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critical comms

Inside

May/Jun 2020

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www.criticalcomms.com.au/magazine

Transmit

No sooner had Australians dealt with one natural disaster — the 2019–20 summer bushfires — when another one, COVID 19, sprang upon us, seemingly out of nowhere. Both crises have inflicted incalculable damage and countless hardships upon lives and livelihoods. All sectors of society have been called upon to respond in their own ways, and the end is nowhere near in sight.

Communications of various kinds have played a vital role in dealing with both calamities. During the bushfires, we saw public safety communications pushed to the limit, and the lack of a public safety mobile broadband capability became all too obvious. It's about time we saw some decisive movement on the latter — Canberra are you listening? And in the strange COVID-19 world in which we now live, digital communications have been the saviour of many an enterprise, both for-profit and not-for-profit, enabling a new (temporary?) working-from-home culture. I can't help but wonder how much worse the situation would have been for the economy and society as a whole, if this pandemic had hit, say, 30 or 40 years ago — before we had the internet and 4G and Wi-Fi and laptops and smartphones.

In this new non-face-to-face era, WF Media can help you if your company has products, services or initiatives that it needs to get out in front of the market. It is more important than ever before to keep information flowing throughout the industry, so please get in touch if you think we can help. Please keep an eye on the Critical Comms website (https://www.criticalcomms.com.au/) and make sure you're signed up for our weekly e-newsletter (https://www.criticalcomms.com.au/subscribe).

Jonathan Nally, Editor
jnally@wfmedia.com.au

Calendar

August

APCO 2020
2–5 August
Orlando, Florida
apco2020.org

IWCE 2020
24–28 August
Las Vegas
iwceexpo.com

AFAC20
25–28 August
Adelaide Convention Centre
afacconference.com.au

October

IoT Festival 2020
9 October
MCEC, Melbourne
iothub.com.au/iotfestival

Comms Connect New Zealand 2020
28–29 October
LHEC, Wellington
comms-connect.co.nz

November

Critical Communications World 2020
03–05 November
IFEMA, Madrid, Spain
critical-communications-world.com

Comms Connect Melbourne 2020
17–19 November
MCEC, Melbourne
melbourne.comms-connect.com.au

Introducing the CM60 Series

Designed, engineered and manufactured in Australia for the toughest conditions, the CM60 Series provides a robust solution ideal for both the large systems integrator with an extensive network of mobiles, portables and repeaters, or the small operator with a single site.

The CM60 Series provides an analogue solution with optional licensing upgrades for P25 in Conventional, Trunk and AES 256-bit Encryption.

The advanced User Interface Control (UIC 600 Series) features an OLED screen for high-visibility characters, back-lit keypad, powerful front facing speaker and a secure in-vehicle interactive bracket.

All CM60 variants are compliant with AS/NZS 4295 (LMR). UHF variants are compliant with AS/NZS 4365 (CB) and all P25 variants are CAP (Compliance Assessment Program) compliant, conforms to TIA-102 Standards.

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FOCUSING ON THE FUTURE

Jonathan Nally

The mission-critical communications industry is firmly on the path towards open standards-based broadband solutions.

TCCA, a global body representing the critical communications industry, and its Australian regional affiliate, the ACCF, have spent the past two decades or more promoting the development and deployment of standards-based mission-critical communications systems. Both organisations began life focused on the narrowband TETRA standard, but in recent years have broadened their spheres of activity to encompass broadband as it begins to make inroads.

To find out more about the two organisations' efforts and aims, and where they see various communications technologies heading, we conducted the following Q&A with TCCA's Chief Executive, Tony Gray, and ACCF's founding Director, Kevin Graham.

TCCA has turned 25 and the ACCF will be 20 next year. What's the secret of your success?
The success to date, and ongoing, was and continues to be based upon the core principles upon which the Associations were founded. TCCA and the Australasian Critical Communications Forum (ACCF), as one of its regional organisations, have drawn together the critical communications ecosystem from around the world, and around Australasia, under a common set of objectives — to drive the development of open standards that address mission-critical-grade user functionality for voice, data and security.

This work involves significant collaboration between key manufacturers and user groups, particularly public safety, to define the essential functionality/user requirements, to advise the standards development organisations and — once commercialisation of products emerges based on the standards — establish a rigorous testing regime to confirm interoperability between vendors. This approach has been proven in the success of the TETRA market, and ACCF and TCCA are working to ensure the emergence of critical broadband follows the same principles.

How is TCCA leading or contributing to standards development for LMR and broadband?
There are many initiatives underway, but there are a couple of specific examples.

For TETRA, the standard continues to be enhanced through the work of ETSI's TC TCCE (Technical Committee – TETRA and Critical Communications Evolution). This work includes updating the Inter-System Interface specifications, improving the performance of TETRA packet data and developing new security algorithms. TCCA's Security and Fraud Prevention Group is closely involved with this work.

For critical broadband, TCCA provides technical support for the ETSI MCX Plugtests, which validate the interoperability of a variety of implementations using different scenarios based on 3GPP Mission Critical Services in Release 14. TCCA's member-driven Broadband Industry Group and Critical Communications Broadband Group are key to gathering industry and user requirements, and TCCA is the 3GPP Market Representation Partner (MRP) for critical communications. This enables TCCA to bring into 3GPP a consensus view of market requirements such as services, features and functionality that fall within the 3GPP market scope.

How should industry contribute to achieving robust critical broadband?
Stakeholder collaboration is essential — the success of TETRA has demonstrated the benefits of standardisation and cooperation for the benefit of all. The open standards model for broadband is attracting participation from a broad ecosystem of interested parties, and this is evident from the diverse nature of the new members that TCCA and ACCF are attracting, from commercial mobile network operators to application developers.

The critical communications market is very small compared to the number of consumer users of broadband, so a common voice is essential. History has shown that standards development underpinned by the most exacting public safety requirements has been well accepted and adopted across a broad range of other sectors that also require secure and reliable critical voice and data communications to support their business operations. These include utilities, energy, resources, mining, transportation, network operators, industrial, manufacturing and enterprise sectors.

" TCCA'S ALLIANCES ACROSS THE CRITICAL COMMUNICATIONS ECOSYSTEM HELP ALL PARTIES TO DEVELOP AND DISSEMINATE BEST PRACTICES.

Why has TETRA been so successful in the Australian mining, oil and gas and long-haul rail sectors?

TETRA is the optimal choice for mission-critical users the world over as it provides a complete multiservice and unified system (critical voice and narrowband data), meeting their communications needs, whilst providing high levels of availability and reliability.

TETRA came late to the market in Australia due to spectrum issues but it was quickly recognised by the Australian resources industry that TETRA is a mature and time-proven open standard with competitively priced and interoperable products and solutions from multiple vendors.

How do you see TETRA expanding in Australasia over the next 25 years?

TETRA will undoubtedly remain strong in some vertical sectors. DAMM Australia's announcement last year regarding TETRA VHF frequencies will mean additional benefits such as improved propagation in challenging topographies.

With the release of combined TETRA/LTE and P25/LTE and hybrid/multi-mode products in Australia and the introduction of private LTE 4G and 5G solutions, true critical broadband for mission-critical use will become a reality over the next 10 to 15 years.

What's happening in other market sectors in Australasia, such as railways?

LMR using TETRA, P25 and DMR remain important and continue to grow across all major user sectors in this region. The Future Railway Mission Critical Standards (FRMCS), based on LTE, will be the next-generation standard ultimately replacing GSM-R with a single, secure communications backbone, for trackside and station communications. Mission-critical broadband standards are important for the evolving Industry 4.0, IoT and private LTE use cases emerging in many local sectors.

Broadband has widened the remit of TCCA and ACCF. How has ACCF ensured it continues to anticipate and meet industry needs?

The ACCF fully supports the TCCA charter. ACCF continues local advocacy and education on global standardisation efforts. Facilitating exchange of information between the local mission-critical fraternity and the eco-systems (including ETSI, 3GPP etc) is important to ensure future solution pathways for local users take maximum advantage of international harmonisation efforts. Local industry support and contribution will be essential in developing local capability and opportunities.

In 2018, ACCF extended its charter beyond TETRA to include other widely adopted standardised LMR technologies, such as P25 and DMR, so future unified solutions including mission-critical broadband can evolve more cooperatively. ACCF has ongoing collaborations with aligned local industry organisations such as the University of Melbourne's Centre for Disaster Management & Public Safety, ARCIA, Telsoc and INCOSE.

How important are the volunteer Working Groups, member involvement and cooperation between industry competitors?

Without the members, TCCA and ACCF would not exist. Their support and collaboration are invaluable in driving the critical communications market forward and many competing manufacturers participate in the same Working Groups for mutual benefit. All TCCA's Working Groups contribute in different ways to advancing the industry, from the Technical Forum's management of TCCA's TETRA IOP process, to the Future Technologies Group horizon scanning for emerging innovations that might be harnessed for the benefit of critical users.

The Global Certification Forum and TCCA are looking at certification for mission-critical broadband. How is that progressing?

The joint task force announced in January aims to move certification forward for mission-critical voice, data and video services. The initial actions of the taskforce will be completed during the first half of 2020 and progress will be reported then.

The goal is to develop a mission-critical broadband certification process that will be an evolution of both TCCA's unique and highly successful TETRA Interoperability and Certification Process (IOP) — which was developed to enable a truly open multi-vendor market for TETRA equipment and systems — and GCF's certification for 2G, 3G, 4G and 5G devices.

TCCA was involved in the MCOP project and is now involved in MCS-TaaSting. Why are they important to the industry?

The Mission Critical Open Platform (MCOP) project is all about making it quick and easy for applications developers to bring to market standardised and interoperable mission-critical PTT services, complying with the 3GPP MCPTT standard. It provides an open source API and SDK and has been an important step in the commercialisation of mission-critical broadband.

Once mission-critical services are developed and available, the final stage before market acceptance is conformance and interoperability testing and certification of the various products. Availability of suitable test sets has been an issue up to now, with test equipment manufacturers not seeing adequate volume in the market. Mission Critical Testing as a Service (MCS-TaaSting) will develop an IP-based test engine that will be available via both a cloud service and LTE hardware for the conformance testing of mission-critical applications. This will help to drive the market forward and benefit the entire mission-critical broadband communications ecosystem.

TCCA has formed lots of alliances recently. Does this reflect converging needs across sectors or a sign of a maturing market?

Actually, it's a bit of both. TCCA has always maintained collaborative and cooperative arrangements with relevant complementary organisations. However, with the increasingly widespread application of critical communications across diverse markets and geographies, and specifically as a result of the move towards 3GPP standardisation of mission-critical broadband, the number of interest groups and parties has increased.

TCCA's alliances across the critical communications ecosystem help all parties to develop and disseminate best practices, and are vital to support and evangelise the use of open standards, which is at the heart of our philosophy.

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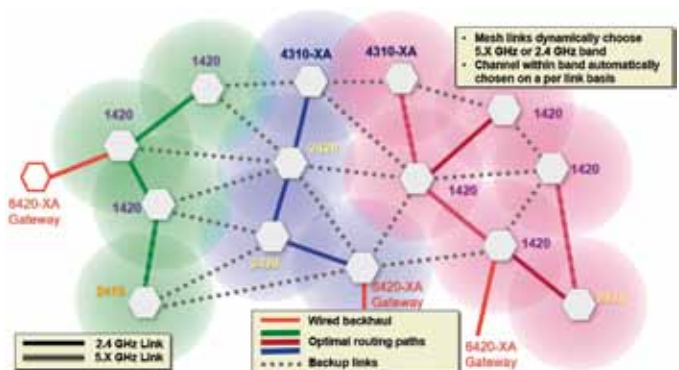
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ACMA ROADMAP FOR BROADCAST RADIO

The ACMA has laid out its priorities for the future delivery of broadcast consumer radio in a report which it says underlines the vital importance of radio to Australian audiences. 'The future delivery of radio' details how the ACMA will prioritise the provision of spectrum to best assist broadcasters to serve the Australian community. "Radio plays a critical role in providing news and informing communities in times of emergencies, as we saw during the bushfires and are seeing now with the COVID-19 pandemic," said ACMA Chair, Nerida O'Loughlin. "We know that the radio industry needs to evolve in response to new technology and changing audience preferences, and the spectrum that the ACMA manages is a key part of that evolution.

More info: bit.ly/3athf4R

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VERTEL DELIVERS WIDE-AREA RADIO SOLUTION

Australia's largest privately owned telecommunications carrier, Vertel, and wireless communications company Ondacomms have joined forces for a major deal. The firms have teamed up to provide a sophisticated, wide-area radio solution for waste management firm Grasshopper Environmental. As part of the deal, the companies formulated a Push-to-Talk over cellular (PoC) solution, tailored to the firm's operational requirements. Grasshopper's vehicle fleet was fitted with Telo M5 in-vehicle mobile devices, with the PoC application installed.

More info: bit.ly/3bpHDhx
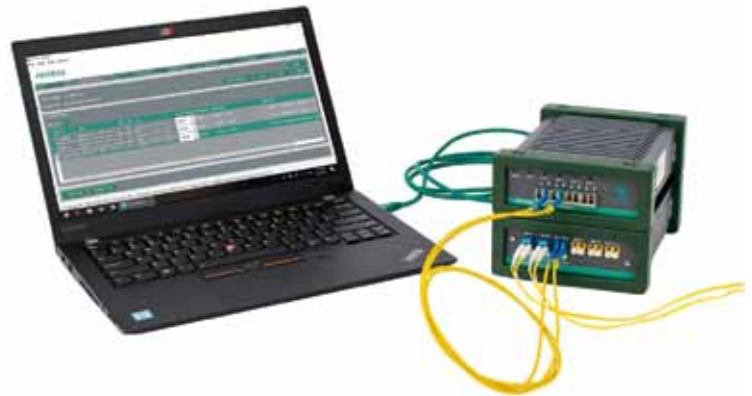
RF and PIM analyser

The Anritsu IQ Fiber Master MT2780A is a multi-port CPRI-based RF and PIM analyser that can perform true PIM analysis over fibre and present RF spectrum results derived from IQ data. The MT2780A reduces test costs and time by providing field engineers, field technicians and third-party contractors with a single instrument to conduct RF interference measurements and PIM troubleshooting on LTE-based systems using CPRI front haul infrastructure.

The IQ Fiber Master leverages patented PIM over CPRI and RF over CPRI measurement capabilities that allow tests to be conducted on the ground, significantly reducing tower climbs. Field engineers and technicians can use the MT2780A to scan the uplink RF signals of a remote radio head (RRH) for in-band interference while simultaneously conducting PIM over CPRI measurements. Supporting all Tier 1 LTE base station radio manufacturers, the single instrument solution can determine if KPIs are being affected by interference or PIM.

Analysing CPRI IQ data allows users to view a radio's uplink spectrum for interference troubleshooting. The IQ Fiber Master measures PIM over CPRI with four SFP inputs, providing the ability to compare multiple bands and sectors, as well. Measurements are performed on live cell tower traffic signals, providing a unique method to conduct real-world testing that results in improved accuracy and no system downtime for test. As measurements are derived from baseband IQ data, the IQ Fiber Master can make measurements on any frequency RRH, or combination of frequencies of the RRH, providing a cost-effective solution.

The IQ Fiber Master analysis results provide a full PIM diagnosis. It will report the presence of PIM, whether it is internal or external, and the distance to PIM. In addition, the unique and proprietary PIM heatmap quickly displays which transmitter contributes the most PIM. This collective diagnosis data shortens the entire PIM hunting exercise by directing field engineers and technicians to the most probable location and cause of the issues.

For ongoing monitoring, IQ Fiber Master can be installed at cell sites to conduct long-term PIM over CPRI measurements and provide analytical information. PIM-related problems, such as intermittent PIM occurring on specific days and times or changes in PIM due to base station load during the day, can be measured in this configuration. Reports of the measurements can be generated and used for comparative analysis.

The IQ Fiber Master MT2780A also serves as a band-less PIM testing solution that can be a carrier's first test tool when identifying an interference problem and its location. This helps to determine the most efficient course of action to follow.

All LTE bands are supported by IQ Fiber Master MT2780A. Extremely compact and lightweight, it weighs only 1 kg and fits in the palm of the user's hand.

Anritsu Pty Ltd
www.anritsu.com

Industry Talking

In my last article I wrote that the bushfires across Australia were the most devastating event imaginable. It seems like 12 months ago now. The really hard part is that the communities so badly affected by the fires were all looking forward to mid-year bookings to bring some funds in, but, as we have seen, the COVID-19 isolation guidelines have robbed them of the travelling public. It must be so hard for them.

The impact of COVID-19 on our country is profound, and yet we are the lucky ones — when we consider the problems that have besieged the rest of the world, our difficulties are not quite so bad. However, there is one area that ARCIA is very concerned about, and that is the retention of technical staff. The federal government's JobKeeper scheme to enable employers to retain their staff is important, and as we come out of the depths of the economic downturn all those technicians and technical staff are going to prove vital.

Since the outbreak began, ARCIA has been in regular contact with the ACMA about the impact on the communications industry. While many ARCIA members are involved with 'essential services', there are also members who are focused on the event and hire sectors… and like so many others, they have been particularly badly affected.

Initially we had concerns that many users would simply not pay their licence renewals and that this would result in many cancelled licences and high levels of confusion as we came out of the other side, plus a high workload for all involved in spectrum management. ARCIA has written to the ACMA and the federal Minister for Communications about the apparatus licence fees, pointing out that they are a major cost that could be delayed while we get through the effects of COVID-19. We would like to thank the ACMA for listening to our position and we note the ACMA did quickly set up a helpline and processes for any licence holder who needed assistance with spectrum fees. This is just one of the ways in which ARCIA can help our industry and many other industries to recover and help our nation grow again, and a reflection of how wireless communications is an essential service.

For many members who provide those essential services, the challenge is how to operate under a 'new normal', protect staff and ensure networks and systems keep working. The ARCIA committee, recognising the potential difficulties, has therefore decided to limit our events to minimise expenditure for our members. As a result the annual dinners in Sydney, Brisbane and Adelaide have all been cancelled, and our premier event in Melbourne is under a 'watch and act' status — if we can justify it, then we will run it.

There has also been a decision to extend Association memberships and partnerships into the new financial year to keep member and partner expenses as low as possible. We recognise that when things are tight every dollar counts, and by extending memberships our members will continue to get the benefits from being part of the group without having to compromise other outlays.

On a final note, the Western Australia events back in March were well attended and the Comms Connect conference offered some great topics and content — but what a great pity that there was basically no radiocommunications content. If our suppliers and our members want the radiocommunications industry to continue and thrive, then we must provide relevant content for our industry conference, Comms Connect — it is our collective responsibility!

As we have worked our way through these difficult times it has become apparent that there are still many issues where ARCIA is working on behalf of its members, and the fight for our industry and our spectrum continues. I hope you stay safe and well through this pandemic and I hope soon we can return to some kind of normal.

Hamish Duff, President
Australian Radio Communications
Industry Association

Intelligent I/O gateways

The ADAM-6700 series are intelligent, I/O-integrated gateway devices with a unique all-in-one design. They perform data collection, storage, processing, calculation and analysis locally. With 24/7 online equipment monitoring, these gateways provide measurable advantages in predictive maintenance as well as minimal downtimes.

ADAM-6700 series gateways have Linux OS installed and feature a built-in small footprint Node-RED graphical programming toolset. The devices support all commonly used industrial IT/OT interfaces and have a built-in I/O interface. This interface collects analog and digital data from temperature, humidity, vibration, water levels, current and pressure sensors and then executes digital and analog output instructions such as turning on/off lights or power switches.

If an abnormality is detected, the ADAM-6700 series gateways can trigger an alert and send email notifications immediately. The gateways support Ethernet, Wi-Fi, 3G, 4G and other network communication protocols. Once the data is processed and analysed, it is transmitted directly via SCADA, database or cloud service providers for AI deep learning and other advanced applications.

Target applications of the ADAM-6700 series include factory management, environment monitoring and management, and energy management.

Advantech Australia Pty Ltd
www.advantech.net.au

Rackmount online UPS

The Vertiv Liebert GXT5 rackmount online UPS is designed to ensure availability within mission-critical small IT environments and edge locations that enable important emerging applications — such as 5G, virtual and augmented reality, and the Internet of Things.

The UPS has a power factor of 1.0 on all models, providing more real power for the user, and is more efficient in both online (up to 95%, according to the company) and Active ECO mode (up to 98%). All models are ENERGY STAR 2.0 certified, and are currently available in capacities from 750 VA to 10 kVA, 230 V.

The product offers a three-year full coverage factory warranty for the UPS and battery. The system also is available with the company's extended warranty and other service packages to support individual user needs.

Vertiv Co
www.vertivco.com

Satellite communications for safety at sea

Icom's IC-SAT100 satellite PTT radio covered the 1,726-nm Yokohama-to-Palau yacht race with one-to-many communications.

Staying connected when out in the ocean is of utmost importance. That's why to avoid perilous situations, it is recommended that ocean race participants (especially those in long-distance races) carry satellite phones. However, a standard satellite phone uses geostationary satellites and may experience communication difficulties when a user makes a call to a race yacht on the ocean. In addition, satellite phones are for one-to-one communication and take a long time to share information with everyone. On the other hand, VHF marine radios are not suitable for long-distance communication, and some require complicated license applications. Therefore, the organisers of the 2020 Yokohamato-Palau race needed a more efficient and reliable communication tool, and they found it in the IC-SAT100, Icom's satellite PTT radio.

The event was a 1,726-nautical mile, long-distance yacht race from Yokohama to Palau, held from 29 December 2019 to 20 January 2020, to commemorate the 25th anniversary of Palau's independence. The communications plan called for a single talk group and long-distance range for the twice-daily roll call. One IC-SAT100 (plus a spare for backup) unit was used by the organisers based in Yokohama (where, for in-building use, an external AH-40 antenna was used when needed), plus there was one aboard the escort ship, and one each was carried aboard each of the seven yachts.

The IC-SAT100's one-to-many communication capabilities are activated by a simple push of the transmit button. The disaster-resistant and real time communication system uses 66 low-Earth orbit Iridium satellites. The satellites are non-geostationary, so users do not need to be concerned with the satellites' locations. In addition, the satellite PTT radio does not require a license, needs no qualifications and does not need to be registered. During the roll calls, the race participants reported their location, wind direction and any difficulties with their yachts. For previous races, the organisers and participants had used standard satellite phones, but this meant it took a long time to complete the roll calls because standard satphones are suitable only for one-to-one communication. It also meant that real-time information sharing could not be achieved. In contrast, the IC-SAT100 offers one-to-many communication, so the roll call time was greatly reduced and organisers could share timely information with all race participants.

At one point there was a severe storm and the ocean became very rough. Fortunately, the organisers were able to inform race participants of the weather in advance using the IC-SAT100. The satellite PTT radio gave organisers the ability to share the storm information in real time and be prepared in case the worst situation, an accident, should have occurred, in which eventuality a nearby ship would have been alerted and sent to the sailor's rescue. The IC-SAT100 provided two unexpected bonuses. One was that it contributed to the excitement of the race. When receiving a signal, the IC-SAT100 shows the transmitter's position information direction and distance on the display, so each of the race participants could know where they and the other participants were ranking in the race. The other was that because the IC-SAT100's audio was so clear, the organisers could detect the emotions in the participants' voices and help them to determine the sailors' mental states. This made it much easier to take care of the participants and improve the overall safety of the race.

In summary, Mr Ken Ando, organiser of the race, said that the IC-SAT100 provides "An epochal system that can timely grasp the position information of yachts and immediately share it with everyone."

Features of the IC-SAT100 include:

- Wide-area global communications
- Real-time, low-latency communications
- Waterproof, dust-tight and durable body
- Long-lasting battery
- Secure conversations with AES encryption
- Short Data Message function
- Integrated GNSS receiver
- SMA-type connector for an external antenna

For more information, please visit www.icom.net.au or email us at sales@icom.net.au.

ICOM

Icom Australia Pty Ltd
www.icom.net.au

WORK TO BEGIN ON
FINLAND'S PSMB SYSTEM

Finland's Virve 2.0 public safety mobile broadband network will be up and running by 2025.

Erillisverkot has awarded contracts for Finland's broadband Virve 2.0 public safety mobile broadband communications network. Under the 10-year deal, the radio access network will be provided by telco Elisa and the core systems will be supplied by Ericsson.

Erillisverkot is the state-owned, national statutory service operator of the current Virve communications network, through which approximately 80 million messages pass every week.

It will also be the operator of Virve 2.0, the aim of which is to provide secure, reliable and more diverse wireless broadband services to the authorities and other public safety users.

Virve 2.0 will be based on commercial mobile 3GPP technology with enhancements to meet security, availability and resilience.

"The importance of Virve in critical operations cannot be overstated. The next generation of Virve will be one of the most important governmental ICT projects in the coming years, and naturally, a high priority for us at Erillisverkot," said Timo Lehtimäki, CEO of Erillisverkot.

"Virve will facilitate seamless cooperation between the authorities and other public safety operators, crucial in daily life but also in crisis situations, such as the current coronavirus pandemic."

Radio access network

Elisa will provide the 4G and 5G radio access system and expand its geographical coverage area to match the current Virve network.

Elisa serves approximately 2.8 million consumer, corporate and public administration organisation customers, and has over 6.3 million subscribers in its core markets of Finland and Estonia.

Virve 2.0 subscriptions will use Elisa's public radio network, which the company is expanding for it to become Finland's largest data and voice network.

"Our long-term cooperation with state administration and security actors is now being taken to a new level," said Timo Katajisto, Director of Elisa's Corporate Customer unit.

"It is great to be able to work together to develop the next generation of network systems and services for the authorities and to be involved in ensuring national security and preparedness."

"From an international point of view, this will be an extremely high-quality and advanced network for authorities, and Finnish authorities are once again forerunners on a global

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level," added Eetu Prieur, director of Elisa's Mobile Solutions.

"Elisa's many years of work on improving the quality and reliability of the mobile network are reflected in this selection."

Core network

Ericsson will supply the core systems for managing the network and key data systems, and for ensuring data security and preparedness.

The system will use Ericsson's dual-mode 5G Core portfolio on a common cloud-native platform, including Ericsson NFVI, Dynamic Orchestration and VoLTE solutions.

"Critical networks demand the very best standards of reliability, security and performance in the core. We are working closely with Erillisverkot to ensure that is exactly what they will get from Ericsson's dual-mode 5G core products and solutions to benefit critical services in Finland," said

Arun Bansal, President Europe and Latin America, Ericsson.

"It's fantastic to see Finland take such bold steps to ensure the safety and support of the nation in such a forward-thinking way and I look forward to other countries following suit."

The procurement will enable Erillisverkot to implement a prioritised broadband connection for public safety authorities and other security operators by the end of the year 2021.

Procurement of applications will be launched later in 2020 to provide communications solutions similar to those of the current Virve network, plus with new functionalities, including a group video call service in 2023.

Virve 2.0 will be fully implemented by the end of 2025, with the current Virve network remaining in use simultaneously until the end of the migration period.

Emergency centres

Finland's Emergency Response Centre Agency, meanwhile, has become a member of industry body TCCA. The Agency manages six emergency response centres (ERCs) that cover almost all of Finland.

ERCs receive calls to the emergency 112 number that fall within the scope of the rescue, police, social and health services, evaluate the requirements and forward the information to the appropriate authorities or partners.

No other country has a system like this Finnish model, where the same information system is used to manage a single number for all emergency calls, process the data, supplement with additional information if necessary and alert all required units simultaneously.

The ERC Agency receives many international visitors looking to learn from the ERC operations, and has actively assisted several countries including Australia, Estonia, Georgia and Sweden with their emergency response system reforms at both a strategic and practical level.

"In an increasingly challenging world it is essential to have access to the latest news and best practices in terms of new technologies," said Dan Berlin, ERC Agency Emergency Communications Specialist.

"We are pleased to now be part of TCCA's membership and look forward to sharing our operational model more widely with an international audience and learning from others in this most critical of areas."

"The Emergency Response Centre Agency sits at the heart of critical response services for Finland — not as visible to the public as the first responders out in the field but no less crucial," said TCCA Chief Executive Tony Gray.

"Their innovation and operational model have won admiration from around the world, and we are very proud that they will be sharing their expertise with TCCA's ecosystem to the benefit of societies worldwide."

Finland's ERCs are the first authority link in the chain of assistance and safety provision during an emergency, able to alert all relevant authorities simultaneously via VIRVE.

All six ERCs use the ERICA ERC information system. The networked operating model enables the nationwide balancing of congestion during regional peaks.

NSW ANNOUNCES $217M FUNDING BOOST FOR GRN

NSW emergency services organisations and other government agencies will benefit from a $217 million boost to the state's mission-critical Government Radio Network (GRN).

The investment will be used to consolidate about 70 separate agency radio networks into one.

"The radio network played a critical role in protecting communities and supporting the Rural Fire Service, Police, Fire and Rescue, Ambulance and the State Emergency Service during the recent bushfires," said Minister for Customer Service Victor Dominello.

"During emergencies such as bushfires and floods, every second counts. We are making life easier for first responders by providing them with a first-class communications infrastructure that will help keep people and places safe."

Minister for Police and Emergency Services David Elliott said the funding will give first responders greater certainty and confidence when working on the frontline.

"In Northern NSW, the coverage will expand to Glen Innes, Inverell, Tenterfield and Ben Lomond and provide improved coverage for areas including Moree and Warialda," Elliott said.

"In Southern NSW, it is expanding across the Riverina to the Victorian border to provide greater coverage to the towns of Holbrook, Tarcutta, Gundagai and Albury."

The funding will enable the NSW Telco Authority to accelerate the Critical Communications Enhancement Program (CCEP) to reach 96% of populated areas.

The $217 million is in addition to the more than $401 million that has been allocated to the upgrade of the GRN since 2016.

CCEP and PSMB

The CCEP is delivering an enhanced GRN to improve operational communications for emergency services organisations and essential service providers.

CCEP sites were vital during the summer bushfires, with 19 CCEP new sites being fast-tracked and made available on 'best effort' capability for emergency services organisations following the State of Emergency declared by the NSW Premier. In addition, 10 mobile cells-on-wheel and six generators were deployed.

During this time, overall network use was 30% higher than normal.

As a result of the CCEP rollout, Rural Fire Service Operations were able to use the GRN for radiocommunications all the way from Armidale to Forster — the first time this has been possible.

Meanwhile, the federal, state and territory governments are working on plans for a national public safety mobile broadband network for use by emergency services organisations and other providers of essential services. Before the system design and network architecture plans can be finalised, a proof of concept is being conducted to test proposed ideas.

Also of relevance is the Regional Digital Connectivity (RDC) Program, part of the $50 million Connecting Country Communities Fund, which is investing in infrastructure to provide fast and reliable broadband internet access to regional communities in NSW. Delivered in partnership with the Department of Premier and Cabinet, it aims to enable the same digital connectivity in the regions that is available in metropolitan areas of the state.

Approval has been given to trial a proof-of-concept program in southern regional NSW. With an expected completion date of December 2025, more than 3800 premises will have improved connection.

The funding will result in improved regional digital connectivity in the NSW towns of Royalla, Gundaroo, Collector, Gunning, Bungendore, Murrumbateman, Googong, Carwoola, Tarago, Michelago and Wallaroo.

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EMERGENCY COMMS A PRIORITY FOR SMARTSAT CRC

Satellite centre aims to tackle the challenges posed by Australia's geography and show the world a better way to communicate.

Bolstering emergency communications is a top priority for SmartSat Cooperative Research Centre (CRC), following Australia's crippling summer bushfires. Working with NASA, the Australian Maritime Safety Authority and Safety from Space, the development of more accurate and reliable disaster management communications forms one of SmartSat CRC's first projects, the centre announced at the 9th Australian Space Forum.

"Critical communications infrastructure is often damaged during a major fire incident, which may complicate rescue efforts and put lives at further risk," SmartSat CEO Professor Andy Koronios said.

Australia's lack of satellite communication capability meant the country had to call on US satellites to help coordinate bushfire responses.

As a result, the centre had a meeting scheduled with NASA last week to discuss a project that will adapt existing emergency beacon technologies into a form of miniaturised satellite radio, connected into a national incident data management system that will deliver a complete, real-time picture of disaster zones and ensure reliable communication for individuals and communities in danger.

The centre also plans to work on technologies that enable its partners and relevant agencies to establish a national network to monitor the quality and quantity of surface and groundwater across the country.

The AquaWatch Australia Mission will see SmartSat, CSIRO and other partners work to establish a 'mini constellation' of dedicated satellites, along with a network of thousands of terrestrial water sensors that will upload data continuously in near real time.

It's expected to spark a suite of other projects aimed at helping regional stakeholders, such as primary producers, environmental managers and resource companies, and developing those areas.

"One major impediment to growth in many regional areas is lack of communication infrastructure, which is often far inferior to that found in capital cities," Prof Koronios said.

"That not only prevents business and industry from investing in these regions but also makes individuals reluctant to relocate, even while many experts point to the great need to grow Australia's regional areas," he added.

SmartSat's seven remaining first-round projects address various technical elements of this national communications challenge, with the goal of establishing cost-effective, sovereign satellite capability to deliver secure, high-speed data nationwide.

Developing independent space capability would not only help protect Australia's national security but also "improve the economic outlook in a range of important industries", Prof Koronios argued in an opinion piece last year, referencing the UK's potential cut-off from technologies it's invested in in the event of a no-deal Brexit and concerns about Australia receiving data slower than partner countries.

It would also benefit Australia's defence sector and individuals, SmartSat CRC said later.

"These technologies represent the future of how the world communicates and Australia is home to internationally recognised experts in the field," Prof Koronios said.

"Now, the mission for the SmartSat CRC is to coordinate research in a way that not only solves the unique challenges posed by Australia's sprawling geography, but in doing so shows the world a better way to communicate."

Launched six months ago, the Lot Fourteen-based organisation has good chances of achieving that mission, with over 100 national and international partners supporting its endeavours.

The new system can track the movements of rescue forces inside buildings.

INDOOR LOCATION OF
RESCUE FORCES
IN DISTRESS

Scientists have developed technology to locate personnel inside buildings without having to rely upon continuous GPS signals.

Rescue forces are often called to free people trapped in buildings following fires, earthquakes or other emergency situations. These missions are very risky: dangers are difficult to assess in advance and the rescuers themselves may suddenly need help.

One of the biggest problems faced during indoor rescues is keeping track of the location of personnel. To help solve this problem, researchers at the Karlsruhe Institute of Technology (KIT) have developed a system to locate injured or buried rescue forces within buildings without the need for GPS signals.

"In crisis situations, a WLAN signal for radio positioning may be lacking and construction plans of buildings are not always available," said Nikolai Kronenwett of KIT's Institute for Control Systems.

Together with Gert Trommer, a retired KIT professor, Kronenwett has developed an autonomous system for locating rescue forces in buildings without any radio connection to the outside.

The system works by implanting small sensors into the shoes or boots worn by the rescue crews. From accelerations and rotation rates thus measured, the direction and speed of movement of a person can be

A PERSON'S POSITION IS DETERMINED WITH THE HELP OF AN ALGORITHM THAT CALCULATES ITS CURRENT POSITION FROM THE MOVEMENT INFORMATION SUPPLIED BY THE FOOT SENSORS.

determined — a technology that is also used in smart watches.

"The unique selling point of the measuring system is smart stance phase classification. A person's gait is analysed and four different phases are distinguished: the stance and roll-off phases, the swing phase and loading response," said Kronenwett.

These phases correspond with a normal step forward. The sensors also detect when movement stops — these zero-speed measurements help estimate and compensate for sensor errors and considerably improve positioning accuracy.

Before entering a building, the system determines the current position by GPS after which no further GPS signals are needed. A person's position is determined with the help of an algorithm that calculates its current position from the movement information supplied by the foot sensors.

Via an external, independent radio connection, current positions of all the rescue forces are transmitted to the commander's computer.

In case of an emergency, the exact locations of the all the crew members are known and the commander can react quickly.

In addition to the measurement system fixed to the foot, Kronenwett is also working on a system worn on the wrist.

"The foot system precisely determines the position of the user, but does not transmit any information about the surroundings and the structure of the building," he said.

"The hand-carried system contains a camera that scans the surroundings with infrared radiation and generates a 3D model of the rooms through which the person moves."

In this way, the commander is given a better idea of the situation inside the building.

The measurement system could be used not only for the determining the position of rescue forces in distress, but also to locate police forces and security staff at airports, shopping centres and train or underground stations; to find miners in underground caves or tunnels; or as an orientation aid for the blind.

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NEW PLAN NEEDED
FOR WA'S TRANSPORT RADIO SYSTEM

The Western Australian Government has announced that the Public Transport Authority of Western Australia's (PTA) $136 million Radio Systems Replacement project "will no longer proceed" with the current HUGL Consortium.

Trade restrictions imposed by the US government on Huawei Australia have resulted in a force majeure event under the contract, which the parties have been unable to overcome.

The Radio Systems Replacement project involves converting the radiocommunications system for Perth's urban rail network from analog to digital.

According to a government statement, the project will now be delivered through a "new arrangement", although that arrangement has not been specified.

The project's procurement process was begun in May 2017, with the contract awarded to the HUGL Consortium (Huawei Australia and UGL) in July 2018.

The HUGL Consortium had earlier provided assurances to the state government that it would be able deliver the project even in the light of trade restrictions imposed by the US government.

However, further restrictions imposed in August 2019 had "greater impact" and, despite efforts, the PTA and the HUGL Consortium have been unable to overcome the problem.

The WA Government has concluded that if the current relationship with the HUGL Consortium is maintained, the measures required to try to overcome the force majeure event would result in unacceptable uncertainty around the total cost of the project, final completion time and no guarantee that the proposed solution would be effective.

The decision also ensures that the Western Australia complies with US trade restrictions.

The PTA and Huawei Australia have therefore mutually agreed to not continue the current arrangement.

"It is extremely unfortunate that the state government's project — which is limited to a radio network for train drivers and transit guards — has been caught up in the ongoing trade dispute between the US and China," said Transport Minister Rita Saffioti.

"Given the trade dispute, and the current economic and health crisis facing the world, the PTA has recommended a fresh approach for the radio replacement project," she added.

The PTA is working with the HUGL Consortium on a transition to new arrangements to allow delivery of the project without breaching US trade restrictions. This could include a range of outcomes, from withdrawal of Huawei Australia from the contract to termination.

The transition work will include exploring which subcontract arrangements can be preserved in the new project.

Given the inevitable delay in completion of the project, the state government and the ACMA have continued to liaise on the availability of the spectrum licences, with the original requirement for the PTA to vacate the analog spectrum by May 2020 extended to beyond 2021.

"The PTA will continue its plans to deliver a new digital radio system for our expanding public transport system," said the minister.

"We'll continue to work towards the delivery of a high-quality radio system at the best possible price for taxpayers."
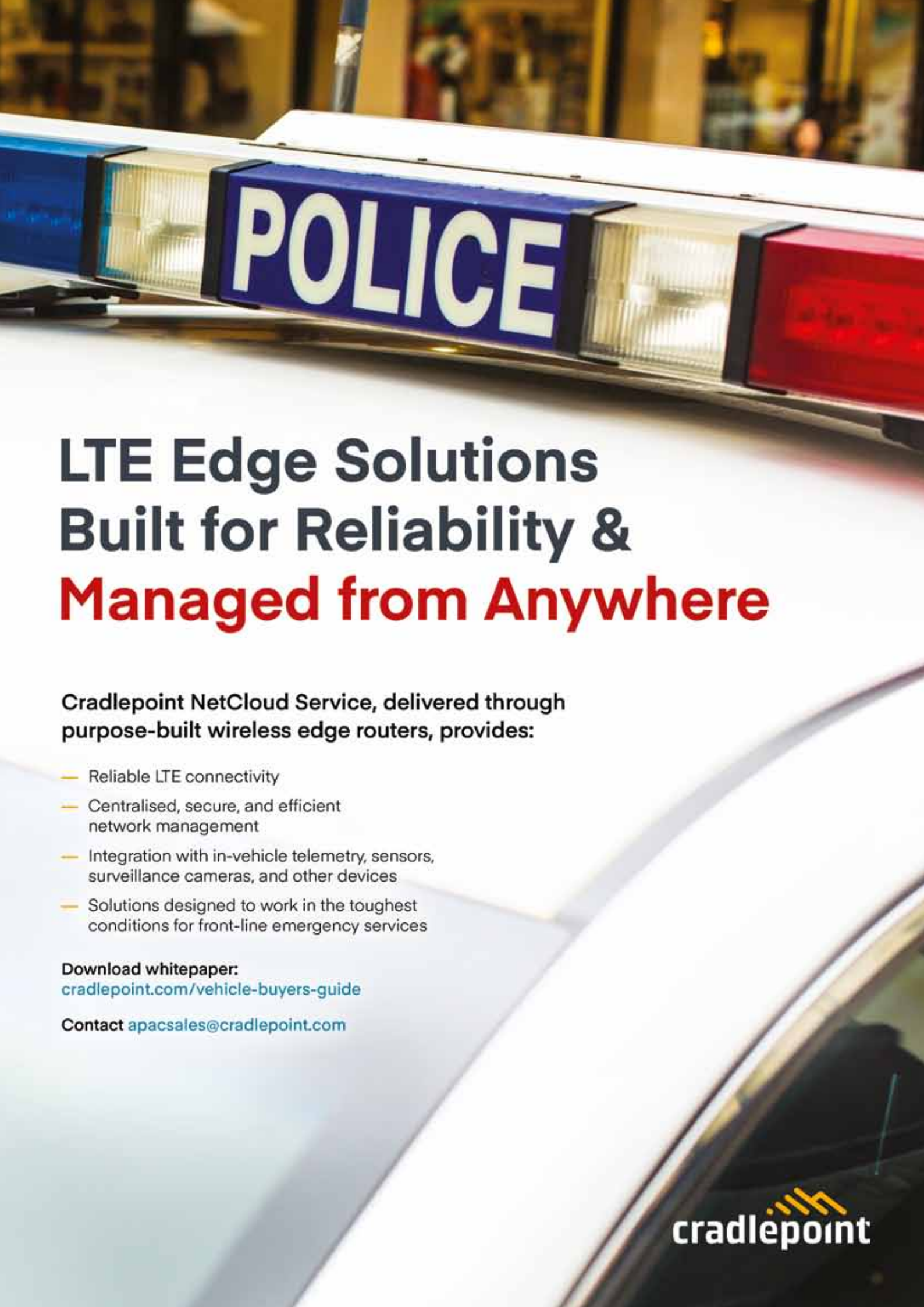
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PRIVATE NETWORKS SET NEW STANDARDS

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A 450 MHz PoC LTE network for a Polish power grid and a private 5G network at a Japanese facility.

Nokia has been chosen by Polish energy sector company PGE Systemy to supply its 5G-ready, industrial-grade private wireless solution, following the successful trial of a 450 MHz PoC network that had been in operation since April 2019.

According to Nokia, this marks a critical first step in evaluating the use of the 450 MHz band to support the wide-area operations of energy distribution system operators (DSOs) across Poland.

PGE Systemy will use the PoC infrastructure to further develop its concept of a country-wide critical communications network. The final private network will potentially support 15,000 to 20,000 users over LTE/4.9G, as well as wireless connectivity for up to 14 million smart meters and 35,000 existing and future SCADA connections.

The Polish Energy Ministry has chosen PGE Systemy to operate a 4.9G private wireless network on the 450 MHz band for critical and operational communications in its next-generation power grid. Favoured by the energy sector across Europe, this band has excellent propagation properties and generous power levels, and there is strong availability of voice and data radios from a variety of equipment suppliers to support numerous applications.

It is also the band of choice for the support of machine-to-machine communications in the energy sector, including smart meters and wireless SCADA connections required, for example, with wind turbines.

Future applications of the network may include distributed energy resource management and other digital smart grid applications.

"Poland has a strong concern to digitalise our energy grid because further integration of renewables with grid as well as conversion to distributed energy systems requires ubiquitous, reliable and safe communications," said Andrzej Piotrowski, Vice-President of PGE Systemy.

"The Nokia proof of concept has demonstrated that it will meet our needs in terms of coverage, service quality, resilience and long-term availability."

"Nokia has a big commitment to Poland's communications infrastructure with over 6000 employees in the country working in our R&D centres, developing our newest technologies, including 4.9G and 5G," said Chris Johnson, Vice-President of Nokia's Enterprise business unit.

"Nokia's proof of concept, 5G-ready private network has ably demonstrated the superiority of cellular systems for mission-critical and machine-to-machine communications in these advanced applications."

Japan's first private 5G network

Fujitsu has been granted Japan's first commercial private 5G radio station licence by the Kanto Bureau of Telecommunications, and will begin operating a private 5G network at the company's Shin-Kawasaki Technology Square office.

Fujitsu will strengthen crime prevention measures in the building by leveraging its private 5G technology for data transmission of high-definition images collected by multi-point cameras, creating an AI-powered security system that quickly detects suspicious behaviour through motion analysis.

Through its newly established private 5G co-creation space, FUJITSU Collaboration Lab, the company will also offer customers and partners the chance to workshop various use cases for private 5G to deliver business innova-
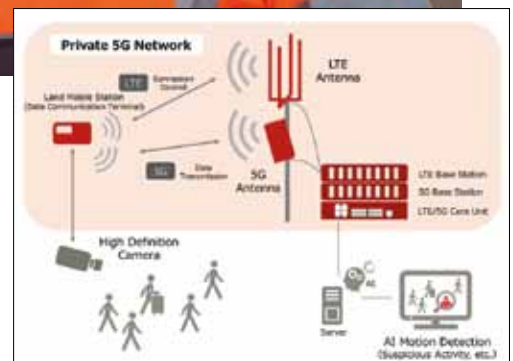
Fujitsu's local 5G system antenna and base station arrangement.

tion and help resolve regional issues. Fujitsu experts will also provide support with on-site implementation for customers at the location.

With the aim of creating a smart factory, Fujitsu will also obtain a licence for private 5G at its Oyama plant in Tochigi Prefecture, which serves as a manufacturing base for network equipment. Together with Fujitsu Telecom Networks Limited, which manufactures network equipment at this plant, Fujitsu will continue to verify the utility and possible applications for its private 5G technologies.

The development required Fujitsu to obtain a private 5G radio station provisional licence from the Kanto Bureau of Telecommunications. Under this licence, Fujitsu verified the registration and connectivity of base stations and land mobile stations, as well as coverage area, in accordance with the Japanese Radio Law, in order to obtain a full commercial licence. As a result, the company's private 5G radio stations were found to be in compliance with the standards set by the Radio Law.

The system configuration is based on 5G- Non-Stand Alone (NSA), which uses 5G for data transmission and LTE for connection control between base stations and land mobile stations. The frequencies used are 28.2 GHz to 28.3 GHz for 5G, and 2575 MHz to 2595 MHz for LTE. The coverage area is approximately 28,000 square metres.

Cabinet coolers

EXAIR's Dual 316 Stainless Steel Cabinet Coolers with ETC (electronic temperature control) keep electrical enclosures cool with -7°C air while maintaining the NEMA 4X (IP66) rating of the enclosure and removing the heat that could adversely affect the internal components. The wear, corrosion and oxidation resistance of type 316 stainless steel should assure long life and maintenance-free operation within food, medical, pharmaceutical, chemical and other harsh environments.

The cabinet coolers are available with cooling capacities of 3400 up to 5600 Btu/h, with the latter suitable for larger enclosures and heat loads. The digital ETC provides precise temperature control for electrical enclosures that is constantly being monitored by a quick response thermocouple.

Applications include cooling control panels used in food processing, pharmaceutical, foundries, chemical processing and other corrosive locations. The systems are UL listed and CE compliant.

Compressed Air Australia Pty Ltd
www.caasafety.com.au

Enclosures

MFB's SoHo 210 range of enclosures offers a useful solution for removing desk clutter. The simple enclosures provide a vertical storage solution for equipment that could otherwise take up unnecessary desk space. Simply drop one under a desk to house modems, switches, routers and other peripheral devices.

The enclosures can be supplied unassembled or assembled with common MFB accessories including shelving and power distribution boards. They are available in a range of heights and depths and a range of powder coat colour finishes.

MFB Products Pty Ltd
www.mfb.com.au

SMART COWS, COMMS AND THE IoT

As the IoT grows and mission-critical applications play a more dominant role, communications devices manufacturers will face pressure to ensure product reliability.

Internet of Things (IoT) devices fail every day. It's a fact of life. If the failed product can be easily fixed or exchanged for one that works, the impact on a company's brand and its bottom line may be minimal. When those IoT products are used in mission-critical applications and installed in hard-to-reach places or in harsh environments, all bets are off. These products simply can't fail. When they do, a company's success or failure may be on the line. Worse yet, if it's an implanted medical device, someone could die.

Here's the problem. Mission-critical IoT products designed in the lab under ideal test conditions don't always perform as expected in the real world. There are many reasons why this is the case and it's not always in the way one would think.

Real-world IoT example

Smart cows provide an excellent example of how a product designed in a lab can potentially fail in the real world. In a smart cow application, IoT sensors are surgically implanted in multiple locations under the cow's skin and used to monitor the health of cows destined for the dinner table. Once in service, the sensors are expected to operate without fail for at least three years. During that time, they track the cow's location, behaviour and other important factors such as temperature, which is a leading indicator of disease.

It sounds simple enough, but chances are the IoT sensors were never really designed to be implanted in cows. And, because the sensors are located inside the cow, they can't be easily accessed if something goes wrong. The sheer weight of the cows and their habit of continu-

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ally rubbing up against objects poses another problem. What happens when an adult cow, weighing upwards of 800 kg, decides to rub a part of its body where a sensor is located? Will the sensor get damaged? Will it migrate to another part of the cow's body only to accidentally end up on someone's dinner plate?

These are valid questions and point to a key differentiator between IoT devices that fail and those that succeed. Successful IoT products are intentionally designed not to fail — not just in the lab, but in the real world where many factors conspire to make them do just that.

Factors driving device failure

What are the factors that can make IoT devices fail in the real world? Here's a look at the top five and some tips on how to navigate the potential pitfalls.

Factor 1: Congestion and load troubles. The moment a new IoT device is powered on, there may be hundreds of other IoT devices in its general vicinity. On one smart farm alone,

there could be a herd of cattle (each with multiple implanted IoT sensors); sensors for measuring soil, plant and environmental variables; sensors for remote animal monitoring; farm bots and farm drones... not to mention any IoT devices the farmer might be carrying. The congestion may impede the device's ability to operate normally. A dramatic rise in network traffic has a similar effect, forcing the IoT device to continually retransmit data. Its battery may drain quicker than expected, or it may fail altogether.

Solution: To avoid these failures, product makers should test the ability of their IoT devices to operate normally with a traffic load comparable to that expected in the target environment. That testing should also be done while simulating different traffic types like streaming video or voice.

Factor 2: Interference. Dense IoT device deployments, with many devices operating on the same crowded bands — for example, a large farm operation with smart cows — greatly increases the likelihood of interference between devices. Many of these devices can't detect one another, let alone cooperatively share the airwaves, forcing some to behave in unexpected ways.

Solution: To avoid these issues, co-existence testing is essential. Co-existence testing helps product makers determine a device's tolerance to other radio signals. It also helps ensure that a certain level of operation is possible, even in the presence of alternate radio protocols. IoT devices should also be challenged to see if they can cope with the many amplitudes, data rates and protocols they will likely encounter in the real world.

Factor 3: Roaming difficulties. Wireless IoT devices often roam from one location to another. That can be problematic if they haven't been designed with robust roaming algorithms to minimise roam delay and avoid outages. An outage of just a few seconds can result in loss of valuable data. Congestion and interference have a dramatic impact on how well roaming algorithms work, making testing under real network conditions critical to preventing a device failure. Even in the smart farm scenario, implanting an IoT device in a cow only makes sense if that device can continually provide data that a farmer can access.

Solution: You can optimise roaming performance by testing IoT devices for roaming handoff behaviour in a variety of challenging conditions. Simulating the device's antenna to

ensure it can handle roaming, while coping with the volume and mix of traffic found in the real world, is also advisable.

Factor 4: Interoperability with network infrastructure. One day an IoT device may work as expected. The next day it may act erratically or stop working altogether. Chances are this isn't a device issue, but rather the result of a firmware update on the network wireless access points. A slight change in the network infrastructure turns a perfectly working IoT device, like a sensor implanted in a cow, into one that's not recognised by the target environment.

Solution: A protocol compliance test suite can provide an effective defence against this type of failure, assuming it tests against all defined functions of a device's wireless protocol, and not just a small subset.

Factor 5: Security breaches. Any IoT device can be vulnerable to attack, even if it's in a cow. Sometimes hackers are after data being collected. Other times, they are looking for a way to exploit the device's lax security to gain a backdoor onto a network. That's what can happen when a device is roaming and experiences interference. That interference can overwhelm the device and cause it to enter a fault state, resulting in long connection delays and making it temporarily vulnerable to hacking.

Solution: Stop hackers dead in their tracks by using a test suite with the ability to simulate roaming behaviour in a cluttered RF environment.

The path to success

As the IoT ecosystem grows and mission-critical applications begin to play a more dominant role, product makers will face increasing pressure to ensure their products are reliable.

For those companies looking to build mission-critical IoT products that won't fail, the trick lies in thoroughly understanding a product's deployment environment and performing the right type of testing to ensure it can withstand the factors conspiring to make it fail.

Whether those devices will be used for smart cows, in medical monitoring devices or something in between, those businesses choosing to make reliability a top priority are sure to set themselves on the right path to opportunity and success in the IoT.

White paper republished courtesy Keysight.

Radio Matters

Due to the COVID-19 pandemic, Comms Connect and RFUANZ have been forced to postpone the annual conference and Gala Dinner until 9–10 September 2020. However, this date too remains fluid and an additional date has been pencilled in for 28–29 December 2020.

The venues remain the same as before, ie, the Lower Hutt Event Centre for the conference and exhibition and Te Papa, Te Marae for our Gala Dinner. The latter will be held on the evening of 9 September at this stage; however, confirmation of all these dates will be advised as things settle down. We wish to thank all our partners for continuing to support the RFUANZ and its events, especially during this disrupted period.

Much has been written about the Level 3 Installers Training Programme and the ease with which it can be undertaken. Now is the perfect time to begin while you have some time on your hands. You might qualify for the Fees Free program; but if not, then perhaps apply under the Student Loan Scheme, which has no up-front payments.

There is always assistance if you wish to undertake further study. For more information please visit the training section of our website, https://rfuanz.org.nz/training.

With the advent of the changeover from older analog radio technologies, and with many of the long-term radio spectrum management rights coming to an end, there is plenty of work being done to assess the best way to redistribute the available spectrum. We hope this is being done to achieve the best outcomes for all users of the spectrum and to maximise its benefit to society. The RFUANZ encourages all members to be a part of the discussions so that the Radio Spectrum Management team gets the full picture of the possible allocation options.

Two bands currently under review in New Zealand are 1710–2300 MHz and 3410–3800 MHz. These are currently used for anything from wireless microphones to fixed links, space operations to fixed multipoint broadband, and cellular technologies. Some allocations are nationwide and some are regional.

One of the questions I hear being asked a lot is, 'How do we allocate this spectrum to get the most out of it and not waste it?' This becomes more important as the frequencies get higher and the non-line-of-sight performance reduces. What you find is that when allocating large chunks of spectrum nationwide there will invariably be multiple areas where the service provider will never use the spectrum it owns, meaning it is essentially wasted. This is even more of a problem in countries like Australia with its large geographical area.

Spectrum users in New Zealand and Australia have been watching the developments in the USA ever since the FCC completed rules for the Citizens Broadband Radio Service in the 3.5 GHz band. These rules enable more efficient use of radio spectrum in smaller geographical areas with spectrum sharing, using dynamic spectrum access system databases. We have also seen many radio manufacturers back this type of technology as well, which is what is required to make any new idea successful and affordable.

Closer to home we have Federated Wireless Inc in Australia, which has been working for a long time to create a spectrum controller to enable more bandwidth for technologies such as private LTE and industrial IoT applications. Submissions to the ACMA regarding 'spectrum sharing' closed in September 2019 and it will be interesting to see what the outcome of the discussion will be. You can read the submissions here: https://www.acma.gov.au/consultations/2019-10/new-approaches-spectrum-sharing-consultation-252019.

The RFUANZ would like to ensure that all users of radio spectrum understand the new opportunities that could be brought about by this new approach to getting the most out of the limited spectrum available, and we encourage you to do your own research and participate in the ongoing debate.

Finally, workshops on how to become an Approved Radio Engineer or Approved Certifier, which were to have been held the day prior to Comms Connect New Zealand, have now been postponed. As yet we have not been advised of alternative dates. Should you have any questions or need to know more, please contact info@rsm.govt.nz.

Criteria on how to become an Approved Radio Engineer or Approved Certifier can be found on the RSM website at https://www.rsm.govt.nz/engineers-and-examiners/how-to-become-an-approved-radio-engineer-or-certifier/.

Corey Weir
Chairman, RFUANZ

Oscilloscope

The Keysight MSOX40224 Mixed Signal Oscilloscope offers next-generation performance, 12″ touch screen and an intuitive interface. The unit gives users the ability to capture random and infrequent events and signal behaviour with its one-million-waveforms-per-second update rate. The MegaZoom IV smart memory technology not only displays more waveforms, but has the ability to find difficult problems in the design. It is available to rent from TechRentals.

The Keysight Mixed Signal Oscilloscope further redefines waveform analysis by integrating seven instruments in one: oscilloscope channels, logic channels, digital voltmeter (DVM), dual-channel WaveGen function/arbitrary waveform generator, frequency response analyser (Bode plots), 8-digit hardware counter and serial protocol analyser including USB.

TechRentals

www.techrentals.com.au

Rechargeable smart key

The CyberKey Blue 2 is a rechargeable smart key that connects to the user's smartphone app and allows them to simultaneously download access permissions of which locks they can access while providing the latest audit trail reporting through the app and to the management software which can be hosted in the cloud or on premise, thus providing virtual real-time access control for the most remote sites.

CyberLock lock cylinders are IP68 rated and do not require a battery or network connection, which means they are suitable for back-of-house applications to padlocks in remote sites. For a major rollout with hundreds or thousands of cylinders, the annual cost savings to an organisation purely from not having to change batteries in the cylinder is substantial.

EKA Cyberlock

www.ekacyberlock.com.au

Distribution boards

Consistent with the 'DB' family of distribution boards, the newly released DB Essential from APS Industrial is custom designed for the demands of Australian industry and purpose built for compatibility with Siemens circuit breakers.

The DB Essential has been developed as a quality lightweight distribution board for high-end commercial and medium-duty industrial environments. The enclosure by KATKO has a fully welded construction and meets the highest IK rating against external mechanical impacts while maintaining an IP55 ingress rating.

Together these ratings make this range of distribution boards suitable for indoor and outdoor applications.

While the DB Essential does not offer a removable gear tray (as featured in the DB Ultimate), the DB Essential offers flexibility in equipment options due to careful design considerations and a range of features such as a dual quarter-turn locking system, a removable hinged escutcheon and door, and a continuous poured door seal. These features are complemented by a galvanised gear plate, dual earth neutral bars and a removable gland plate at the top.

APS Industrial

www.apsindustrial.com.au

Outdoor fixed wireless device

The Powertec Telecommunications Cellferno offers high-speed mobile internet for commercial, IoT and residential applications. It is available in two different models: the M600 featuring Cat6 2x2 MiMo, capable of speeds up to 300 Mbps, and the M1200 featuring Cat12 4x2 MiMo, capable of speeds up to 600 Mbps. It is supported by all mobile operator bands.

Cellferno can operate in temperatures of up to 65°C thanks to its steel casing, plus it has IP67 protection and an in-built heater for clearing ice.

Powertec Telecommunications Pty Ltd

www.powertec.com.au

Oscilloscopes

Pico Technology announces the PicoScope 6000E Series PC-based oscilloscopes, featuring eight channels with 500 MHz bandwidth, 16 digital channels and resolution of 8, 10 or 12 bits. This addresses challenges faced by engineers when debugging complex IoT and embedded systems that have mixed analog and digital elements, such as serial and parallel communications with high-speed low-voltage signalling.

FlexRes architecture allows the hardware to be configured by the user to optimise the sampling rate to 5 GS/s at 8-bit resolution or up to 12-bit resolution with 1.25 GS/s sampling. For diverse applications such as capturing and decoding fast digital signals, or looking for distortion in sensitive analog signals, flexible resolution allows both measurements to be made with the same oscilloscope.

Deep capture memory offers the ability to capture long-duration events while maintaining a high sample rate. The PicoScope 6824E, with 4 GS memory, can capture a 200 ms signal at a sampling rate of 5 GS/s, so 200 picoseconds resolution (a ratio of 1:1,000,000,000). Deep captures can be explored with the included waveform buffer navigator and zoomed in by up to a million times using the zoom/pan controls. Built-in tools for embedded systems debug include DeepMeasure, which captures the measurement results of each one in up to a million cycles.

The series utilises PicoScope 6 PC software — a graphical user interface that presents information in time, frequency and digital domains as required, showing clean, crisp waveforms on screens of any size and resolution. Mask limit testing and user-defined alarms are included, as well as capture memory segmentation from 1 to 10,000. The software includes decoders for 21 serial protocols as well as parallel bus decoding of the digital channels; more protocols will be deployed as updates in the future.

The series delivers high performance, with better than -50 dB harmonic distortion at 1 MHz on all models and over 60 dB SFDR (PicoScope 6824E). Baseline noise specification is <150 μV RMS on the most sensitive range. Other features include an integrated 200 MS/s arbitrary waveform generator (AWG) and 50 MHz function generator with built-in sine, square, triangle, DC voltage, ramp up, ramp down, Gaussian and half-sine functions.

Emona Instruments Pty Ltd
www.emona.com.au

MiMo 4G/5G antennas

The Panorama Antennas LGMHM4, 4x4 MiMo 4G/5G Dome Combination antenna range has been designed to provide 4x4 4G/5G MiMo performance in the 617–960/1710–6000 MHz ranges in a robust, low-profile housing. The flexible platform enables the main elements to be combined with a number of other functions including integrated GPS/GNSS and up to 6x6 MiMo Wi-Fi 2.4/5.0 GHz, a requirement that is being increasingly desired by the industry.

The GPS module, which supports GPS, Glonass, Galileo, QZSS and Compass with 26dB LNA gain, features advanced filtering for LTE B13/14, making it a suitable solution for today's high-tech public safety and fleet environments.

The LGMHM4 range is available in a black or white radome that meets IK10 for vandal resistance and ingress protection. The range enables single-hole mounting, thus reducing vehicle damage, installation time and cost.

Panorama Antennas Pty Ltd
www.panorama-antennas.com

Ribbon fusion splicer and cleaver

The Fujikura 70R+ Ribbon Fusion Splicer and Cleaver is a fast and ruggedised ribbon fusion splicer with a splice time of 11 s, sleeve shrink time of approx 29 s and a heat time of 18 s. It is available to rent from TechRentals.

The unit sets a new standard in speed, ease of use and optical performance by incorporating fully automated features such as wind cover and heater operation. Its long battery life can provide up to 110 splice/heat cycles and 1500 splices per set with its extended electrode performance.
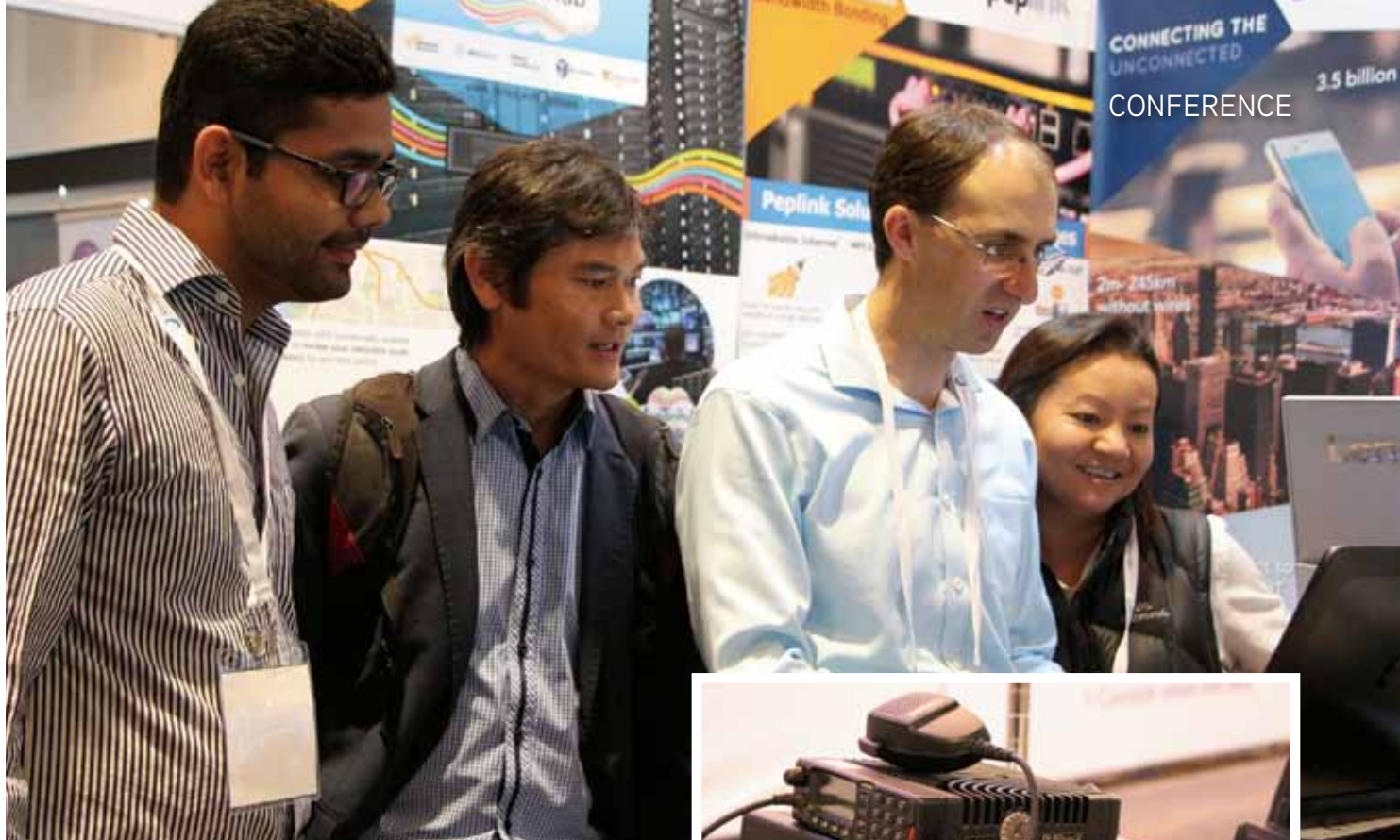
The Fujikura 70R+ has a large 4.73″ colour screen for optimal visibility and offers onboard instructional videos and tutorials for users who might need assistance of any kind. The devices also offer Bluetooth capability, a fibre holder and a transit case with work table.

TechRentals
www.techrentals.com.au

COMMS CONNECT UPDATE

Paul Davis

We're taking steps to continue providing the best options for the Comms Connect delegate, sponsor and exhibitor family.

With recent developments relating to the COVID-19 coronavirus, events all over the world have been postponed or cancelled, with our local Comms Connect conference and exhibition series no exception.

These are obviously very challenging times, and those of us in the events world are having to deal with issues we've never faced before and which we could not have conceived of just a few months ago. With a ban on gatherings and travel hugely restricted, it's just not possible to run any 'live' events currently. So we've had to look very closely at our calendar, at what we had planned and when we might realistically be able to run our face-to-face events again.

Our first move was to postpone our New Zealand conference until the first week of September. But we then took the view that moving it to a date later in October was the best idea, giving more time for all stakeholders to plan their participation after restric-

tions lift and for our marketing campaign to have the time it needs to have impact.

With Comms Connect Sydney it was different, as the last quarter of the year was already busy. A lot of the same clients exhibit at both the Sydney and Melbourne events, and, while the audiences who attend are largely different — with the Sydney event attracting more than 90% of delegates and visitors from NSW, most of whom don't make it to Melbourne — having both Sydney and Melbourne events just a month or two apart at the end of the year wouldn't have been ideal in the current climate. So we have decided to postpone the Sydney event until June 2021.

And so, with the New Zealand event now in October and Sydney now not running until 2021, what about our flagship event, Comms Connect Melbourne, and other initiatives we have had planned for the broader critical communications community?

Well, I'm happy to report that it is full steam ahead for Comms Connect Melbourne

in November. We may see some impact on international travellers this year, but we're taking plenty of bookings for exhibition space and sponsorships and we'll be seeking submissions for speakers shortly. We look forward to welcoming everyone to what will be the first real chance for the communications community to catch up with each other after an extended period of limited contact.

In addition, as you'll have seen, many event organisers are looking at what they can do to fill the gap. How can they deliver quality content and training opportunities to their audiences, and keep them engaged and up to date? Well, we're no exception and are currently working behind the scenes on some plans to run training workshops, panel discussions and micro-conferences.

We know there has been disappointment about Comms Connect Sydney, from delegates/visitors and sponsors/exhibitors. But with these new initiatives, we'll be able to offer the community what it needs and wants — access to experts from the sector, with all their experience, and access to potential customers for our sponsors and would-have-been exhibitors.

Paul Davis is Events Director for WF Media. WF Media is the publisher of Critical Comms.

Comms Connect (WFevents)
www.comms-connect.com.au

Switch

The Crystal Group RCS7850-32Q rugged switch (based on the Ruckus ICX 7850) is a MIL-SPEC switch that offers high network speed with up to 32 ports of 100 gigabit bandwidth, switching and forwarding and routing capacities, as well as a redundant, hot-swappable power supply and real-time data processing and transmission.

Metromatics Pty Ltd

www.metromatics.com.au

Solar battery power systems

The ENSA SSL-B Series comprises professional solar battery power systems with integrated LED lighting that are suitable for wherever main power access is not possible or is inconvenient.

Preconfigured and ready for implementation, the SSL-B Series is available in 56, 80, 120 and 180 W panel sizes, with options for 12 or 24 V power output.

Each model features high conversion monocrystalline solar panel technology with a high capacity lithium iron phosphate (LiFePO4) battery to extend the system's operating time for multiple days of use, even in poor solar conditions.

The solar battery power station also features a 180 lm/W LED area light with customisable microwave motion detection system to conserve power usage. The LED light can be turned on from dusk to dawn or when motion is detected. Includes remote for setting control.

Users can customise their own solar battery power station for off-grid, completely standalone outdoor lighting, security, CCTV, Wi-Fi boosting, remote TX/RX and more.

RhinoCo Technology

www.rhinoco.com.au

Ingress protection testing

Ingress protection is the rating of the degree of protection provided by an enclosure with respect to foreign object ingress. The foreign object may be dust or accidental, or even intentional, contact with water.

The IP Code is formulated from a possible combination of IP tests to provide the full IP rating code. The IP Codes that are shown on many products are defined by International Protection Marking, often called Ingress Protection Marking. Many electrical, industrial and consumer products require IP testing as it is often mandatory by regulation or by contract condition. It has also become increasingly common for marketing claims. Examples include waterproof mobile phones, sports watches and outside equipment enclosures.

EMC Technologies is accredited to test and issue for IP and can issue accredited NATA or A2LA accredited test reports to IEC 60529 or AS 60529 — degree of protection provided by enclosure (IP Code testing) up to IP6X (dust) and IPX8 (water).

Enclosure Protection testing involves assessing ability of the product or its enclosure to provide protection against: ingress of water (drip, spray, jet or immersion); ingress of dust; solid foreign objects; access to hazardous parts; and mechanical impact.

EMC Technologies

www.emctech.com.au

Industrial AC UPS

Helios Power Solutions' DIN rail-mounted industrial AC UPS is suitable for integration into communication/control panels.

The offline device is designed to be lightweight and can provide surge protection. It has an operating temperature up to 50°C; two power ratings: 500 VA/300 W and 850 VA/510 W; and input and output wiring terminals, input CB for protection and a remote on/off terminal.

The UPS has a built-in internal battery (standard size: 9 Ah) and includes auxiliary DC output for powering external communication options. It has a dry contact interface box, Ethernet network card with SNMP and Modbus protocols, and an RS232 communication port.

Helios Power Solutions

www.heliosps.com.au

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- Antenna considerations for MW planning
- Interference
- Link design and the elusive five-nines

TREVOR MANNING
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Additional workshops and content will be announced soon

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ACCURATE MEASUREMENTS FOR 5G COMMUNICATIONS

New NIST testbeds are helping to define how 5G communications will safely interact with other technologies such as 4G, GPS, Wi-Fi and radar.
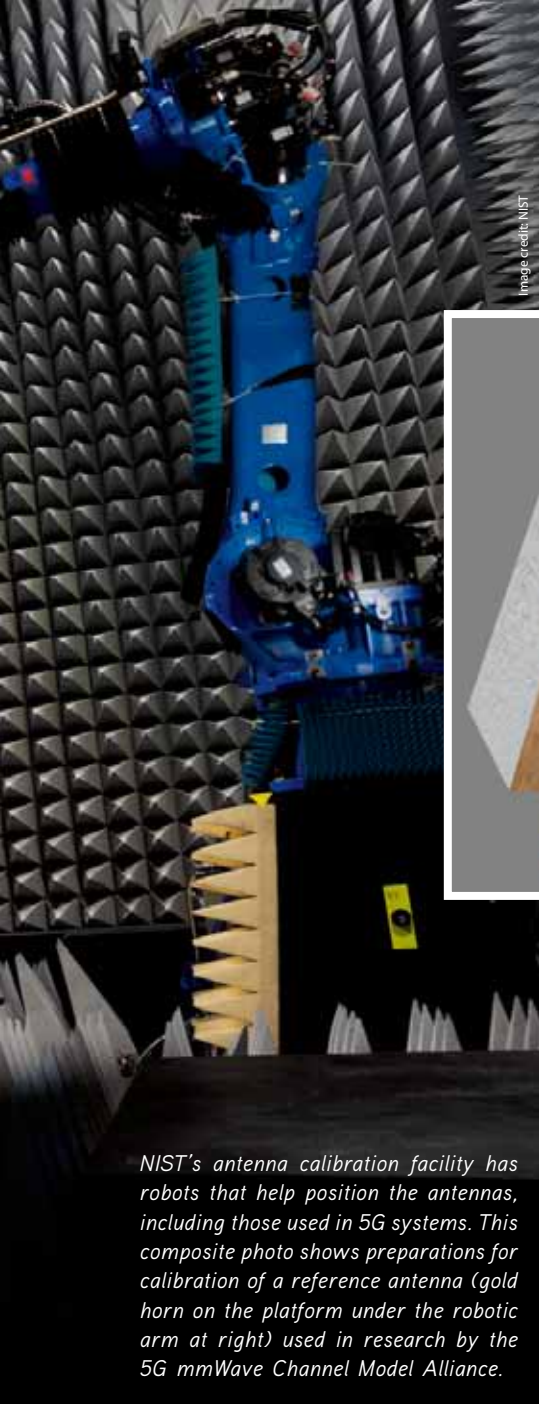
As 5G devices and networks begin to roll out, the US National Institute of Standards and Technology (NIST) is helping to build the crucial measurement infrastructure for emerging wireless systems by developing new measurement methods and analysis tools and by facilitating the sharing of 5G performance data.

These resources can help industry optimise designs for many applications, including mobile phones, the Internet of Things, virtual reality, smart manufacturing and autonomous vehicles.

One new NIST resource is a 5G Spectrum Sharing Test Bed, an adaptable network that can measure how well 5G and systems such as Wi-Fi, GPS and military radar can operate using spectrum sharing.

The testbed will help clarify how thousands of different possible network settings and environments through which signals travel will affect interference between 5G and older systems operating in the same frequency band.

The 5G mmWave Channel Model Alliance, organised by NIST five years ago to address the need for accurate channel

Image credit: NIST

Below: NIST's visualisation tool for 5G systems shows 10 wireless devices attempting to communicate with a base station (dark blue ball in the centre) using different antenna patterns (yellow, green and red clouds). Redder colours indicate stronger antenna transmissions in a specific direction.

Image credit: NIST

NIST's antenna calibration facility has robots that help position the antennas, including those used in 5G systems. This composite photo shows preparations for calibration of a reference antenna (gold horn on the platform under the robotic arm at right) used in research by the 5G mmWave Channel Model Alliance.

"HAVING A NUMBER OF REPRESENTATIVE CHANNEL MODELS ALLOWS SYSTEM DESIGNERS TO DEVELOP ELECTRONICS THAT WILL OPERATE RELIABLY IN COMMON ENVIRONMENTS." — KATE REMLEY, NIST

measurements and models, now has more than 175 participants representing 80 academic, government and industry research organisations worldwide.

The Alliance has produced dozens of datasets and complex models for 5G communications scenarios ranging from offices to shopping centres to outdoor areas. These resources are publicly available and used by many companies and some organisations that set telecommunications standards.
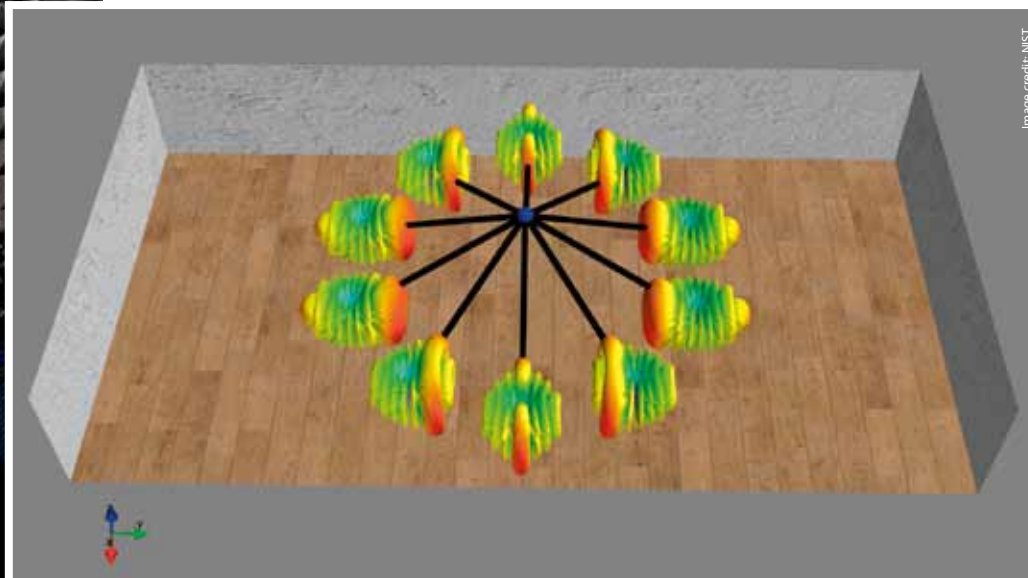
The group has also developed best-practice measurement guidelines for instrumentation used at these frequencies.

"System designers need to know how fast they can send and receive data with a given level of reliability," NIST engineer and Alliance Co-Chair Kate Remley said.

"The data rate and reliability depend on the channel conditions between the transmitter and receiver.

"Until recently, few models or measurements have existed at frequencies where 5G

systems will operate. Having a number of representative channel models allows system designers to develop electronics that will operate reliably in common environments," she added.

Mobile devices such as mobile phones, consumer Wi-Fi devices and public safety radios mostly operate below 3 GHz. In addition to operating in these bands, 5G systems will also use higher, millimetre-wave frequency bands, up to 300 GHz.

Transmissions at these high frequencies promise massive capacity — more than 1000 times that of conventional systems — and connectivity, with billions of users and machines.

But signals at these frequencies lose a lot of energy along the way, which weakens received signal strength, and they don't travel around corners well.

Given the need for accurate channel models and the difficulty in developing models for millimetre-wave bands, NIST has been working to fill gaps in the metrology infrastructure for these frequencies.

The 5G mmWave Channel Model Alliance is developing tools and test methods that are more complete, accurate and appropriate than older versions. Some existing channel models were either unreliable, often retrofitted from legacy models or inadequate to fully characterise 5G channels.

NIST has developed state-of-the-art channel sounders, which identify multiple signal paths between transmitter and receiver. Many channel-sounding measurements are made in a specific environment, such as a city, and then fed into channel models that provide a simplified, yet realistic, representation of that environment.

The resulting output includes dozens of datasets and complex models at frequencies ranging from 28 to 83 GHz.

NIST is also developing antenna evaluation methods to boost 5G capacity and publicly available simulation platforms to evaluate wireless communication system performance.

Another NIST facility — the NIST Broadband Interoperability Test Bed — is also in the midst of a 5G upgrade and will eventually include a suite of four new shielded rooms to enable testing across multiple chambers.

The 5G Test Bed capabilities include a standalone information technology network and 'carrier-grade' commercial base stations, and support for 5G, older 4G systems, Wi-Fi and GPS. It can also be reconfigured to support other networks of interest.

"The 5G NIST testbed will enable us to develop and perform quantitative measurements of spectrum sharing or interference scenarios that are either already deployed or under consideration," NIST engineer Jason Coder said.

Spectrum

The critical need to accelerate PSMB deployments globally

The wireless broadband public safety network in the US, commonly known as FirstNet, was borne out the recommendations from the 9-11 Commission report after the World Trade Center and Pentagon tragedies. The 9-11 Commission concluded that the communications systems used were not sufficiently interoperable to enable first responders to adequately communicate in times of large-scale emergencies. The result was a recommendation for a new, single interoperable public safety network to be implemented across the US.

While it took several years to pass the legislation that ultimately created FirstNet, once completed, efforts moved quickly, resulting in a fully interoperable nationwide broadband network that has provided new advanced communications capabilities to US first responders. This has proven critical — particularly in light of the recent COVID-19 pandemic — and demonstrates the need for such networks to be replicated for public safety in countries around the globe as soon as possible.

Though deploying such networks is challenging, there are ways to take advantage of existing infrastructure and operations to significantly speed up deployment and reduce costs. In less than a year after the FirstNet contract was awarded, service was available to all US public safety personnel on a fully prioritised basis with a dedicated public safety core network. And now, just three years after contract award, coverage has been significantly expanded with newly deployed spectrum, new features have been added (such as mission-critical push-to-talk) and more than 10,000 agencies are using the network on a purely voluntary (not mandated) basis. All of this demonstrates recognition of the need for advanced communications capabilities, particularly in light of the increase in large-scale emergencies we have seen over the last several years, including the current pandemic.

Given the ease of transmission of COVID-19, the public safety sector has had to take unprecedented measures to perform its lifesaving duties. FirstNet now enables critical capabilities to help public safety deal with this crisis, including the ability to engage in reliable and secure telehealth and telemedicine efforts. This is especially important since FirstNet is fully en-

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crypted, so public safety and healthcare professionals are able to securely send rich patient data from the bedside, temporary hospitals, triage facilities and remote testing centres, freeing up critical hospital facilities and resources for those who need them the most.

In addition, FirstNet enables public safety to receive critical information provided by situational awareness applications, mapping and GPS programs, real-time video cameras, biometric sensors and other data sources and Internet of Lifesaving Things devices to increase their own safety and that of the communities they serve.

Despite the scope of network coverage needed in the US, estimated to cost more than US$50 billion to build on a greenfield basis, FirstNet was initially deployed in a matter of months. This was done by developing an operating model, based on public safety's needs, which created commercial incentives for industry to build, operate and maintain the network as part of a public-private partnership with the US government.

The success of FirstNet highlights the ability to deploy public safety grade LTE networks with significantly lower levels of funding when government and industry partner together with aligned incentives and leverage the multitudes of existing wireless infrastructure available today. It takes the appropriate government commitment, dedicated and experienced people, and coordination among government, public safety agencies and industry.

Given the rise in the number of global natural disasters, multinational planned events and now the COVID-19 pandemic, it is clear that countries around the world should expedite their efforts to deploy these mission-critical broadband networks. These networks can be designed and procured very quickly with the right understanding of the operating models and associated incentives that will expedite their deployment to ensure success. Lives literally do depend on it.

Jason Karp is one of the co-founders and principals of the Public Safety Network, prior to which he was the General Counsel and senior executive with FirstNet, where he was responsible for developing and implementing the legal strategy and framework to enable successful deployment of the US public safety broadband network. He has extensive strategic and operational experience building, managing and advising across a variety of technology organisations.

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