customers nationwide.

With a population of more than 260 million people spread out over thousands of islands, SAS believes Indonesia to be an "ideal" market for its nanosatellite technology. The company adds that the agreement with CTN will also enable it to leverage and expand its existing connectivity services across the entire Asia Pacific region.

UK-based SAS is claimed to be

LATEST COMPANY RESULTS

Date	Company	Country	Period	Currency	Sales (m)	EBITDA (m)	EPS (units)	Notes
17/7/18	Telenor	Norway	2Q18	NOK	27,485	11,300	1.79	On organic basis, subscription & traffic revenues grew 0.4% while total revenues decreased by 1%. CEO Sigve Brekke says in Malaysia, Digi achieved revenue growth for second consecutive quarter, operation in Thailand continues to deliver "robust results", & subscriber base in Pakistan & Bangladesh also saw growth. "[We] strengthened our positions in rapidly developing markets. We added 2 million subscriptions in the quarter, & now connect 172 million customers."
18/7/18	Ericsson	Sweden	2Q18	SEK	49.8 (bn)	NA	-0.58	Sales as reported & sales adjusted for comparable units and currency both decreased by -1% YoY. MEA sales declined slightly YoY. Networks sales were negatively impacted by monetary restrictions in a few markets in the Middle East; decline partly offset by growth in Digital Services. Overall Networks segment showed sales increases of 2% YoY, with strong growth in North America.
26/7/18	Bharti Airtel	India	1Q19	INR	20,080 (crore*)	6,837 (crore*)	NA	Consolidated total revenues down 2.3% YoY on an underlying basis. India revenues down 7.0% YoY on an underlying basis; Africa revenues up 13.9% YoY. (*one crore = ten million).
26/7/18	Nokia Corporation	Finland	1H18	EUR	5.3 (bn)	NA	0.03	On a constant currency basis, net sales down 1%. Results consistent with company's view that the first half of the year would be weak followed by an "increasingly robust" second half.
26/7/18	SES	Luxembourg	1H18	EUR	981.4	621.1	0.45	0.5% decline in reported revenue at constant forex. CEO Steve Collar said: "We have delivered a strong first half of 2018, fully in line with our expectations & continuing our momentum from the first quarter. It is pleasing to see that our underlying revenues are growing again, fuelled by sustained performance from our Networks business & in particular from our aeronautical & government customer segments."
27/7/18	Telkom Indonesia	Indonesia	1H18	IDR	64,368 (bn)	NA	87.80	Slight YoY increase in earnings from IDR64.021m reported for 2017.
31/7/18	Intelsat	US	2Q18	USD	537.7	408.5		Results represent net loss of USD46.8m for the quarter. Network services revenue was USD198.5m (37% of total revenue), a decrease of 8% compared to 2Q17. But revenues from Media and Government divisions were both up at five & 15% respectively compared to 2Q17.
1/8/18	Eutelsat	France	FY17-18	EUR	1,408	1,076.09	NA	Revenues down 1.9% like-for-like (-4.7% reported). Konnect Africa project remains on track for commercial launch in August 2018.
2/8/18	Motorola Solutions	US	2Q18	USD	1,760		1.05	18% YoY sales increase driven by growth in all regions. Around USD154m of revenue growth related to acquisitions. Americas & EMEA led Products & Systems Integration segment growth of 14%, & Services & Software segment growth of 27%. For FY18, company now expects earnings growth of around 14.5%, up from prior outlook of 14% including USD40m of unfavourable currency impact.
2/8/18	VEON	Netherlands	2Q18	USD	2,270	857	NA	Total reported revenue decreased by 6.1%, mainly due to currency movements. Organically, total revenue grew by 3%, driven by Russia, Pakistan, Ukraine & Uzbekistan, partially offset by continued pressure in Algeria & Bangladesh.
8/8/18	Singtel	Singapore	1Q19	SGD	4,134	1,207	NA	Operating revenue up 2% in constant currency terms. Underlying net profit fell 19% due to weaker results from Airtel & Telkomsel, reduced economic interest in NetLink NBN Trust, an increase in withholding taxes from higher dividends, & adverse currency movements. Net profit declined 7% to SGD832m & would've been down 4% in constant currency terms.
10/8/18	Sri Lanka Telecom	Sri Lanka	1H18	LKR	39.4 (bn)	12.2 (bn)	NA	Group reported net profit of LKR2.8bn during the period, 13.5% YoY growth.
24/8/18	Axiata Group	Malyasia	2Q18	MYR	6.3 (bn)	2.4 (bn)	0.05	Group revenue, on constant currency basis and excluding the application of the Malaysian Financial Reporting Standard 15 and 9, increased 4.6% from RM6.1bn compared to previous year.

the first company to successfully use narrowband connectivity provided by nanosatellites to deliver a voice call, text messaging and financial transactions capabilities. It is planning to launch 200 LEO satellites by 2020. (*Do LEO satellites represent a new horizon for satcoms? Feature, pp20-22*).

Public Wi-Fi to contribute USD2bn to Indian GDP

Public Wi-Fi can play a key role in driving ubiquitous connectivity and digital inclusion in India, according to Analysys Mason.

In its *Accelerating connectivity through public WiFi: Early lessons from the railway WiFi project* report published in early July, the research firm says that despite rapid increases in the number of people connected (316 million at the end of 2017 compared to 200 million in 2016), India's mobile broadband penetration stood at only 31 per cent at the end of last year.

Analysys Mason believes that the development of a wider connectivity ecosystem with public Wi-Fi as a key component can not only benefit users and wireless ISPs, but also telecom service providers (TSPs), handset manufacturers and venue owners.

It reckons TSPs in particular can benefit by monetising demand for faster mobile broadband and higher data volumes on their networks as people get used to fast speeds and ubiquitous connectivity. The report found that around 100 million people would be willing to spend an additional USD2bn to USD3bn per year on handsets and a similar amount on cellular mobile broadband services as a result of experiencing fast broadband on public Wi-Fi.

In addition to driving productivity improvements from high speed Wi-Fi for the overall economy, Analysys Mason says public Wi-Fi can also translate into "tangible" benefits to GDP, and forecasts that the market will bring in around USD20bn between 2017-19 and at least USD10bn per annum thereafter.

Analysys Mason partner David Abecassis says that to really achieve its digital connectivity vision, India will need to further invest in developing public Wi-Fi as a complement to mobile and fibre broadband. He says: "'[The] Google and RailWire project to deploy high speed Wi-Fi across 400 stations has shown that there was a technical and operational solution to providing high-quality public Wi-Fi to millions of Indians nationwide, on affordable terms. The success of this rollout and Reliance Jio's 80,000 public Wi-Fi access points as of mid-2017 provide valuable insights in further developing public Wi-Fi as a service that can truly achieve the Digital India vision."

The report also says investment in public Wi-Fi can further unlock an opportunity for MNOs to off-load excess data traffic from cellular networks, and deploy advanced technologies such as 'Hotspot 2.0' for ensuring interoperable roaming between cellular and Wi-Fi.

PTToC market forecast to increase significantly by 2026

The global push-to-talk over cellular market (PTToC) is expected to grow at a CAGR of 8.5 per cent from 2018 to 2026, says Persistence Market Research (PMR).

In its Push-to-Talk Over Cellular Market – Global Industry Analysis 2013-2017 and Market Forecast 2018-2026 report published in early August, the researcher says the PTToC market was worth at USD2,741.4m in 2017 and predicts this will "grow significantly: to reach USD5,658m by 2026.

PMR believes this is due to a worldwide increase in demand for next-generation LTE networks.

It also says that the increasing penetration of IoT devices in various industry verticals is encouraging mobile device manufacturers to integrate PTToC software into their hardware. As a result, PMR says the software subsegment in its study is projected to register more than 30 per cent of global market share at the end of 2018.

Moreover, it says the software segment is expected to grow at a relatively higher CAGR as the demand for PTToC software is growing rapidly in various countries such as India due to an expanding mobile workforce.

Apart from this, the services segment is also expected to witness a high growth rate during the forecast period as the demand for integration and deployment services as well as maintenance and support services for PTToC solutions is growing rapidly in various developing countries around the world.

Nokia expects to earn EUR3 for each 5G mobile phone

Nokia says the licensing rate for mobile phones that use its 5G SEP standard essential patents (SEPs) portfolio will be capped at EUR3 per device.

In a press statement issued in late August, the company described itself as a "long-term innovator" in the development of fundamental technologies for wireless communications, and said it has made "significant" contributions to the development of related standards for more than two decades.

According to Nokia, this R&D investment has resulted in a significant portfolio of SEPs which it has committed to license on FRAND (fair, reasonable and non-discriminatory) terms, in line with the applicable IP rights policies of relevant standard setting organisations.

"Our innovation continues in 5G, where significant parts of the emerging 5G standards will be based on Nokia innovations, and Nokia expects to have a significant position in SEPs once the standards are finalised later in 2018," stated the firm.

Beyond mobile phones, Nokia believes that there will be an "unprecedented" variety of end user devices that will use its innovation.

For these other categories of devices, the firm said it will determine its licensing rates separately and will engage in dialogue with relevant industry participants to define the models best suited for those industries.

INVESTMENTS, MERGERS, ACQUISITIONS

Date	Buyer	Seller	Item	Price	Notes
6/7/18	Sterlite Tec	Metallurgica Bresciana	Company	EUR48.7m	Metallurgica designs & manufactures precision optical fibre & specialised copper cables. Sterlite hopes its all cash acquisition of the Italian firm will "significantly" expand its European market presence.
23/7/18	G+D	Various financial institutions	Bonded loan	EUR200m	This is the first time Giesecke+Devrient has placed a bonded loan. The issue was placed with a greater number of savings banks & co-operative institutions as well as the German commercial banks, and comprises terms of between five & 10 years. Proceeds will be used for general business financing as well as supporting operational growth in the areas of payment, connectivity, identities, & digital security.
23/7/18	Infinera	Coriant	Company	USD430m	Infinera will pay around USD150m in cash at closing, plus estimated additional amounts of USD25m in two quarters post-closing, & USD55m over a period of years. It will issue around 21 million shares, which when combined with the cash consideration, results in total transaction consideration of around USD430m. Infinera says proposed acquisition positions it to capitalise on the next wave of global network spending as operators transform their networks to transition from 4G to 5G, from OTN to packet, and from closed to open architectures.
9/8/18	Es'hailSat	Eutelsat	Stake in *EUTELSAT 25B*	EUR135m	Eutelsat and Qatar's Es'hailSat jointly launched *EUTELSAT 25B/Es'hailSat 1* in August 2013 to serve users across MENA and Central Asia. Eutelsat says its share of the satellite generated FY2018 revenues of c.EUR16m in video application, adding that the sale has no impact on its revenue objectives.
27/8/18	Nokia	European Investment Bank	Loan	EUR500m	Nokia will use financing to further accelerate its R&D into 5G. Loan has an average maturity of approximately five years after disbursement, which can take place at any time during the next 18 months. The EIB transaction is supported by the European Fund for Strategic Investments (EFSI), a key element of the EU's *Investment Plan for Europe* (also known as the *Juncker Plan*).

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IP-based capability accelerates interconnection of TETRA networks

The ETSI standard for the TETRA Inter-System Interface (ISI) has been revised and now includes IP connectivity.

The ISI is the mechanism that enables separate secure TETRA networks to interconnect. For example, first responders need communications continuity if working in regional or national cross-border areas.

Up until now, interconnection of individual TETRA networks via the ISI required a dedicated E1 link. According to the TCCA (TETRA and Critical Communications Association), this can be expensive and sometimes impossible to lease because providers no longer support circuit switched connections.

To ensure that the new IP option for ISI is included in interoperability process testing and certification, the TCCA's ISI working group has been working in parallel with the ETSI revision process. The group has written new ISI TETRA interoperability profiles (TIPs) which form the basis for testing.

Each TIP is based on ETSI TETRA standards. They primarily constitute a clarification of the standards and may impose limitations in order to achieve a range of fully compliant and interoperable TETRA equipment available to the market.

TCCA contracts Istituto Superiore delle Comunicazioni e tecnologie dell'Informazione), an Italian Ministry of Communications lab, as the independent certification authority responsible for supervising the testing sessions.

The new TIPs are now available in the members' area of TCCA's website. *www.tcca.info*

Inseego unveils new range of IoT devices

Inseego has launched a new line-up of industrial-grade 4G IoT solutions as part of its *Skyus* product range.

The firm says its expanded portfolio includes gateways, routers and USB devices that provide "affordable, reliable and secure" cellular connectivity for fixed or mobile deployments.

For quick, plug-and-play deployments, Inseego claims the globally certified *Skyus SC* series of devices offers a lower cost USB connectivity solution built to withstand extremely harsh operating environments.

Packaged in industrial grade aluminum, the devices are available in LTE Cat-M1, NB-IoT, Cat-1 and Cat-4 variants, and include features such as an onboard app for space and connection management. Inseego reckons the *Skyus SC (pictured left)* simplifies the integration needed to provide basic connectivity to any IoT custom computing solution or as a primary or failover solution. It adds that the solution is well suited for use in agriculture, manufacturing, metering and enterprise SD-WAN environments.

For deployments that rely on a combination of cellular, Wi-Fi, Bluetooth networking and GPS for tracking purposes, Inseego says the *Skyus 100* series edge gateways (*pictured*) target numerous IoT use cases and enable seamless machine connectivity with a wide variety of equipment.

The platform is said to offer numerous connectivity options and industrial-grade reliability at an economical price point. The initial offerings feature Cat-1 and Cat-4 LTE speeds with GPS and a 12-hour backup battery to address specific IoT applications.

They include the *Skyus 110* family which offers various LTE Cat-1 gateways with Wi-Fi, Bluetooth, Ethernet, USB and four-pin interfaces to enable use cases with low data demands.

www.inseego.com

Compact APs can squeeze into most enclosures

Ruckus Networks has launched two new 802.11ac Wave APs designed to provide Wi-Fi coverage in space-constrained sites and hard-to-reach areas.

They include the *E510* which is said to be the industry's first embeddable enterprise AP. Ruckus says it features an innovative two-element design that minimises the aesthetic or physical impact at deployment sites such as outdoor digital signage, street furniture, kiosks, lighting fixtures and stadium seats. Measuring just 21 x 14.2 x 3.3cm, it's claimed the base unit can "squeeze into most enclosures", including cylindrical light poles, to expand the reach of any Wi-Fi network.

The *E510* is equipped with Ruckus' weatherproof *BeamFlex+* antenna module. The company says this "diminutive" 17.5 x 8 x 8cm module is built for outdoor stealth placement and can be positioned up to three metres away from the radio. It adds that with 2x2:2 spatial streams, MU-MIMO support, and a data rate of up to 867Mbps, the *E510* delivers "sustained throughput for demanding users and applications".

Meanwhile, the new *M510* offers mobile Wi-Fi with LTE backhaul for expanded coverage and redundancy. It is designed for use wherever supported LTE service is available, and is said to be ideally suited for use on buses, trains and in temporary locations where Ethernet connectivity is absent, unreliable or cost-prohibitive. Ruckus adds that the device can be used anywhere WAN) redundancy is desired.

According to the firm, the *510*'s integrated LTE modem allows network designers to create Wi-Fi hotspots at will, and to implement redundant backhaul to improve Wi-Fi service reliability and/or to help ensure that SLAs are maintained. Sustained downlink throughput is said to be up to 150Mbps when using LTE backhaul.

www.arris.com

'Unique' ULTRAMAX antenna features multiple Wi-Fi ports

Airgain has released an antenna which it claims is the first of its kind to include six dual-band Wi-Fi ports inside a single enclosure.

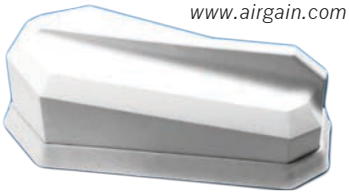
The company says its *ULTRAMAX* MIMO 9-in-1 antenna will help improve public safety and fleet solutions with enhanced Wi-Fi capability. It is equipped with nine ports and features 6x6 MIMO Wi-Fi, dual LTE, and multi-GNSS technology antennas to provide support for full HD streaming video as well as other high bandwidth applications.

With a single compact footprint, Airgain reckons the *ULTRAMAX* promotes ease of installation, avoiding multiple mounting and cable entry points associated with existing solutions.

It says the antenna includes high rejection GNSS technology with coverage for multiple satellite systems including GPS, GLONASS, Galileo and BeiDou.

The company adds that the *ULTRAMAX* MIMO 9-in-1 is the only single unit antenna that complements Cradlepoint's *IBR1700* fleet router, and supports all six of its Wi-Fi ports.

www.airgain.com



Comprion eases introduction of eSIM and RSP technology

Comprion says many MNOs believe that over the next few years, there will be hardly any devices holding traditional SIMs and that eSIMs will be used instead.

Using its new *Remote SIM Provisioning* (*RSP*) *Consumer Devices Platform*, the firm says service providers, network operators and manufacturers can test their real components against a simulated, GSMA-conforming system to make sure that RSP works.

The software-based platform emulates the consumer devices infrastructure defined by the GSMA in a test environment. This infrastructure

consist of back-end servers (SM-DP+, SM-DS), eSIM and mobile devices, as well as the communication interfaces to be used.

Comprion claims the simulated system can be deployed with only a few clicks and within just minutes. It adds that the simulations only incorporate the component features needed for testing RSP functionality. As a result, the firm says the process becomes simpler, problems can be detected more quickly, and business processes can be optimised.

It is also possible to test dedicated operative components of the infrastructure by replacing the simulated component with the component under test. Comprion reckons it then becomes "very easy" to set up various error scenarios by changing the parameters of the remaining simulated components and seeing how the component under test reacts. *www.comprion.com*

LAN tester upgraded for 5GHz demand

IDEAL Networks has introduced a new dual band USB Wi-Fi adapter for its *LanXPLORER* Pro network troubleshooter and also upgraded it with updated software.

The vendor says the USB antenna offers enhanced functionality to support both 2.4GHz and 5GHz Wi-Fi testing in accordance with the 802.11a/b/g/n/ac international test standard.

IDEAL claims the free software updates have also improved Wi-Fi testing capabilities and accuracy by enabling the *LanXPLORER Pro* to display new RF parameters such as signal strength (dBm) and signal to noise ratio. The company reckons this makes the tester an effective, time-saving tool for integrators and technicians that need to test all their devices and have the Wi-Fi access they need.

As well as testing Wi-Fi, IDEAL says the multifunction *LanXPLORER Pro* also offers a wide range of network diagnosis capabilities, from testing the copper and fibre cables that serve the wireless APs, to troubleshooting problems in Ethernet devices that may be reducing network performance.

The new software update also includes an extended list of wiremap templates for common Ethernet cable types including Cat6A/7A/8 and non-Ethernet cable, such as Profinet 4 and ISDN. IDEAL says user-defined custom wiremap templates are also available for "maximum versatility and accuracy" when testing proprietary cabling systems.

The *LanXPLORER Pro* can be used with the company's free *AnyWARE* app. This is designed to enable technicians to quickly and easily share pass/fail test results with clients. IDEAL says detailed PDF and CSV reports can also be transferred via the app or shared with colleagues off site to improve collaboration and productivity and reduce network downtime. *www.idealnetworks.*

Qualcomm claims first with 5G New Radio

Qualcomm Technologies says it has introduced the industry's first 5G NR (New Radio) solution targeted for small cells and remote radio head (RRH) deployments.

The company says the new *FSM100xx* builds upon its existing *FSM* platform for 3G and 4G small cells, and will support 5G NR in both mmWave and sub-6 GHz frequencies. The device also includes a software defined modem, and is designed to enable original OEMs to reuse both software and hardware designs across sub-6 and mmWave products to comply with future 3GPP releases.

Qualcomm says the *FSM100xx* supports various options for interface splits between a central unit and the RRH, providing OEMs and operators with the flexibility to use a 5G RAN architecture.

According to the firm, small cell densification, which is already under way for 4G, is also expected to be a critical component of 5G network deployments. Given the propagation characteristics of 5G NR's higher frequencies (especially mmWave), it says solutions are needed to support delivery of uniform 5G experiences, especially indoors where most data is consumed.

The *FSM100xx* has been designed to scale and address outdoor small cell performance requirements, such as support for MIMO implementation and multi-gigabit throughput, as well as support indoor requirements such as compact form factor and PoE.

The solution is expected to begin sampling in 2019 and Qualcomm is already working with early access customers. *www.qualcomm.com*

Also look out for...

Successful tests for C-COM's phased array Ka-band antenna

C-COM Satellite Systems has successfully tested its 16x16 subarray phased array antenna using 4x4 transmit and receive building block modules.

The Canada-based company has been working on a research project to develop a fully electronically steered phased array mobile satellite Ka-band antenna since 2016 (*also see feature, Guaranteeing a great reception, Q217 issue*). Its panels have been developed and tested in partnership with the Centre for Intelligent Antenna and Radio Systems (CIARS) at the University of Waterloo in Ontario.

CIARS director and research team leader Professor Ali Safavi-Naeini says: "Measured lab results have demonstrated the high performance of the small modular scalable intelligent transmit and receive antenna modules and validated our simulation model for larger panels. We also achieved good beam steering up to 70° from a boresight, a significant achievement."

C-COM explains that the developed system uses a unique adaptive control technique in such a way that a prescribed quality of polarisation can be guaranteed over the entire scan range.

Furthermore, it says the beam-processing unit and the antenna intelligent module can generate more than one radiation beam simultaneously and support multi-beam-tracking. C-COM says this is functionality "highly desired" in emerging LEO mobile networks.

The company goes on to say that by utilising a unique blend of low-cost but flexible/reconfigurable hardware and highly intelligent software, the modular technology platform developed at CIARS provides the most cost-effective evolution path towards any antenna system configuration with prescribed performance for a wide range of low-end to high-end applications.

It adds that the platform can be "easily" extended to the rapidly emerging mmW 5G and complex radar systems.

A new horizon for satcoms?

Will low Earth orbit satellites offer the ultimate in connectivity from space? RAHIEL NASIR finds out.

On 25 June 2015, a high-profile industry group unveiled a new satellite mission which promises to completely bridge the digital divide by 2019. In the famous Faraday Lecture Theatre at the historic Royal Institution of Great Britain in London, the heads of Airbus Group, Bharti Airtel, Hughes Network Systems, Intelsat, Virgin Group and Qualcomm revealed what was hailed as a "ground-breaking global communications system" based on a fleet of microsatellites that will orbit the Earth at low altitudes.

The companies are among the first round investors backing tech entrepreneur Greg Wyler's OneWeb venture which is working on putting 900 microsatellites into space, starting with the first 10 towards the end of 2018 (*also see News, 3Q15*).

Wyler is no stranger when it comes to pioneering telecoms. He helped to create some of the first networks in Rwanda when he owned Terracom Communications during the early 2000s. In 2007, he founded O3b Networks (now owned by SES) which has created what is often described as a 'fibre in the sky' trunking network using satellites that are placed in medium Earth orbit (MEO). But unlike O3b's fleet which orbit the planet at an altitude of just over 8000km, or more conventional geostationary (GEO) satellites which are around 36,000km away, OneWeb will place its spacecraft into a low Earth orbit (LEO) of just 1,200km.

Since OneWeb made its announcement three years ago, several other companies have also been developing LEO programmes that aim to provide ubiquitous and affordable connectivity from space. Fleet Space Technologies, Global IP, Kepler, LeoSat, Sky Space and Global, and Telesat are some of the companies that feature prominently here. But the names of the major GEO satellite players are conspicuous by their absence. So if LEO space technology is the answer to bridging the digital divide once and for all, why have the more established operators never invested in it?

Speaking at the OneWeb launch event in 2015, Intelsat CEO Stephen Spengler said: "We have a different focus, and a very large installed base of customers that we are serving with our GEO fleet. The bulk of the applications can be supported very well from GEO and so we're going to continue with that as the core of our strategy."

So why is Intelsat part of the initial consortium of investors that has backed OneWeb to the tune of around USD2bn? Indeed, it even tried to merge with the firm earlier in 2017, although the proposed deal collapsed (*see Wireless Business, 3Q17*).

"We can't do the poles effectively," said Spengler. "So what a LEO system does is that it allows us to work with our mobility customers and give them pole to pole, high-performance coverage."

Intelsat's plan is to integrate its GEO satellites with OneWeb's LEO fleet, connecting customers from pole to pole on what it claims will be a "seamless" basis.

Spengler also said that working with OneWeb will also give Intelsat another layer of capacity in some cases, such as helping to ease the congestion that can occur with spot beam systems. "And there are going to be certain situations where the low latency of a LEO system will be beneficial. We don't believe latency is an issue across the broader set of applications, but in certain applications it's going to be beneficial for certain customers so we'll be able to bring that to the equation."

Who's interested in LEO?

When it comes to some of the other big names in the satellite industry, SES is clearly now committed to MEO and acquired all of the remaining shares in O3b for USD730m in August 2016. And following a request for its views, a Eutelsat spokesperson told us: "We do not have interest in LEO communication". This contradicts an announcement Eutelsat made in March 2018 which stated that the company had commissioned its first low Earth orbit satellite (*see News, 2Q18*). Eutelsat has so far not responded to a request for further clarification here.

Meanwhile, Ken Betaharon, EVP and CTO of ABS (Asia Broadcast Satellite) appears almost dismissive of the LEO satellite providers when he says: "Except for a small portion of the current traffic which may be latency sensitive, there is no need for a LEO system, especially if

[the operator's] business plan entails competing with GEO systems and provide the same services. A GEO system can do it all at a much less cost than a LEO solution both in terms of the satellite cost and the ground segment cost (user terminals). So why bother?"

Why bother indeed, especially when the idea of LEO satellites is not new and has been tried before without much success. During the 1990s, Teledisc had ambitious plans to launch 840 satellites at an altitude of 700km. Globalstar and Iridium also had similar plans. But the programmes cost billions of dollars and did not take-off commercially.

So why has there been renewed interest in LEO missions during recent years?

Perhaps the best companies to answer that question are those that are investing in the technology today, such as US-based LeoSat Enterprises. Working with Thales Alenia Space, the company plans to manufacture and launch a constellation of up to 108 Ka-band high-throughput satellites (HTS). These will be interconnected through laser links which according to LeoSat, effectively creates an optical backbone in space which is about 1.5 times faster than terrestrial fibre backbones. LeoSat expects to begin its launch in 2021 with full deployment expected in 2022.

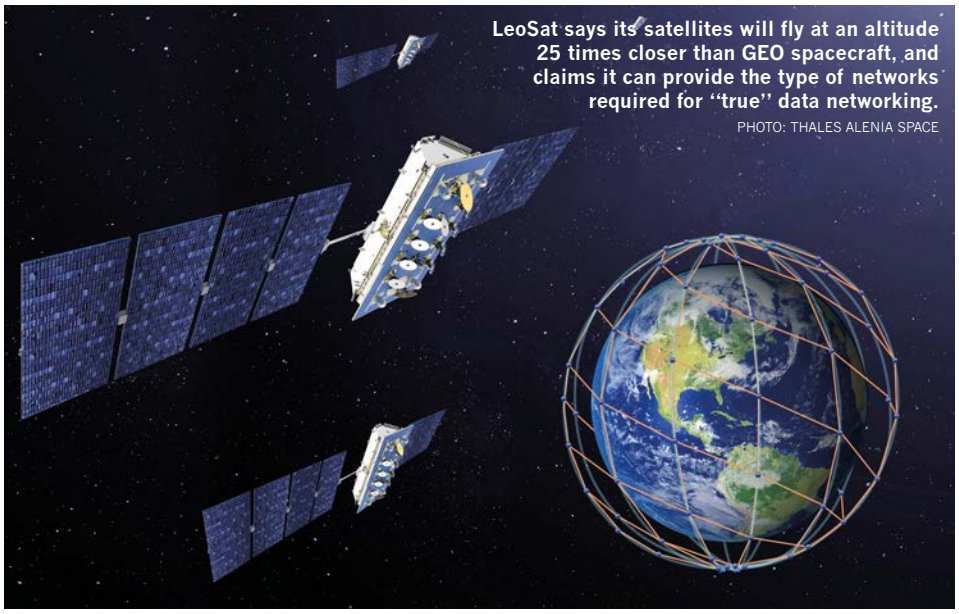
CCO Ronald van der Breggen believes that with the continuing growth of the data market worldwide, the satcoms sector is looking to deploy LEO solutions that will enable telecom and satellite operators to complement their current portfolio with suitable capabilities for future demand.

He goes on to point out that two major established GEO operators have now invested in LeoSat: Hispasat, the Spanish national satellite operator along with Asia's largest operator SKY Perfect JSAT. He says: "Both companies believe that LeoSat's system design, combining satellite and networking technology to provide an MPLS network in space, is a departure from existing solutions and is a key opportunity to opening up new markets and delivering business growth."

Canada-based Kepler is another recently established company that is building plans to gradually deploying a constellation of 140 LEO nanosatellites while delivering store-and-forward data backhaul and IoT services worldwide.

Mina Mitry, CEO, Kepler

"Radiation events are much frequent at higher altitudes and can be incredibly damaging to electronics."



LeoSat says its satellites will fly at an altitude 25 times closer than GEO spacecraft, and claims it can provide the type of networks required for "true" data networking.
PHOTO: THALES ALENIA SPACE

CEO Mina Mitry believes that the space industry in general has seen "incredible growth" in past years, and that the standardisation of nanosatellites has significantly influenced how LEO spacecraft can be built and deployed.

"Since off-the-shelf components used for LEO are significantly cheaper and the availability of launch vehicles available is multiplying, we see now how access to space is remarkably being re-defined. This is making it easier for new entrants to access the space market through rapidly deployable nanosatellite constellations, providing a diverse array of new services and applications."

Mitry says the reason the more established operators have not invested in LEO is simply because it is not their business. He also suggest that they lack the skills to do so.

"To operate in LEO, you require a certain expertise that is not easy to transfer from GEO since these two orbits have different complexities and challenges. The technologies are fundamentally different – mostly inherent to the design and operation aspects – and require a specific body of knowledge to successfully compete at each orbit.

"Moving to a LEO system means that a GEO operator would need to take time and resources away from their mainstay business. When you have quarterly earnings reports, investor calls, and a plethora of demanding customers, the opportunity cost for investing in a new capability is simply too great to bear.

"With small satellites you can ride-share to orbit, the radiation environment is more forgiving, and cost of launch is cheaper. This drives down cost, meaning you can build more satellites that are rapidly refreshed."

Frederick Morris,VP of satellite operators market vertical with satellite technology specialist Comtech EF Data, agrees here. He says GEO satellites are generally large, designed for long life, and are therefore expensive to manufacture and launch, which limits the numbers being built. But LEO and MEO satellite constellations can have anywhere from two dozen to 6,000 satellites driving scale, which is always good for economics.

In addition to the individual cost savings from volume production, Morris says the cost of a line of software code has also plummeted, making the much more complex control (compared to GEO) of LEO constellations far more feasible than before. "With the enhancement in satellite technology and the enhancements in launch capability, what was once considered science fiction is now becoming science fact and the potential user benefits becoming realisable."

Reaching high with low orbit satellites

Kepler's Mitry reckons LEO satellites offer "significant" advantages over their GEO counterparts for certain applications. "Naturally, each orbit has its own unique set of characteristics that pre-define the type of service and coverage it can offer. GEO satellites are particularly good at supporting direct broadcast and fixed connectivity services. MEO and LEO satellites instead are far more suitable for delivering mobile satellite services, including IoT services.

Mitry says LEO satellites orbiting at less than 2,000km mean considerably less latency than those in geostationary orbits that are much further away. Because LEO satellites fly closer to the planet, he says they do not suffer from the signal path losses of GEO satellites, and can therefore be used with smaller antennas and less power on the ground.

He also points out that in general terms, the higher the orbit the harsher the radiation environment, and the more effort needs to be put into ensuring that the spacecraft's electronics can survive. "This not only drives up development effort but means GEO electronics lag behind their terrestrial counterparts in terms of performance. Radiation events, such as single event upsets or latch-ups, are much frequent at higher altitudes and can be incredibly damaging to electronics. In the lower radiation environment of LEO, small satellites can use commercial off-the-shelf components, again reducing the costs and improving the performance."

Mitry also highlights the fact that GEO satellites are designed to have a lifespan of around 15 years,

largely owing to the buyback period needed to recuperate the original investment. But he says the typical service life expectancy of small satellites is under 3-5 years which makes it easier to upgrade technology with the latest advancements.

LeoSat's der Breggen believes current GEO satellite solutions remain "suboptimal" for data. "Broadband and data applications benefit from low-latency communications, which is where LEO constellations provide an advantage over geostationary satellites. For data communications, the LeoSat constellation can even outperform fibre on inter-continental networks. For example, current fibre latency for New York City-Tokyo is 175ms – the LeoSat solution is below 100ms."

The issue of latency comes up time and again during conversations about LEO.

For instance, ABS' Betaharon agrees that while LEO satellites offer some advantage in terms of latency, this is only required for a very small portion of current traffic and is a "huge disadvantage" in terms of the cost.

He also says LEO systems may have an advantage over GEO for providing service above and below arctic circles where very few people live and in some very specific targeted markets. Hence, as part of their universal service obligations, he says some governments may invest in LEO satellites to provide services to their citizens living in remote areas, citing Canada-based Telesat as an example. "Considering that very few people live in the extreme northern part of Canada (80 per cent of the country's population lives within 80 miles of the US border), this does not make financial sense. But for a government helping its people and targeting some specific markets, it does make sense."

Telesat's fleet currently consists of 16 GEO satellites as well as the Canadian payload on *ViaSat-1*. In January 2018, it launched a phase 1 LEO satellite that is currently undergoing commissioning and orbit-raising. The company says its LEO fleet will offer a low latency, high throughput broadband service with an initial constellation of around 120 satellites planned by 2021.

Morris explains that a LEO satellite hop can be approximately 40ms while a GEO hop can be around 550ms. "This sounds as if there would be no question that if latency forced a choice to be made, it would be LEO over GEO. However, there are satellite configuration differences within the proposed LEO constellations, and it has to do with whether there are inter-satellite links (ISLs) between satellites or not.


Andrey Kirillovich, director of integration services and projects, RSCC

"The effectiveness of such a system and its advantage over GEO by adding coverage over the poles is questionable."

OneWeb's first round investors include some big name ICT and tech players. Shown here at the company's launch in 2015 are (from left to right): Dean Manson, EVP, general counsel and secretary, Echostar (Hughes Network Systems); Stephen Spengler, CEO, Intelsat; Richard Branson, founder, Virgin Group; Sunil Bharti Mittal, founder and chairman, Bharti Enterprises; Greg Wyler, founder, OneWeb; Tom Enders, chief executive, Airbus; Dr. Paul E. Jacobs, former executive chairman, Qualcomm.

"If the constellation has ISLs, then a ground station can connect to another ground station or gateway station by a hop up to the satellite, then over to a satellite covering the geography of the other end of the link, and down to the ground station. SpaceX's Starlink, Telesat LEO and LeoSat have ISLs in their constellation designs."

Without ISLs, Morris says the signal must go from ground station to gateway, to possibly a terrestrial link to another gateway, then up to a satellite covering the destination, then down to the end point station. "This type of constellation configuration, with multiple hops, can have implementations that can have close to the same latency of a single GEO satellite hop."

Andrey Kirillovich, director of integration services and projects, for the Russian Satellite Communication Company (RSCC), also plays down LEO's latency advantage. He says that while latency is essential for response time critical applications in corporate networks and verticals or online gaming, he agrees with Betaharon above and says that in terms of the overall satellite service provider business, such traffic does not exceed 10-15 per cent.

Kirillovich adds: "New 5G mobile network features also will not run smoothly on LEO, as the 5G standard requires latency around 1ms, and this can be achieved only on ground. So the benefit of LEO systems is really questionable, while the disadvantages are great in number. They include numerous launches, need for constant renewal of the satellites in space, and the main bottleneck – the absence of a proven, mass production and easy use steerable antenna. As of today and even in the near future, the cost of a non-GEO terminal will be too far from GEO costs, purely because of the RF part."

He acknowledges that LEO satellites also offer another major advantage over their GEO counterparts in terms of offering true global coverage. But he goes on to ask, at what cost?

"[LEO] coverage is continuous and achieved by hundreds or even thousands of satellites. Many of them will, most of the time, cover oceans with no customers there. So the effectiveness of such a system and its advantage over GEO by adding coverage over the poles is questionable. It may be effective, but for regional use, or in certain verticals only."

On top of all this, Caroline De Vos and Fulvio Sansone, co-founders of satellite services provider SatADSL, point out that LEO satellites are also perceived to be in motion by a user on Earth, so terminals need to be able to connect to a moving object in the sky. They say: "This means the use of either omnidirectional or tracking antennas is necessary. The former can only use lower frequency ranges and are therefore limited in bandwidth and efficiency which means higher communications costs, while the latter is, until now, based on motorised, mechanically moving dishes which are costly and bulky.

"Additionally, the user terminal and its antenna need to be able to cope with handover between one satellite fading out of view below the horizon and another one rising over it. These challenges can only be economically addressed by using a new generation of antennas based on flat-panel electronically steerable elements. Such technology is still at its infancy, and it is not yet possible to have low-cost mass-produced electronically-steerable flat-panel antennas with satisfactory performances."

Morris amplifies their points when he says that as LEO satellites rise and set, the time that an individual one is visible may be between 10 and 25 minutes. "So that traffic is not interrupted, it is likely that there would be two antennas at

the Earth station location, one online and one off-line, where they hand-off traffic as a 'new' satellite rises and an 'old' one sets."

For Morris, connecting with moving satellites implies more complex and currently more expensive ground segment equipment. He reckons this may initially limit LEO's use to markets where the benefits of low latency can command a premium price.

Others may not agree here, especially with companies such as AddValue, Hughes Network Systems, Isotropic and Kymeta who are all making significant in-roads into developing the ground technologies that will be needed to support LEO constellations and applications.

It's all about the app

For SatADSL, the most important advantage of GEO satellites over LEO and MEO comes when you need to transfer a single content to many users in real-time. "This is the case with linear, real-time television" say De Vos and Sansone. "This is the killer application of GEO satellites and, at least for these types of applications, GEOs are here to stay."

Kirillovich is likely to support this argument, and says GEO constellations have the added advantage of having a track record that spans more than half a century. "They have been changing and adapting to the market, starting from 16m antennas working in C-band in the past and now reaching 0.6 cm antennas working in Ku- or Ka- bands, with RF costs below USD100.

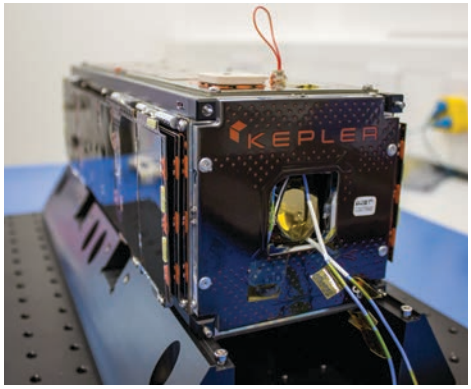
"GEO has always produced an innovative response to market challenges – the latest response for better throughput requirements was GEO HTS, which can accommodate hundreds of Gbps or even a Tbps on a single satellite.

"In combination with GEO wide beam satellites, GEO HTS can also provide almost global coverage and a massive throughput delivering true broadband connectivity to the places where it is needed. To reach global coverage, you need to launch just three GEO satellites. In LEO you will need hundreds of them."

Ultimately perhaps, the industry should not be arguing about LEO versus GEO and the prospect of a looming 'format war' in space. What's clear is that each orbital sector is good for different applications

Caroline De Vos, COO and co-founder, & Fulvio Sansone, CTO and co-founder, SatADSL

"Linear, real-time television is the killer application of GEO satellites and, at least for these types of applications, GEOs are here to stay."



Kepler successfully launched its first satellite, KIPP, in January 2018. It will launch two more proof of concept spacecraft before rolling out its 140 satellite GEN1 constellation in 2019. Each CubeSat will be around the same size as a loaf of bread.

Kepler's Mitry admits that the ground segment for LEO always needs some tracking mechanism, whether it be mechanical or electrical. While this makes LEO satellites less suitable for fixed applications, he says they are "very suitable" for mobile applications which, regardless of LEO or GEO, need ground antenna tracking.

LeoSat's van der Breggen lends his weight to the argument and says: "GEO satellites are mostly used for communications connectivity for remote regions where fibre cannot reach and for broadcast applications. So GEOs are superior for broadcast but inferior for data, hence they are losing to fibre all the time. For data communications, the simple answer is that GEO constellations cannot beat LEO or MEO.

LEO constellations such as LeoSat, at an altitude 25x closer than GEO, have many advantages when it comes to throughput, latency and true global coverage and can provide the type of networks required for true data networking.

"LeoSat's solution means that satellite, rather than being considered as a last resort for data networking, can become superior again and the solution of choice, reclaiming its position and staying relevant in tomorrow's world which is about data, not video."

When fully operational, van der Breggen claims LeoSat will provide point-to-point data connections to and from anywhere on Earth without the need for any terrestrial landings or transport. Combining what he describes as "advanced" on-board routers with inter-satellite laser links, van der Breggen says LeoSat will provide low-latency and gigabit per second data delivery which is "ultra-secure and extremely resilient", thanks to its gateway independent meshed-network data-connectivity from transmitter to receiver.

"The unique features of LeoSat's system – ubiquity, low-latency, speed and cyber security – are ideal for a number of applications, such as: enabling global 4G and 5G satellite connectivity for cellular operators; providing the bandwidth required for energy, maritime or financial sector operations; delivering secure networks for government and defence communications; ensuring critical emergency communications; and enabling internet access and connectivity for remote communities.

Meanwhile in January, Kepler successfully launched *KIPP*, its first spacecraft. "Today, *KIPP* is the only provider of pole-to-pole high-capacity Ku-band satellite services," says Mitry. "We deliver store-and-forward communication services to remote customers that lack access to terrestrial networks and have bandwidth constraints with its current satellite providers. As we roll out our constellation we will incrementally service other markets as well, such as M2M and IoT."

Kepler's second spacecraft, *CASE*, is scheduled for launch later this year. Mitry explains that each spacecraft is approximately the size of a loaf of bread and built based on the standardised CubeSat form factor.

"These sister satellites will perform a technology demonstration mission of the performance of our low Earth orbit communication system. We are launching our third satellite, *TARS*, next year. *TARS* will expand upon the capabilities of *KIPP* and *CASE* and deliver narrowband connectivity services for IoT devices."

TARS will be the final prototype prior to Kepler's roll out of its *GEN1* constellation beginning in 2019. It will establish the capacity and performance required from the company's future constellation of 140 satellites.

In the meantime, SatADSL is keeping an eye on the LEO market and says its customers are certainly interested in the platform. De Vos and Sansone say the company has developed a *Cloud-based Service Delivery Platform* which enables it to be technology, frequency, satellite and orbit agnostic. "If and when operators are able to fulfil the promises they make, LEO will be an additional opportunity for SatADSL to provide high-quality services. We're working to ensure our platform can seamlessly integrate with future LEO constellations with the objective of adding LEO-based services to our portfolio – just as soon as bandwidth will be made available by LEO operators."

And despite RSCC's passion for GEO, the company has not dismissed the possibility of using other orbital planes. While the operator's fleet is still relatively new, having been renewed in 2013-15, Kirillovich says non-GEO spacecraft will be a part of the development strategy by 2023.

"Non-GEO has got only one advantage over GEO – coverage on the poles and a better elevation angle at northern latitudes. RSCC's primary domestic market is Russia where the majority of territory is located above parallel 50N, so the elevation angles from GEO are below 30°. Taking this into account, RSCC plans a regional constellation of four satellites at highly elliptical orbit (HEO), which provides ideal elevation angles over Russia."

Kirillovich says RSCC's main target for its HEO satellites – named *Express-RV* – will be mobility users (trains, buses and ships). He believes that a non-GEO constellation can offer supplementary support to a GEO operator and improve the quality of services for customers in certain vertical markets, such as mobility. "Undoubtedly, if any of the new mega [LEO] constellations come into being, they will be a good add-on to the

Security without strings attached

Surabaya is Indonesia's second busiest shipping port, and now has wireless infrastructure from InfiNet Wireless to support its video surveillance systems and data networks.

From cities to war zones, wireless technologies are crucial in helping to keep people safe.

Kurnool City is a major metropolis in the south-eastern Indian state of Andhra Pradesh. With the city emerging as the primary hub for agricultural and industrial development, the local municipal corporation has begun focusing on enhancing quality of life for citizens, and developing the area into a leading participant in the Indian government's Smart City programme.

With rapid population growth, new businesses entering the commercial district, and an increase in tourism, city leaders found that they needed to increase public safety measures. They therefore decided to add video surveillance to provide the city's first responders with round the clock information. Brihaspathi Technologies was contact to design and implement a solution that would cover the city.

Based in Hyderabad, Brihaspathi Technologies specialises in IT solutions such as software development, apps, GPS, among others, and claims to have more than 3,900 clients spread across various industries and vertical market sectors. MD Rajasekhar Popolu also claims that his company has "rich and valuable" expertise in offering end-to-end CCTV surveillance solutions.

He goes on to explain that Brihaspathi chose equipment from Cambium Networks for Kurnool City's video surveillance system. "We used Cambium Networks' wireless broadband connectivity in the 5GHz frequency to connect 120 closed circuit cameras at 30 intersections. There are three central monitoring stations, each with multilevel data storage to maximise security. This combination of cameras, infrastructure, and monitoring gives us a world-class solution."

For the communications infrastructure, it was important that the system provided high performance and was scalable to support growth as the network continued to grow. Brihaspathi chose Cambium's *ePMP 1000* connectorised access points with synchronisation, and *Integrated ePMP* subscriber modules. The vendor's *LINKPlanner* software was used to develop the network design and model system performance.

Popolu says: "Based on the design model, we could support all of the 120 cameras and have complete city-wide surveillance with FIVE *ePMP* AP locations and 30 *ePMP* [subscriber modules]."

The radios operate at 2.4GHz and 5GHz, and are said to offer 100Mbps throughput in a 20MHz channel. "The video surveillance system allows for intelligent traffic management, and the images are consistently clear," says Popolu. "The system will scale for expansion, and provides IP bandwidth that is leveraged for interoffice connectivity."

He adds that because it is IP-based, the system can be leveraged for multiple purposes. "The city is able to use the network for video surveillance and traffic management. [It] is also able to be leveraged for other applications such as internet access, audio conferencing, video conferencing, geo-tagging, and GPS tracking."

From Brihaspathi's perspective, Popolu reckons the installation was "easy" and was backed by support from Cambium. But because the solution itself was complex, he says planning was vital to success. Brihaspathi cites three main factors that contributed to the success of the deployment: (1) a detailed site survey which identified specific locations with line of sight connectivity; (2)identifying the optimal location of access point equipment to provide connectivity to all of the subscriber modules; and (3) professional support from Cambium Networks to guide technicians in designing, installing and delivering the solution.

Since the initial installation, Kurnool City Municipal Corporation has contacted the company again to expand the network's coverage to include new areas.

Improving vessel traffic system for Indonesia's busiest port

The city of Surabaya on East Java island is home to some six million citizens, making it Indonesia's third largest city after the Greater Jakarta and Greater Bandung metro areas. It is also home to Distrik Navigasi Kelasi I, the country's second busiest shipping port which is run by the Ministry of Transport, and is used for exporting mainly tobacco, sugar and coffee to all parts of the world.

Before InNetWireless was consulted in 2016, Surabaya Port already had a vessel traffic system (VTS). But unfortunately, this did not support the current recommendation by the International Association of Lighthouse Authorities (IALA) for operational and technical performance.

Cambium Networks' wireless broadband connectivity from Cambium Networks connects 120 closed circuit cameras at 30 intersections in the city.

One of the biggest problems the local port management company experienced was that its existing platform did not have ENC (electronic navigational chart) map integration. Instead, it used *Google Maps*. While these are permissible, they are not as accurate as other map systems, meaning that shipping companies could run into legal difficulties when claiming for compensation in the event of an accident.

Another driving factor for the upgrade was due to the fact that the port's VTS platform was based on old microwave links. This had very limited bandwidth that was needed in order to transmit significant amounts of data including communication with ships, radar locations and CCTV footage.

InfiNet's partner in Indonesia, Warga Kusuma Jaya, specialises in VTS integration and has maintenance contracts for more than 20 existing deployment locations around Indonesia. It was approached by the port authority to conduct an audit of the existing infrastructure and to identify suitable solutions that could handle high-speed data transmissions. A minimum bandwidth speed of 20Mbps was required for the VTS to fully function.

One of the greatest challenges presented by the project was the distances that needed to be covered, and for the operators being able to adequately transmit over a 60 per cent line of sight due to difficult ground topology and transmission across water. A solution based on InfiNet's products was proposed in order to provide the port operators with a stable platform, enabling multiple high capacity connections to be seamlessly established with all remote locations and capable of transmitting very large volumes of real-time data over short and long distances. The main applications that needed to be migrated onto the new platform included CCTV monitoring, vessel radar tracking, two-way voice communication as well as the main VTS database itself.

The first trial undertaken by the port authority consisted of a single link to connect, in a point-to-point topology, the Port of Surabaya with the remote lighthouse located in Sembilangan, replacing the previous microwave links. To further complement this link, an *InfiMAN* 2x2 base station and *InfiniLINK* 2x2 point-to-point wireless units were installed and used to connect a third location at Karang Jamuang. This small network alone covered a total area of 20 nautical miles (around 37km) and far exceeded the required minimum of 20Mbps.

By using InfiNet's wireless solution, it's claimed the port authority was able to deploy the selected solution in record time. According to the vendor, the port now benefits from greater efficiency and productivity thanks to the flexibility offered by the fully integrated solution. InfiNet says its has enabled the seamless transmission of data from three different radars, a number of cameras in the port itself and all along its perimeter fence, a remote location weather station as well as two automatic identification systems (AIS) located in a distant site.

Because of the difficult terrain which included the need to transmit over water, installers had to overcome the major challenge of very limited line of sight for the radio equipment.

With this new solution in place and the higher performance it offers, Distrik Navigasi Kelasi I is now able to transmit all CCTV footage, including footage in unmanned areas, with a 30 to 40 per cent spare capacity to cater for any future data transmission requirements.

Warga Kusuma Jaya project manager Imran Akram says: "Not only did we manage to provide Surabaya Port with the required bandwidth capability it needed for the VTS systems to run correctly, but we have also future-proofed the whole wireless infrastructure network for further expansion."

Secure mission critical comms for US military in Afghanistan

Proactive Communications (PCI) is said to have built-up a reputation as a trusted resource for satellite communications in the most demanding situations and harshest environments.

The US-based company aims to deliver reliable and secure enterprise-class communication capabilities to government agencies, military and corporate entities around the world. It is contracted by the US government to provide vital communications support to the US military in war zones in the Middle East.

Mission critical comms in war zones require constant transmission and delivery of highly sensitive and secure information. Speaking at the time, Marc LeGare, who recently retired as PCI's CEO, said: "Our customers are completely reliant on us for satellite communications, and meeting their needs in their difficult and dangerous environment is a paramount consideration."

As a result, the company was looking for a partner that could provide both effective breadth of coverage in challenging and remote locations, as well as being able to provide significant depth in satellite and engineering expertise for the ongoing project.

The solution came in the form of SpeedCast which delivered C- and Ku-band coverage from its Australian teleport in Adelaide, as well as fibre backhaul technology. As well as providing the service SpeedCast also custom-designed a system that fitted with PCI's requirements securely and cost effectively. It enabled PCI to provide critical communication needs in the deployment of rapid tracking terminals, VoIP, unified communications and private secure networks, using what's claimed to be "state-of-the-art" platforms such as modems from ComtechEF Data and Paradise, as well as iDirect's DVB-S2 hub technology.

According to SpeedCast, one of the key reasons it was selected for this project was because of its "unrivalled" service coverage in the Middle East from its "world recognised" teleports and satellite infrastructure. It says the Adelaide teleport is one of only a few US military accredited global access points, which meant SpeedCast was able to meet the stringent security criteria required for the country's military operations.

The company goes on to boast that its ability to deliver "industry leading" technical and engineering support made it an ideal choice for PCI. SpeedCast adds that as part of its overall service proposition, its aftermarket support also meant it was "perfect" choice for PCI from both a business as well as an operational point of view.

It further claims that its experience and expertise eliminated the need for third party consultants and associated costs, thus dramatically improving PCI's return on investment.

Mission critical comms in war zones require constant transmission and delivery of highly sensitive and secure information.

"I can directly attribute a sizeable impact on our business having SpeedCast as our business partner," said LeGare. "They have provided the capacity for our growth and I'm able to do about USD10m because of their solutions." ■

Riding the new technology wave

New research places the maritime sector either on a par with or ahead of other key markets for Industrial IIoT adoption, as RONALD SPITHOUT explains.

The maritime industry may be at a more advanced stage of readiness to adopt the Industrial Internet of Things (IIoT) and its analytic, management and operational tools than many have supposed.

In July, Inmarsat published the 2018 edition of its *Industrial IoT on Land and at Sea* research report. It explores IIoT trends across the maritime, transport and logistics, energy, mining and agriculture sectors, and is based on 750 interviews conducted by Vanson Bourne. These included 125 maritime respondents working on container ships, tankers, bulk carriers and offshore vessels.

According to the report, the IIoT is set to play a profound role in providing end-to-end transparency across supply chains and improving their efficiency. It says: "We are reaching a point where all events in a supply chain will be captured as data by nerve-like sensors, before being routed for analysis and actioned."

Resource efficiency, improving health and safety, and the monitoring of environmental change are identified as the top three drivers for IIoT-based solutions across all sectors.

The study shows 21 per cent of respondents having fully deployed IIoT solutions of one type or another, 25 per cent trialling them, and a further 10 per cent saying they will deploy within six months. However, it also reveals that adoption levels are inconsistent across the sectors surveyed, with the mining and energy industries so far showing much lower levels of adoption than transport and maritime.

In general, the researchers found that respondents closer to consumers are likely to have the strongest and most developed strategies for data use. It is therefore understandable that, of the sectors studied, the part of the transport industry involved in mass transit and the distribution of finished products exhibits exceptional IIoT readiness: 40 per cent of transport respondents feature among the survey's 'leaders' while a further 30 per cent are described as 'progressives'.

However, the transport sector is highly segregated, with mass transit significantly ahead of parts of the freight transport market when it comes to IIoT engagement. Only 19 per cent of businesses within the freight sector and 22 per cent of those in the container sector said that they had fully deployed IIoT solutions. That compares to 64 per cent of the mass transit sector who reported full deployment, with the remainder planning to do so within 12 months.

Despite, or perhaps because of, the rise of online shopping, the report indicates that low margins are hindering IIoT adoption in the 'last mile' transport sector, although the researchers predict rapid change is coming in this part of the supply chain.

Maritime is special

Industrial IoT on Land and at Sea considers the maritime industry separately, and arguably offers the most detailed account ever of the sector's attitudes towards the IIoT, while also putting digital penetration among ship owners in the context of other markets that Inmarsat has experience of.

By its very nature, maritime's journey towards digitalisation is 'special' because its connectivity options are more limited. Fifty-one per cent of maritime respondents rank satellite connectivity as 'number one' by usage, while 69 per cent say they rely on the technology to support their IIoT-based solutions.

In findings that challenge the received wisdom of shipping as a 'backward-looking' business when it comes to digitalisation, the study suggests that actions by the sector's thought leaders mean that the industry as a whole is ahead of many of its customers on IIoT uptake.

However, more stereotypically, the shipping sector also finds room for a sizeable rump of IoT 'laggards' whose resistance to change will ensure that the wider transport industry stays ahead of its maritime component on digitalisation for the foreseeable future.

In some ways, variations in shipping attitudes are inevitable as reflections of the industries with which they engage. For example, as a core contributor to the dry bulk sector, agriculture is at the earliest stage of investment in the IIoT, with 80 per cent of those surveyed characterised as 'starters' in the investment cycle. This contrasts with the maritime industry, where around 35 per cent are considered starters in investment terms, against a 53-54 per cent 'progressives' constituency. In the mining industry, around 42 per cent of respondents are identified as IIoT starters while 39 per cent are progressives.

These findings put shipping ahead of the curve in terms of IIoT investments. But the positives need to be qualified – for example, where around eight per cent of the study's respondents overall could be described as IIoT investment 'leaders', none of these came from the maritime group (a small number of leaders were found in the mining sector). Meanwhile, 10 per cent of ship owners and more than 10 per cent of mining respondents are described as IIoT investment 'laggards': proportionately, this is twice the size of the overall 'laggard' constituency, demonstrating how both sectors provide a haven for intransigence.

Of course, investment perspectives can change: for example, with 77 per cent of respondents from agriculture and 84 per cent from mining 'agreeing' or 'strongly agreeing' that the IIoT will revolutionise their industries, there appears to be a clear realisation that change is in the wind.

Sector priorities

A survey of drivers for IIoT uptake across shipping's customer base not only offers a chance to evaluate motivations but also, for the more competitively-minded, presents an opportunity to identify areas for empathy.

For example, those involved in the bulk

shipping sector may be interested to learn that around 50 per cent of respondents from agriculture identify environmental monitoring (of soil and weather conditions) as a main driver, while 44 per cent pinpoint the IIoT's potential to reduce operational costs. However, while 64 per cent believe the IIoT will help them gain better insight into their supply chains, only nine per cent have actually achieved this objective so far.

Meanwhile in the mining sector, the priority for IIoT focuses on tracking and smart monitoring. Like its maritime counterpart, this customer base is attracted to the health and safety benefits associated with wearable technologies.

Respondents from the energy sector span industry roles from exploration through to distribution, so it is no surprise to find a range of attitudes here when it comes to the IIoT. For instance in exploration, IIoT can help to accelerate and enhance seismic performance data acquisition and analysis to improve production performance. In both exploration and extraction phases, however, health and safety benefits such as wearable technology are cited as key by 50 per cent and 60 per cent of respondents, respectively, while monitoring environmental changes are respectively cited by 53 per cent and 58 per cent. Further downstream, IIoT sensors can help to optimise supply and demand forecasting, as well as pipeline operations.

Collectively, the study identifies two major aspects of IIoT readiness among the organisations underpinning shipping's oil and gas cargoes. First, they are further advanced in their commitment and attitudes towards digitalisation than their dry bulk peers, with 50 per cent of energy respondents among the survey's 'progressives'. Secondly, 90 per cent of energy respondents believe that the IIoT will be essential for gaining a competitive advantage.

From the maritime perspective, one of the most striking findings is that ship-owners expect average expenditure per business on IoT-based solutions to amount to USD2.5m over the next three years as part of their IT expenditure. In absolute terms, the more mature energy and transport sectors predict higher average spend over the period (USD4m and USD3.5m, respectively), while the figure for agriculture is significantly lower (USD1m).

Maritime respondents also say that they intend to invest a larger share of their IT budgets (7.8 per cent) in IoT-based solutions than in any other 'next generation' technology. Maritime therefore achieves a middle ranking when it comes to the 7 to 9 per cent range of IT budgets set aside by all sectors for IIoT. However, IT spend may not account for all maritime spending on IIoT, where ship connectivity costs cut across the operations, training and safety budgets that often sustain the adoption of new technologies.

Furthermore, analysis also places maritime ahead of agriculture, mining and even energy when it comes to specific attitudes towards IoT-based solutions, with 34 per cent of maritime respondents indicating that they have an IIoT solution under 'full deployment'. By their own testimony, driving these 'leaders' is the need for ships to be more cost

efficient, cleaner and safer than ever before, with 56 per cent of maritime respondents already using or trialling smart asset monitoring.

Drilling further down into the report, owners show themselves as upholding the maritime industry's decade-long fixation with costs. While 51 per cent of respondents say that revenue generation does not figure in considerations, 75 per cent say that they have realised, or expect to realise, savings using the IoT. Route optimisation is typical and is identified by 57 per cent as in use or on trial.

Environmental agenda

Emissions also matter: the environmental agenda is a key driver for IIoT adoption in the land-based and mass transit sectors, with 61 per cent of respondents saying that monitoring techniques such as emissions sensors provided primary motivation for IIoT adoption.

In the maritime sector, regulation coming into effect over the short term is providing an extra prompt for adoption. In line with global fuel sulphur limits from 2020, the International Maritime Organization's target to halve ship CO2 emissions by 2050 and use EU Monitoring, Reporting and Verification for fuel use, 65 per cent of respondents say they already use IoT-based solutions to monitor consumption. A further nine per cent say they will do so within a year, with deployments projected to reach 100 per cent by 2023.

However, maritime respondents also exhibit a marked ambivalence towards IoT-based solutions that is unique to the sector: enthusiasm in some quarters is tempered, in that the industry is also home to the largest group of IoT 'laggards' – a description applied to more than 25 per cent of respondents. Even the least prepared organisations in the neighbouring mass transit and inland distribution sector said that they would deploy IIoT-based solutions within two years.

In the cost-conscious world of shipping, one explanation may be that while 33 per cent of respondents believe that IoT solutions will bring 10-20 per cent savings within five years, their potential to create new revenues is considered only half as likely, while 14 per cent of respondents believe that – even five years out – there will be no savings at all. Some 54 per cent of peers in the mass transit and inland distribution industries identify improving resource efficiency as a primary driver for IIoT adoption.

But direct operational savings are not the only savings available from deploying IoT-based solutions in the maritime sector. Cutting marine insurance premiums is cited by 70 per cent as one of the most important drivers for adoption. This finding is especially interesting because the industry self-selects as a 'laggard' when it comes to taking steps to remedy its cyber security shortcomings, even though this topic is one of the fastest growing areas of business for insurers.

Cyber awareness

Maritime respondents are more concerned about data storage methods (55 per cent), network security (50 per cent) and potential mishandling of data (44 per cent) than they are about targeted attacks (39 per cent). Even so, only 37 per cent report initiatives to improve security training, with just 25 per cent working on new IoT security policies.

Maritime's inward-facing security concerns are therefore distinct: respondents in the energy sector (48 per cent), transport (52 per cent) and mining (64 per cent) most frequently cite the threat of external cyber attacks as among their biggest security challenges.

The industry's lack of cyber preparedness raises a deeper malaise over more full-blooded commitment to IoT-based solutions in some quarters: overall, the industry's lack of decision-making skills is the most frequently cited impediment to uptake (by 56 per cent of respondents). Maritime also identifies itself as behind the curve when it comes to planning skills, where 42 per cent of respondents believe their organisations would benefit from additional skills against a figure for all respondents expected to amount to 37 per cent.

Once more, however, these findings should be considered in context: across all sectors, the lack of in-house skills was identified as a brake to IIoT uptake.

A different frustration appears to be thwarting ambitions among those already fully engaged in IoT-based solutions. Here, 51 per cent of maritime respondents cited the time lag between data collection and its availability as the biggest obstacle blocking their optimisation of IoT-based solutions. This is despite the finding that only 20 per cent of maritime respondents cite connectivity issues as a barrier to adoption of IoT-based solutions within their organisation – lower than any other sector.

However, to assess the maritime industry's readiness to adopt IoT-based solutions on owner testimony alone is to overlook a mature quirk of the maritime industry: much of the technical expertise historically held in-house has been outsourced to ship managers and equipment suppliers. Marine equipment can contribute 70 per cent of the value of a new ship, meaning that it has been suppliers, rather than owners, making the running on connectivity, Big Data analytics, and app-triggered remote diagnostics and preventive maintenance.

Therefore, while lack of skills and siloed knowledge are acting as a brake on IIoT uptake in the supply chain, the willingness of 64 per cent of maritime respondents to consider external partners for some or 'as much as possible' of their IIoT facilitation may, in the long term, be more a benefit than a block. ■

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Africa's first commercial 5G service

Vodacom has launched Africa's first standards-based, commercial 5G service. Its subsidiary in Lesotho is using 3.5GHz spectrum to initially deliver fixed wireless access broadband services to two enterprise customers.

While the operator has not named the firms involved, a spokesperson said: "[They are] two major customers in the mining and banking industries who were chosen due to their relative size and influence in the country. We are working closely with them to deploy the service based on their requirements." No further details about the number of users involved or what devices they are using were revealed.

Vodacom Lesotho said the immediate benefit of 5G technology for its subscribers includes the quicker deployment of broadband services with "fibre-like" speeds. The company added that with early access to the technology, entrepreneurs and the government will be able to work with it to develop and incubate innovative applications to power digital transformation in the country.

Meanwhile, Vodacom is claiming another 5G first, this time in South Africa with the deployment of the same standards-based technology as used in Lesotho. This followed the cellco being granted a temporary spectrum license of 100MHz in the 3.5GHz band to showcase 5G network capabilities in South Africa.

Vodacom has deployed advanced 5G Massive MIMO to provide improved spectral efficiency and coverage, enabling increased network capacity. It said its network is delivering speeds in excess of 700Mbps and latencies of less than 10 milliseconds. The company added that it will exceed 1Gbps as new software versions and devices become available.

Vodacom Group CTO Andries Delport presents the speeds achieved in the South African trial. The tests were conducted over a live 5G mobile network and independently evaluated by test experts MyBroadband and Ookla.

Sudatel aims to be region's "most admired" ICT provider

Sudatel has begun trialling 4.5G, 4.9G and 5G technologies along with fixed FTTH in an effort to boost mobile and residential broadband in Sudan. Under its *2020 Strategy*, the company is focused on transforming its fixed access and mobile service offerings.

The operator will conduct several different use-case tests using Nokia's fixed and mobile technologies in the vendor's labs in Finland and Belgium.

With an initial focus on enhancing mobile data services in Khartoum, Sudatel will evaluate how Nokia's *AirScale* RAN portfolio can increase capacity and speeds today while providing a path to 5G in the future.

In July, Sudatel also started trialling high-speed fixed technology in Khartoum, using Nokia's PON fibre solutions for residential broadband. Sudatel Telecom Group president and CEO Tarig Hamza Zain El Abdein said: "Bringing Nokia's technology expertise and innovations to Sudan is very strategic for us in the execution of our vision of becoming the most admired ICT provider in Africa."

El Abdein also hopes that working with the vendor for the development of ultra-broadband services will contribute to enhancing Sudan's ranking in the UN's *Broadband Development Index*. This measures how much progress member states have made in terms of increasing access to ICT and the internet.

In the 2018 index report published in July, Sudan's sustainable development goal global rank is given as 143 (out of 156). The proportion of the country's population using the internet is 28 per cent, while mobile broadband subs per 100 inhabitants is 25.8.

Telenor Group to coordinate pan-European 5G project

The EU has given Norway's Telenor Group coordination responsibility for its new project to accelerate the uptake of 5G.

The 5G Verticals *INNovation Infrastructure* (*5G-VINNI*) initiative comprises 23 partners including major operators, academia and industry vendors. It is designed to ease uptake of 5G in Europe by providing an end-to-end facility that validates the performance of new technologies, and explore solutions for vertical industries such as public safety, e-health, shipping, transportation, media and entertainment, and automotive.

The EUR20m project will be run for three years at four main sites located in Norway, UK, Spain and Greece. In addition, experimental sites will be established in Germany and Portugal. Open APIs will be provided in order to ensure easy access to the *5G-VINNI* facility.

The facility in Norway will be run by Telenor Research, Telenor Norway and Telenor Satellite. It will be hosted in two locations: Kongsberg, the first city where Telenor will pilot 5G in Norway; and another unnamed site in the greater Oslo area. Ericsson and Huawei will supply 5G radios and core, Cisco will deliver a distributed IoT data fabric service, while Nokia will provide the virtualisation platform and end-to-end orchestration.

VP of Telenor research Patrick Waldemar will manage the project. He says: "Being one of three large-scale test platforms for Europe, 5G-VINNI will help propel the development of 5G. Our aim is to make it as easy as possible to utilise and test the platform and we now call on industry players to engage with the project."

Orange claims first with cloud RAN trial in Poland

Orange has completed a network trial in Poland to validate the benefits of cloud-optimised RANs for the smooth evolution to 5G technologies.

It's claimed that the trial, which was carried out on a live network carrying commercial traffic, was the first of its kind in Europe that used an operator's own infrastructure.

It took place from March to the beginning of May with radio sites in the city of Chelm. The virtualised part of the baseband was running around 70km away in a data centre in Lublin.

Orange used its *NGPop* cloud infrastructure together with Nokia's equipment such as the *AirScale* virtual cloud base station for 4G and 5G.

Orange says it worked with Nokia to test cloud RAN technology to prepare for the eventual introduction of a distributed cloud architecture for 5G. Nokia claims *AirScale* provides capacity where needed and paves the way for 5G access technology as part of a multi-layered architecture. According to the vendor, its base station architecture splits baseband processing functionality across the cell sites and data centre. Time-critical functions are performed at the cell site and connected via Ethernet fronthaul. Nokia says this allows the operator to use its existing transport network, while centralised software hosted at the data centre "cost-efficiently" performs non real-time functions.

Nokia's AirFrame data centre platform features pre-integrated racks with what's said to be ultra-dense servers (pictured), high performance switches, and software defined storage.

The company claims its cloud base station provided "equally strong" network performance on both its reference cloud infrastructure as well as on Orange's own cloud environment.

Huawei claims news speed record in Tunisia

Huawei has claimed a new throughput record for Tunisia following a test of all LTE technologies carried out in the country at the end of May.

Working with Tunisie Telecom, the vendor tested 4-transmit-4-receiver (4T4R) antenna technology, CA and 256 QAM. Huawei said that during the demo, a single user peak throughput speed of 706.14Mbps was achieved – the fastest so far on a commercial network in Tunisia.

Tunisie Telecom is planning to build a large-scale 4T4R network with Huawei this year in a bid to deliver what it says is an "optimal" LTE experience for subscribers, as well as create the country's fastest network. Data flow of usage per user is said to have reached 4GB in Tunisia, while LTE traffic volume is expected to increase by 370 per cent in 2020.

The operator's CEO, Fadhel Kraiem, said: "Spectrum resources are fully utilised to ensure that our network is more efficient. In addition, large-scale 4T4R network deployment allows us to be fully prepared for an evolution towards a new 5G era."

According to Huawei, 4T4R increases network capacity by up to 80 per cent without adding extra spectrum or sites, greatly improving spectral efficiency. It adds that 256QAM is also a proven technology that can effectively increase peak data rate by 33 per cent.

Saeed Xia, the vendor's general manager in Tunisia, said: "Huawei 4T4R solution has been extensively deployed worldwide. We believe that this solution perfectly complements Tunisie Telecom's network development strategy and is an important tool to help maintain a leading competitive edge."

In a separate development, Sparkle has upgraded Tunisie Telecom's international IP transit connectivity through the activation of a 100G port at its Sicily Hub in Palermo. The new port represents the operator's main trunk to Europe and will support increasing demand for digital content and advanced IP services in North Africa.

UK's "smartest" street showcases IoT

Mosley Street in the city of Newcastle, north-east England, is said to have become the UK's smartest street following an IoT deployment to showcase the possibilities of smart city technologies.

The project combines live and historic data on the street from several sources, including Newcastle University's Urban Observatory which is said to house the UK's largest set of real-time urban data.

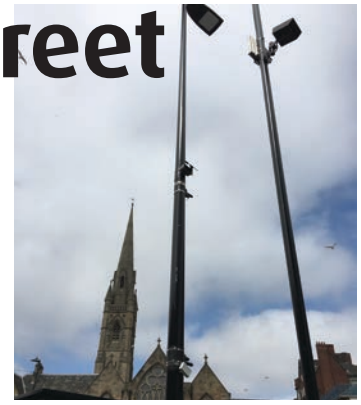
The smart city applications being showcased include: using data trends to predict whether drivers will be able to find a parking space; using predictive analytics to enable power companies to manage energy consumption more effectively and improve safety with lighting; collecting and analysing environmental data to help find the causes of pollution; amongst others.

All of the applications are facilitated by the *Cisco Kinetic for Cities* (*CKC*) platform which is said to securely connect data from all kinds of devices, sensors, cameras, applications, etc., in an open standards-based infrastructure.

Connexin has designed and built the infrastructure to support the solutions in Newcastle. It has integrated sensors and cameras onto the network, providing a dashboard via *CKC* where data can be tracked and monitored.

Other partners include Mayflower which has supplied its *Central Management System* to provide remote control, monitoring and energy measurement of street lighting over a wireless interface (ZigBee/GPRS).

As the integration and AI partner for the project, Quantela will utilise its *Atlantis* platform to deliver descriptive, predictive and proscriptive analytics for domain specific and cross domain use cases.



There are five of Clarity's AQ air pollution sensors deployed across the city as part of the IoT showcase.

In 1879, Mosley Street became the world's first street to be lit by an incandescent lightbulb. According to Cisco, it will now achieve another feat as the UK's smartest street.

Nationals hit a home run with DAS

A new wireless network can now support more than 41,000 spectators at Nationals Park, home to the Major League Baseball (MLB) team, the Washington Nationals.

MLB sponsor T-Mobile led the effort to ensure that previous communication issues would be resolved by using JMA Wireless' *TEKO* distributed antenna system (DAS). This has replaced two older DAS networks that were not meeting the growing needs of the venue's staff and patrons.

JMA says the newly expanded 24-sector wireless system was deployed throughout the venue within 65 days during the off-season, and has several new capabilities including MIMO functionality and faster LTE speeds.

According to the vendor, *TEKO* is designed to support four carriers along with multiple bands ranging from 700MHz to 2.5GHz, as well as LTE, CDMA, EVDO and UMTS. It says the modular platform completely fits into the room at the head end, ensuring the minimum amount of valuable onsite real estate is used for housing technical equipment.

JMA worked with New Jersey-based indoor wireless infrastructure specialist Multipath Communications Group on the deployment which included the installation of more than 400 antennas. Additional antennas were required in the upper seating areas, and to meet stringent requirements, JMA says it provided smaller, customised antenna enclosures that were approved by the MLB.

Freight company connects with IoT

European railway freight carrier, DB Cargo, will use embedded IoT enablement technology from Eurotech to gain insight on the real-time status of its locomotive fleet.

A subsidiary of Deutsche Bahn, DB Cargo is said to be Europe's market-leader in rail freight transport. The Germany headquartered company has around 4,200 rail sidings, 93,000 freight wagons, and 3,000 locomotives.

As part of investing in the technology of the future, DB Cargo is digitalising its locomotives, freight cars and processes in the marshalling yards and workshops. It will install Eurotech's *BoltGATE 20-25* as the intelligent IoT Edge gateway on at least 450 vehicles. The vendor says this railway-certified on-board computer is designed to meet the demanding requirements of rolling stock installations. It is said to provide on-board functions for safe non-invasive signal sampling and recording of multifunction vehicle bus data, as well as features for real-time data communication.

The *BoltGATE 20-25* is powered by Eurotech's *Everyware Software* IoT Edge framework. DB Cargo will also leverage the vendor's *Everyware Cloud* IoT integration platform.

DB Cargo will use Eurotech's BoltGATE 20-25 IoT Edge gateway and cloud integration platform to gain real-time insights on its locomotives.

UK develops spaceports

The UK is building its first spaceports and plans to develop both vertical and horizontal launch sites. Sutherland on the north coast of Scotland has been selected as the first vertical launch site. It will be developed using initial government funding of GBP2.5m, and plans to use a combination of proven and innovative rocket technologies. Scotland is said to be the best place in the UK to reach in-demand satellite orbits with vertically launched rockets. Commercial vertical and horizontal launch demand is said to be worth a potential GBP3.8bn to the UK economy over the next decade.

Gilat and GSS partner

Gazprom Space Systems (GSS) and Gilat Satellite Networks have signed a contract worth around USD18m to provide broadband connectivity across Russia. Gilat will deliver its multiservice platform and user terminals to operate over GSS' *Yamal 601* Ka-band satellite which is due to for launch in 2019. Its 32 beams will be lit up using two Gilat *SkyEdge II-c* gateways that will be installed in Siberia. GSS and Gilat have also agreed to jointly develop communication projects such as IFC and railway transport.

Al Yah 3 tests completed

After a tricky launch at the start of 2018 which saw it placed into the wrong orbit, *Al Yah 3* has now successfully completed in-orbit testing. At the end of May, UAE-based Yahsat announced that its third satellite was ready to launch commercial services from 20°W. It was expected to go live in August. The company says *Al Yah 3* will offer Ka-band coverage to 19 additional markets across Africa and cover 60 per cent of the continent's people, as well as 95 per cent of Brazil's population.

Avanti leads disaster response project in Kenya

A new satcoms-based initiative aims to enhance Kenya's ability to plan for and respond to disasters.

Funded under the UK Space Agency's International Partnership Programme, the *Satellite Enablement for Disaster Risk Reduction in Kenya* (*SaTDRR Kenya*) project is led by Avanti. It will provide secure fixed and mobile communications for emergency situations via its *HYLAS 2* Ka-band satellite which was launched to the 31°E orbital position in August 2012.

Other project partners include consultants from Torchlight Group, Airbus Defence and Space, Global Radiodata Communications, and the Red Cross Society in Kenya. All will work closely with the country's Ministry of Interior and the National Disaster Operators Centre.

As well as enabling emergency responders and humanitarian organisations to act quickly and effectively on the ground, *SatDRR Kenya* will also provide Earth observation data. Avanti says this will improve Kenya's pre- and post-disaster strategy and planning, allowing end-users to access information on large-scale disasters such as floods and droughts. According to the company, the project will demonstrate how high throughput resilient satellite connectivity and accurate remote sensing data can save lives, as well as reducing the social and economic impact on affected communities.

Avanti adds that access to satellite services will be underpinned by a capacity building and knowledge transfer programme to embed capability which will deliver sustainable benefits to the Kenyan Government and communities.

Police in Paraná join Brazil's TETRA network

The Federal Highway Police (Polícia Rodoviária Federal, PRF) in Paraná state, Brazil, has joined the TETRA communication system that Teltronic is currently deploying. The nationwide network comprises 600 base stations and offers coverage to twelve different states as well as the main Federal District.

Teltronic says its system gives Paraná State PRF higher security thanks to the use of encrypted technology that makes it difficult for outsiders to intercept communications between the officers.

The TETRA network has been described as ''a significative advance'' in the police's operational capabilities''.

At the official opening of the new PRF unit in the city of Cascavel in western Paraná during early May, Brazil's public security minister Raul Jungmann said that the arrival of digital radio to police communications was "a significative advance in integration, technology and operational capabilities". Jungmann was the first to use the new system with a radio call to public security national secretary, Carlos Alberto dos Santos.

Separately, Teltronic says the state of Acre on the border with Peru and Bolivia also has a new digital radio system that enhances communication quality for users. Acre Public Safety delivered the digital radios to both civilian and military police in the area, as well as to the fire department.

Tenda extends Wi-Fi reach with Nova mesh

Tenda Technology reckons the days of boosting Wi-Fi using powerlines and extenders are finished thanks to its *Nova MW3* mesh system.

The China-based equipment maker, which was founded in 1999 but is only now beginning to expand into other regions such as Europe, is hoping to bring its so-called "smart" Wi-Fi system to the masses in Ireland following a recent deal with Dublin-based distributor and integrator, EurAsia.

Tenda says the *Nova MW3* is a 1200Mbps dual band distribution mesh system and claims it can provide whole house Wi-Fi coverage as well as a fast and stable internet connection. The company says a pack of three units provides up to 300m^2 coverage, while a pack of two provides up to 200m^2.

It add that *MW3*s are compliant with IEEE 802.11v and IEEE 802.11r seamless roaming protocols, and also support automatic network optimisation and automatic routing selection. Tenda says they create a self-healing mesh network that uses Wave2 MU-MIMO technology that enables the use of multiple devices at the same time without any lag, interference or signal dropouts.

Users can customise and manage the network with features such as parental control, guest access and UPnP, using a dedicated app that can be downloaded onto *Android* and *iOS* devices.

"The Nova MW3 brings smart Wi-Fi technology to every home user and modern smart home," says Jason Zhao, general manager of Tenda UK&RoI. "We're demonstrating that the era of powerlines and extenders is over, as Mesh WiFi is now available at better value with a better experience."

It's claimed that three Nova MW3 units provide ''robust, reliable and fast'' Wi-Fi coverage across homes of up to 300m^2.

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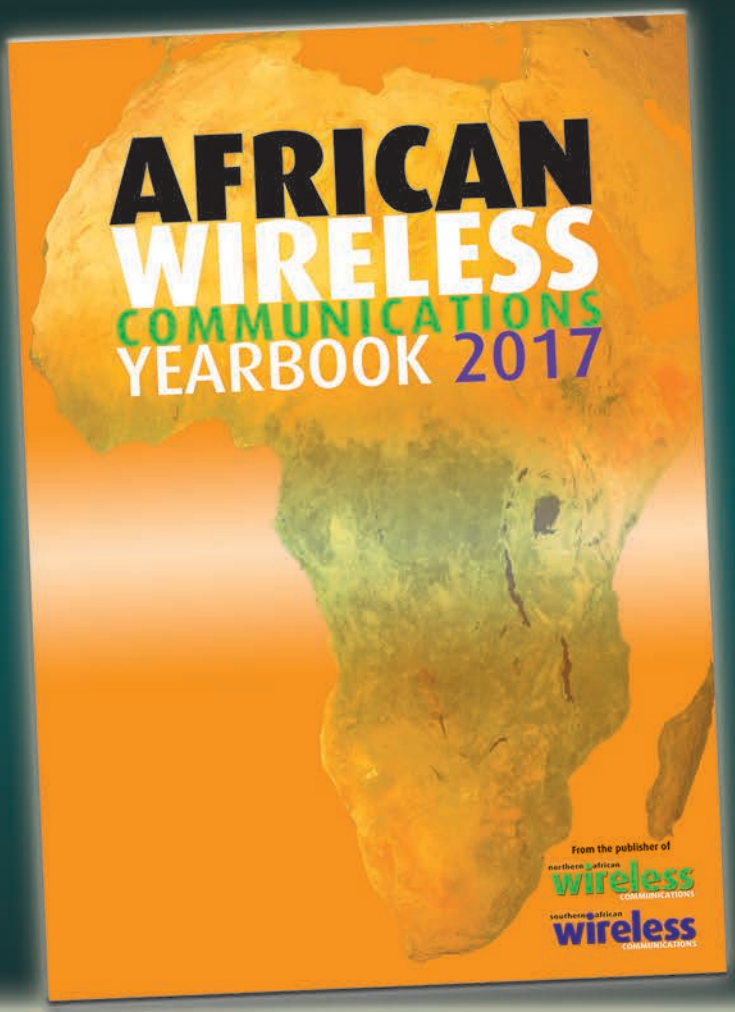

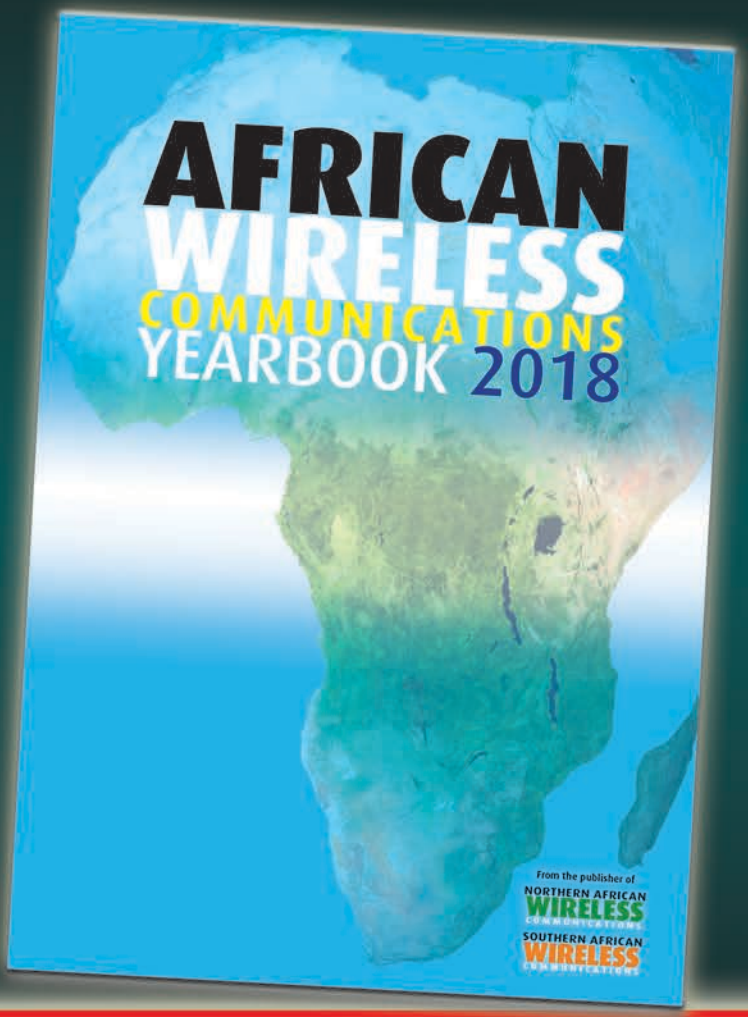

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