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critical comms

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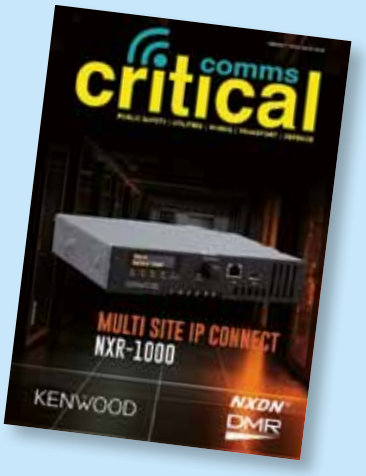
Inside

September/October 2023



KENWOOD is a well-known manufacturer of communication equipment with a reputation for producing high-quality repeaters that are used in various industries, and the new NXR-1000 Series is no exception. At 1RU in height and half a rack in width, this compact yet mighty unit provides 50W transmission and 25W at full duty cycle.

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Do you read me?

Hello and welcome to this bumper issue of ***Critical Comms***, which is being released just in time for our annual Comms Connect Melbourne conference and expo. I am pleased to reveal that this issue features several articles and case studies that will be presented in further detail at the conference, as well as products and services from many of the exhibitors. Our Comms Connect coverage begins this issue with a preview article on page 14.

I have been surprised by the sheer number of critical comms projects announced lately by the Australian Government. In recent months, the government has opened funding applications for the Telecommunications Disaster Resilience Innovation program; sought feedback on the second round of the Peri-Urban Mobile Program; pledged to improve the resilience of 107 ABC radio sites used for emergency broadcasting; teamed up with NBN Co to keep the nbn running in South East Queensland during natural disasters; and awarded the NSW Telco Authority funding to improve digital connectivity during severe weather events. It certainly makes a stark difference to what's been going on in the UK, where the government's failure to deliver a timely Emergency Services Network has resulted in emergency services having to spend millions of pounds to replace their current (close-to-obsolete) devices while they wait for the new network — which does not even have an estimated completion date — to be ready.

The other significant development of late was the news that security consultancy Midnight Blue had discovered five vulnerabilities in the TETRA standard, claimed to allow for real-time decryption, message injection and user de-anonymisation. Of particular concern was 'CVE-2022-24402', a purpose-built backdoor for TETRA's TEA1 algorithm that reduces the original 80-bit key to a 32-bit key — which the researchers were able to crack in about one minute using an ordinary laptop. The European Telecommunications Standards Institute (ETSI) has since acknowledged the need for some areas of improvement in the TETRA protocol, as well as weaknesses in the TEA1 algorithm, saying that these have been or are in the process of being addressed. In any case, this is a timely reminder of the importance of cyber resilience, and our lead article, on page 6, addresses this very subject.

Lauren Davis, Editor
cc@wfmedia.com.au

Calendar

October

ETSI Security Conference 2023
16–19 October 2023
Sophia Antipolis, France
https://www.etsi.org/events/2155-etsi-security-conference-2023

ARCIA 2023 Industry Gala Dinner & Excellence Awards
18 October 2023
Melbourne Convention & Exhibition Centre
https://arcia.org.au/events/arcia-industry-gala-dinner-2023-melbourne/

Comms Connect Melbourne
18–19 October 2023
Melbourne Convention & Exhibition Centre
https://melbourne.comms-connect.com.au/

ACRNA 2023 Conference
24–25 October 2023
The Gabba, Brisbane
https://acrna.org/conference/

November

ITU World Radiocommunication Conference 2023
20 November–15 December 2023
Dubai World Trade Centre, United Arab Emirates
https://www.itu.int/wrc-23/

PMRExpo 2023
28–30 November 2023
Koelnmesse, Germany
https://www.pmrexpo.com/en/

December

IEEE GLOBECOM 2023
4–8 December 2023
Kuala Lumpur Convention Centre, Malaysia
https://globecom2023.ieee-globecom.org/

ICCRA Congress 2023
5–7 December 2023
Le Louise Hotel, Brussels, Belgium
https://www.iccra-congress.com/

January

WONS 2024
29–31 January 2024
Avoriaz 1800, France
https://2024.wons-conference.org/

For a full list of industry events, see criticalcomms.com.au/events

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Critical communication solutions for rail and metro

– When reliable communication is crucial

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HOW TO MOVE BEYOND TRADITIONAL SECURITY

BUILDING CYBER RESILIENCE IN OPERATIONAL TECHNOLOGY

*Michael Murphy, Acting Operational Technology Leader, APAC, Fortinet**

As the digital era continues to evolve, operational technology (OT) environments, including professional radio communication systems used by public safety professionals, are rapidly integrating with information technology (IT) systems to improve efficiency and productivity. As a result, they have increasingly become prime targets for cybercriminals. The transition from isolated, air-gapped systems to internet-enabled ones exposes OT environments to a myriad of cyberthreats previously targeted at IT systems.

Among these threats, radio-based cyber attacks are of particular concern. Notably, the Terrestrial Trunked Radio (TETRA) standard, a system used by crucial infrastructure sectors, recently experienced the disclosure of five security vulnerabilities, known as TETRA:BURST. These vulnerabilities pose a significant risk to OT systems and operations as they allow real-time decryption, message injection and user de-anonymisation. Two of the most severe, CVE-2022-24401 and CVE-2022-24402, can respectively disclose encrypted communications and allow data injection into industrial monitoring and control traffic.

These attacks involve a threat actor intercepting or emitting radio signals for malicious purposes. They often target wireless communications that are not encrypted or have weak authentication protocols. This means OT operators must move beyond merely safeguarding their systems to prioritise building resilience more proactively within their OT environments.

Sophisticated threat actors targeting OT environments can cause extensive damage, creating health and safety hazards, tarnishing reputations, and leading to significant financial and intellectual property (IP) losses. This is especially impactful for public safety professionals whose radio systems are critical for coordinating responses to emergencies. Unlike threats to IT systems, which are often financially motivated, the motives behind OT attacks vary. From geopolitical conflict and disruption to ego-driven subgroups and IP theft, the reasons are as diverse as they are destructive.

Additionally, OT cyber attacks tend to have more negative effects than IT threats as they can also have physical consequences. For example, cyber attacks focused on OT can trigger facility shutdowns and equipment malfunctions, and even cause plant explosions.

In 2022, a series of near-miss cyber attacks on OT systems occurred as threat actors attempted to disrupt various critical infrastructure (CI) providers globally. In Moscow, cybercriminals tried to spoil 40,000 tons of frozen meat at Seliatino Agrohub by manipulating temperatures, while multiple Indian State Load Despatch Centres weathered an eight-month-long, state-sponsored attack from China. Meanwhile, Ukraine faced targeted assaults on its high-voltage substations and power plants by Russia, and Mexico's Secretariat of Infrastructure, Communications and Transportation (SICT) experienced an attack threatening to disrupt international trade and truck operations.

Building resilience in OT environments

As threat actors shift their focus towards disrupting OT environments, it's important that OT operators, including those maintaining professional radio systems, strengthen their resilience strategies. Building cyber resilience within the OT sphere is not just about defending against cyber attacks; it's about enduring them and maintaining operations even when they occur. To build resilience, it's important to achieve a level of cybersecurity maturity on par with IT networks. This means shifting from respond-

ing reactively to threats and adopting a proactive, anticipatory posture. Several best practices to enhance OT resilience include:

1. Centralised visibility. A lack of centralised visibility increases risk and weakens an organisation's security posture. To bridge the gap between OT and IT security, a centralised system that offers comprehensive, real-time visibility into all communication assets, networks and operational processes is crucial.

2. Automated asset management. For greater cybersecurity resiliency, organisations must consider automating their asset inventory. Automated asset management provides a consolidated view of all communication assets, including both known and unknown devices. With this information, threats can be identified and countered before they escalate.

3. OT network segmentation. Without deliberate division of control systems and data networks, like industrial control systems (ICS) and supervisory control and data acquisition (SCADA) systems, cyberthreats may freely infiltrate operational systems. By segmenting these networks, vulnerabilities are reduced, monitoring of data traffic is simplified, access is limited to authorised personnel, and the lateral spread of threats is prevented.

4. Regular security evaluations. Building resilience requires regular security assessments. Tactics such as red teaming and penetration testing simulate real-world attacks, checking the organisation's ability to detect and respond to threats, and evaluating the risk against crucial communication assets.

5. Measuring cyber resilience. For OT operators, it's essential to keep track of their cyber resilience. This involves analysing the current threat landscape, tracking how risks change based on proactive steps taken, and then using that information to strengthen defences to ensure ongoing operations and business continuity.

6. Vulnerability management. Creating a risk-based inventory and developing risk management frameworks to proactively identify, assess and mitigate incidents is vital. Alignment with IT systems and ongoing evaluation can enhance security considerably.

7. Security controls. Implementing robust processes and technologies can shield OT environments from internal and external cyber attacks. Secure authentication, authorisation and data encryption practices, alongside active system monitoring, are key to this effort.

> **OT OPERATORS SHOULD INVEST IN SPECIALISED TRAINING THAT ADDRESSES THE UNIQUE CYBERSECURITY CHALLENGES SPECIFIC TO OT SYSTEMS.**

Raising the awareness of cyberthreats through education

To effectively build cyber resilience, OT operators must also invest in employee awareness and training programs, equipping their workforce with the knowledge and skills to identify and respond to potential threats. By fostering a culture of cybersecurity awareness, employees become the first line of defence against attacks. Training sessions should cover topics such as recognising phishing attempts, practising secure authentication and password management, and understanding the importance of regular software updates.

Additionally, OT operators should invest in specialised training that addresses the unique cybersecurity challenges specific to OT systems. This includes understanding the risks associated with integrating OT and IT systems, identifying vulnerabilities in legacy systems and implementing secure configuration practices.

The path to operational resilience

In this ever-evolving digital landscape, there's a heightened, global susceptibility to ransomware attacks that will continue to shape the OT cyberthreat scenario. Unfortunately, many communication systems used in emergencies aren't secure enough, making them easily accessible without permission. While the systems used by the military or government are usually the main targets, others, including those used by emergency services, hospitals, airports and data storage centres, are also at risk.

Threat actors targeting the OT space are patient, well-funded and highly motivated. There will continue to be an upswing in ransomware attacks directly disrupting operations by targeting industrial control systems (ICS) across a range of industries, organisations, vendors and subsidiaries. The intensification of these attacks is driven by several factors, such as rising geopolitical tensions, the debut of the LockBit Builder, and the persistent expansion of the ransomware-as-a-service (RaaS) model. These elements contribute to the increase in ransomware activity, substantially impacting industrial organisations and reshaping the threat environment.

As the OT sector continues to connect with the cloud and the internet, its exposure to cyberthreats continues to grow. OT operators must understand the changing landscape and secure their operations accordingly. Recognising the risks, the motives behind attacks, and the strategies of different threat groups is critical to developing and maintaining a resilient OT environment. It's time to shift perspective on OT security, from simply defending against threats to actively building resilience that anticipates, withstands and mitigates these steps. The move to a more resilient OT environment can be complex, but the journey is not just necessary, it's inevitable.

**Michael Murphy is the Head of Operational Technology and Critical Infrastructure at Fortinet. Michael has more than a decade of real-world experience in CI, with a background in critical incident response and digital forensics. He has held various roles as a cybersecurity practitioner and has built OT incident response teams for events with real-world ramifications using a broad range of structured knowledge and pre-existing frameworks and standards. Michael's experience has taught him that adaptability and agility in these scenarios are just as valuable if not more so than any playbook. Michael's role with Fortinet focuses on assisting organisations to build cyber resilience for OT while helping them understand how to achieve strong outcomes for OT security.*

Image shows an artist's impression of the SKA-Low telescope antenna station at Inyarrimanha Ilgari Bundara, the CSIRO Murchison Radio-astronomy Observatory. Image ©DISR

WHITE RABBIT DEVICES TO SUPPORT SQUARE KILOMETRE ARRAY

Safran Electronics & Defense has announced it will provide more than 200 White Rabbit (WR) devices for the Square Kilometre Array Observatory (SKAO). The SKAO is building two next-generation radio telescopes that are set to revolutionise our understanding of the universe by observing the sky in unprecedented detail.

White Rabbit is a collaborative project including CERN, the GSI Helmholtz Centre for Heavy Ion Research and other partners to develop a fully deterministic Ethernet-based network for general-purpose data transfer and sub-nanosecond accuracy time transfer. It provides sub-nanosecond synchronisation accuracy, which formerly required dedicated hardwired timing systems, with the flexibility and modularity of real-time Ethernet networks.

The SKA telescopes will meanwhile allow astronomers to observe the universe over a broad range of frequencies, from low-frequency radio waves at 50 MHz up to mid-frequency waves of 15.4 GHz. The data generated by the telescopes will be used to study a wide range of astrophysical phenomena, from the formation of the first stars and galaxies to dark matter and signatures of life beyond Earth.

"The integration of White Rabbit technology with the SKA telescopes represents a crucial step in ensuring the success of this pioneering project," said Carlos Valenzuela, Navigation & Timing, Product Manager with Safran Electronic & Defense. "White Rabbit allows users to synchronise remote devices within one billionth of a second (1 nanosecond). It will enable the telescopes to achieve the level of precision and accuracy required to generate groundbreaking scientific insights into the mysteries of the universe."

Australia will host the SKA-Low telescope, which will have 131,072 antennas receiving low-frequency radio waves. South Africa will host the SKA-Mid telescope, comprising 197 dish antennas receiving mid-frequency radio waves.

"The SKA project has a strict timing requirement for its operation with a performance below two nanoseconds, which is not achievable by Network Time Protocol (NTP) or Precise Time Protocol (PTP) technology," Valenzuela said. "The WR-Z [White Rabbit Z] platform is a critical solution developed through Safran's Navigation & Timing portfolio for the SKA telescopes' pulse per second (PPS) distribution system. It is a new design integrating WR technology, thus enabling sub-nanosecond accuracy."

Carlos Frias, EMEA Technical Sales Market Manager for Safran Trusted 4D, said WR-Z had been evaluated in different scenarios to demonstrate its timing performance in dynamic environment conditions fulfilling the SKA telescopes' requirements for PPS distribution. It will thus enable the SKA PPS distribution system to synchronise the thousands of antennas and dishes spread across Australia and South Africa.

NOKIA CLAIMS EXTENDED RANGE MMWAVE 5G SPEED RECORD

Nokia says it has achieved sustained average downlink speeds of over 2 Gbps using millimetre wave (mmWave) spectrum and 5G Fixed Wireless Access (FWA), over a distance of 10.86 km. This download speed, understood to be the fastest recorded to date, was accomplished using Nokia's 5G extended range mmWave solution at the OuluZone test facility in Oulu, Finland.

The test utilised the company's AirScale baseband and AirScale 24 GHz (n258 band) mmWave radio as well as Nokia FastMile 5G PoC CPE (customer premises equipment), which is currently being trialled by major operators globally. High speeds over significant distances can be achieved with its high-gain 360° antenna (27 dBi), which dynamically adapts to changing conditions to overcome mmWave deployment challenges.

Testing involved eight component carriers (8CC) in the downlink, aggregating 800 MHz of mmWave spectrum. This enabled a top downlink speed of 2.1 Gbps and an uplink speed of 57.2 Mbps.

The achievement, which builds on a previous world record announced by Nokia in 2021, demonstrates the reach and connectivity speeds that 5G mmWave can deliver. It also lays the foundations for high-quality internet connectivity solutions delivered via FWA to areas where wired connections are not always possible.

"We just set a new speed record for extended range 5G mmWave," said Ari Kynäslahti, Head of Strategy and Technology at Nokia Mobile Networks. "This demonstrates that mmWave solutions will be an essential building block for operators to efficiently deliver widespread, multi-gigabit 5G broadband coverage to their customers in urban, suburban and rural areas, complementing sub-6 GHz spectrum assets. This is a substantial achievement that reflects how we are constantly innovating and evolving our 5G services and solutions."

Nokia's mmWave radio portfolio comprises compact high- and medium-power solutions, offering a wide range of deployment options that provide flexibility in ensuring service continuity across a wide variety of environments.


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TELSTRA AND ERICSSON PERFORM VOICE OVER NEW RADIO CALL

Telstra and Ericsson say they have achieved Australia's first implementation and validation of the next evolution of 5G technology, using Ericsson's pre-commercial Reduced Capability (RedCap) software to make a Voice over New Radio (VoNR) call over Telstra's 5G commercial network.

RedCap is a RAN software solution that enhances existing 5G use cases and enables new ones for devices such as smartwatches, other wearables and industry sensors. Building on the progress of 4G IoT technologies such as Cat-M and narrowband IoT, it delivers benefits including reduced device chipset cost, complexity and power consumption, while supporting higher data rates and key 5G service enablers delivered via 5G Standalone.

VoNR is the method by which voice calls can be handled over the 5G network, and was achieved by Telstra and Ericsson through the use of a MediaTek RedCap testing device. The voice call on frequency division duplex (FDD) was made in Box Hill, Victoria, and signals the start of ongoing testing and validation of this new 5G capability on Telstra's network.

"With this Australia-first Voice over New Radio call using the Ericsson Reduced Capability software, Telstra is paving the way for new 5G use cases and enhancing uses across consumer, industrial and enterprise devices that don't require the full range of 5G's capabilities," said Emilio Romeo, Head of Ericsson, Australia and New Zealand. "We're pleased to be working with Telstra and MediaTek to make this Voice over New Radio call, and push the boundaries of technology by bringing greater 5G capabilities to the ecosystem."

"This evolution of the latest 5G technology capability provides so many more opportunities for intelligent IoT devices to enhance our everyday lives," added Nikos Katinakis, Telstra Group Executive for Global Networks & Technology. "Using less power and being capable of delivering our customers more value is something that Telstra is incredibly committed to."

FIRSTNET, BUILT WITH AT&T ANNOUNCES MEMBERSHIP OF TCCA


Image courtesy of FirstNet, Built with AT&T

FirstNet, Built with AT&T has announced its membership of The Critical Communications Forum (TCCA), the global member-led organisation working for the advancement of critical communications. As a member of TCCA, FirstNet will be able to share its expertise on public–private partnerships for mission-critical communications networks and help guide the industry to create more innovative solutions that will help keep communities and first responders safer around the globe.

Shaped by the vision of the US Congress and the first responder community following the 9/11 terrorist attacks, FirstNet is built with AT&T in public–private partnership with the First Responder Network Authority (FirstNet Authority) — an independent agency within the federal government. As the only network built with and for America's first responders and the public safety community, FirstNet provides first responders with benefits such as always-on priority and pre-emption, as well as high-quality Band 14 spectrum to give them a dedicated lane of connectivity when they need it. Today, the FirstNet network is delivering its dedicated Band 14 spectrum and its physically separate and dedicated core to over five million connections, covering more than 25,000 public safety agencies.

"As public safety's partner, we intimately understand the importance of communications in a crisis," said Ryan Burchnell, AT&T's Director of FirstNet Strategy & Development. "By working alongside TCCA and its members, we can further open up conversations with government agencies, device manufacturers, application providers and other mobility operators around the world to collaborate on mission-critical solutions."

Within its Working Groups and interoperability and certification programs, and via its flagship Critical Communications World event, TCCA along with its members and partners sets the agenda for the global development of critical communications. Prior to FirstNet, the most recent organisation to join TCCA was Druid Software, whose innovative Raemis platform supports 2G, 3G, 4G and 5G as well as integration with Wi-Fi.

"The strategy of many governments to deliver mission-critical broadband to their essential agencies is through partnering with existing wireless telco networks," said TCCA CEO Kevin Graham. "We are very pleased to welcome FirstNet, Built with AT&T to our global membership, given the highly successful partnering they have established with the FirstNet Authority to build their FirstNet capability across the US.

"We look forward to the valuable information sharing they can contribute to peers and end users across our global community, allowing our members around the world to leverage their success."

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SIGNIFICANT COSTS TO UK EMERGENCY SERVICES AS ESN DELAYED

Significant costs are being created for emergency services by the UK Government's failure to deliver a replacement communication network, according to a new report from the UK Parliament's Public Accounts Committee (PAC).

The government started the program to deliver a new Emergency Services Network (ESN) in 2015 and expected to turn off the current system, Airwave, in 2019. Airwave will eventually become obsolete and does not provide users with access to modern mobile data. But the government still does not know when ESN will be ready and, despite having spent some £2 billion, ESN has not delivered anything substantial or reduced any risks, the report found.

The PAC's inquiry — its fourth into the delayed program — looked into how much delays to ESN had cost the emergency services, which have had to pay for additional Airwave devices as a result. ESN transitional costs for the ambulance service amount to £9.5m, while the fire service said it had spent £6m preparing for transition and £2m on early versions of ESN, which now had to be replaced. Police forces estimate that Airwave devices cost £125m since 2018 and expect to spend another £25m by 2026. Forces had spent a further £5m on transition teams. Further costs are inevitable, according to the report, as current systems will be obsolete in 2028 and may need replacing again before ESN is ready.

The report warns that the Home Office appears complacent in its confidence that it could reduce the risks to the project, and its optimism appears disconnected from the reality of its performance to date and the challenges ahead. Following Motorola's departure from the project, having already been paid some £140m without the taxpayer getting full value, only limited further progress can be made before the Home Office finds a new supplier. Other challenges include integrating the various parts of ESN together, testing the technology, providing the right level of coverage and resilience, and transitioning all emergency services onto the new service.

The PAC is now calling on the government to explore how to help fund the transition to ESN, new Airwave devices and maintaining Airwave for emergency services, as well as producing an outline plan for the main building blocks of ESN by the end of 2023.

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APPLICATIONS OPEN FOR $50M TELCO RESILIENCE PROGRAM

The Australian Government has officially opened applications for the $50 million Telecommunications Disaster Resilience Innovation (TDRI) program, to fund projects that improve the resilience of the telecommunications network during natural disasters — particularly in rural, regional, remote and First Nations communities.

Reliable communications coverage is vital in emergencies and natural disasters to ensure Australians can contact Triple Zero, receive emergency information, and stay in touch with family and friends. The TDRI program is set to accelerate the development and deployment of new and innovative solutions to address communications issues during natural disasters. There are two concurrent rounds of the program that are now open for applications:

- The $30 million Power Resilience Round will fund solutions that reduce the impacts of power outages — the leading cause of telecommunications disruptions during natural disasters. This includes standalone off-grid power solutions, deployable power supplies, and technology to extend how long backup power gives to telco infrastructure.
- The $20 million Innovation Round will fund innovative earlier-stage technologies to improve the resiliency, redundancy and availability of telecommunications during disasters. This includes new or enhanced satellite connectivity — like low Earth orbit satellites — and new ways to monitor networks and share critical information with emergency services.

"The new Telecommunications Disaster Resilience Innovation program will fund a wide range of innovative local projects across Australia to reduce the likelihood of telco outages during disasters," said Minister for Communications Michelle Rowland. "I strongly encourage the sector to engage with communities across the country to develop and submit proposals that will ensure Australians are able to stay connected when they need it most."

Minister for Emergency Management Murray Watt added that the TDRI program is "another step in the Albanese government's plan to ensure we're better prepared for disasters, through investments in mitigation and resilience works, upgraded warning systems and more reliable communication systems". It is part of the government's $1.1 billion Better Connectivity Plan for Regional and Rural Australia, and complements work taken by the government to boost the resilience of ABC broadcasting towers (through the Broadcasting Resilience Program) and mobile networks (through the Mobile Network Hardening Program).

Grants are generally available for mobile network operators (MNOs), mobile network infrastructure providers (MNIPs), NBN Co, and companies with an ABN with relevant expertise or experience. Applications for both streams are open until 5 pm AEDT on 20 October 2023.

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COMMS CONNECT

COME ON DOWN TO COMMS CONNECT MELBOURNE

Lauren Davis

The Southern Hemisphere's premier critical communications and public safety event, Comms Connect, is returning to the Melbourne Convention & Exhibition Centre (MCEC) from 18–19 October.

This year's conference is jam-packed with both local and international speakers, including some of the world's leading authorities on public safety, emergency services and critical communications technology. It will be held across three concurrent streams — Public Safety and Emergency Management, Technology, and Industry — with attendees able to build their own agenda by selecting the sessions of most interest to them.

The 18th edition of Comms Connect Melbourne will feature more international industry experts than ever before, with Canada, USA, New Zealand, Singapore and Hong Kong all represented on the conference program. FirstNet USA Executive Director Joe Wassell will keynote on day one, where he will explain how the FirstNet network has provided first responders with the best possible PSBN experience to protect their country. Julian Gorman, APAC Head of the GSMA, will travel from Hong Kong to headline day two on the subject of new technologies driving changes in critical comms networks. Other key international speakers include Dereck Orr and Brianna Huettel from the US National Institute of Standards and Technology (NIST), speaking separately on pre-incident planning and next-gen broadband technology; and Phil Crnko from Canada's PSBN Innovation Alliance, addressing innovation in first-responder communication.

Several speakers are also making the journey across the ditch, with an update on New Zealand's Public Safety Network being presented by Steve Ferguson and Paul Smith from Next Generation Critical Communications (NGCC) as well as Vaughan Matthews from Hourua. NGCC and Hourua made headlines back in July when they launched a multi-network cellular roaming service, providing emergency services with better access to mobile broadband and around 28,000 km^2 of additional coverage to help them better serve the community while staying safe. You can read more about the significance of this milestone in the article on page 78.

In terms of local stories, representatives from Tasmania's Department of Police, Fire & Emergency Management will cover the journey so far for the $763 million Tasmanian Government Radio Network (TasGRN) — from its inception in 2020 to its launch in July — and how it brought together eight organisations into one consolidated network to improve emergency services and government agency communications. Richard Gibb, from Fire and Rescue NSW (FRNSW), will meanwhile detail how FRNSW has embarked on an extensive Connected Firefighter program of works, to uplift and enhance critical comms across the organisation to provide connectivity to firefighters on the frontline anytime, anywhere. You can learn more about some of the recent comms upgrades for firefighters in NSW, as well as their neighbours in Queensland, in our article on page 38.

Other local industry leaders will include NSW Telco Authority Managing Director Kylie De Courteney, making a welcome return following her keynote last year; Australian Mobile Telecommunications Association (AMTA) CEO Louise Hyland, presenting on the power and potential of mobile networks and 5G in emergencies; ACMA's Dominic Byrne, with a regulatory update; Telstra's Sri Amirthalingam, speaking on critical comms across Australian industry; and Chris Dowling from the Telecommunications division of the Victorian Department of Government Services, with an update on the $550 million Connecting Victoria program.

In addition to case studies and technical papers focused on industry, technology, public safety, emergency and disaster response communications, three leadership panels will be held across the two days of the conference, featuring local and international panellists representing emergency services, government and telco leaders. These sessions will cover "The future of critical communications — from narrowband to broadband and everything in between", "Public Safety Mobile Broadband — global lessons learned and the local way forward" and "Where to with P25 in Australia?". The full conference program can be viewed at https://melbourne.comms-connect.com.au/program/.

Comms Connect association partners ARCIA and ACCF/TCCA have also put together six preconference workshops, covering subjects including private LTE/5G fundamentals, designing and planning microwave networks, mission-critical broadband and P25 standards. The workshops will be held at the MCEC on 17 October, serving as a valuable forerunner to the Comms Connect conference presentations. For more details and to register for the workshops, visit https://melbourne.comms-connect.com.au/workshops/.

Over 70 leading vendors will be presenting their wares on the expo floor on 18–19 October, giving attendees the chance to get up close and personal with the latest products and solutions. Telstra headlines the event sponsors, as Innovation Partner, while the Platinum Sponsors are Hypha, L3Harris, Simoco Wireless Solutions, Tait Communications and RFI Technology Solutions. The full list of exhibitors is available at https://melbourne.comms-connect.com.au/2023-exhibitors/.

The exhibition hall will also host networking drinks on the evening of 18 October, which will be followed in the Convention Centre's Sovereign Room by ARCIA's Gala Dinner and Industry Excellence Awards (emceed this year by comedian and entertainer Paul McDermott). ARCIA recently announced a revamp of the awards and is excited to see nominations coming in for the updated categories, which will celebrate the best people and projects across the local industry. To book for the Gala Dinner, visit https://events.humanitix.com/2023-arcia-industry-gala-dinner.

It's clear that the world of critical comms is at a turning point, and Comms Connect Melbourne will provide the chance for attendees to learn about just some of the possibilities that are on the horizon. So don't delay — register now at https://melbourne.comms-connect.com.au/pricing-registration/.

COMMS CONNECT
Events for critical communications users and industry

2023 NEW | PRODUCT SHOWCASE

STAND 22

Mobile control head upgrades

Tait solutions are designed for maximum flexibility, to be tailored to each customer's needs. Tait TM9000 mobile radios have a wide range of control heads, microphones, speakers and installation kits to suit a variety of different vehicles and types of operation.

Three new control heads are becoming available this year for use with Tait TM9000 DMR and P25 mobiles. All three control heads have a bright, easy-to-read, high-resolution colour display.

The control heads will be available to order with new radio packages or could be fitted to existing TM9000 fleets to provide an improved user experience. They can be used with either standard Tait microphones or Tait keypad microphones.

The TCH3 is a local mount control head with a built-in 4 W speaker. It is compact, the same width as the TM9000 radio body that it attaches directly to. The user interface includes four programmable function keys (including two softkeys).

The TCH4 is a DIN-sized remote mount control head with a built-in 4 W speaker. It has five programmable function keys (including two softkeys).

The TCH6 is a DIN-sized remote mount control head with built-in keypad, and requires an external speaker to be connected. It has five function keys (two softkeys).

Tait has 10 W standard external speakers or 15 W rugged external speakers that can be connected to any TM9000 mobile radio to provide louder, clearer audio in high noise environments.

One of the function keys on each head is orange and can be used as a dedicated emergency key. The TCH4 and TCH6 also feature a built-in covert microphone for use in emergency mode.

Tait Communications

www.taitcommunications.com

STAND 18

Control centre solutions

Frequentis safety-critical communication and information solutions leverage more than 75 years of cross-industry experience in civil aviation, defence, public safety, maritime and public transportation, and have been deployed locally in Australasia for over two decades. The company's public safety portfolio supplies emergency service organisations with easy-to-use control centre solutions.

LifeX is a future-oriented public safety communication and collaboration platform designed to satisfy all the demands of a next-generation control room and its multimedia handling. The software seamlessly integrates with existing IT infrastructure with options of on-premises, SaaS or cloud deployment.

Multimedia mission-critical data services are essential to support crucial functions and features such as situational awareness, position tracking, distribution of images or live video streams. MissionX is an integrated, end-to-end solution based on mission-critical services (MCS/MCX), which enables mission-critical multimedia communication over public, dedicated and hybrid standardised 4G/5G mobile networks. The Frequentis OnSite mobile client provides MissionX services for first responders.

Both products support NG000 and NG111.

Frequentis Australasia

www.frequentis.com

STAND 11

4G and 5G network software solutions

Nokia has announced its optimised Core network software solutions for the field and wide area network (FAN/WAN) needs of public safety and power utilities, expanding the portfolio range available to large, mission-critical enterprises and governments.

Nokia Core Enterprise Solutions are based on the company's widely deployed Core products and have been optimised to help enterprises take advantage of secure carrier-grade capabilities and digitalise their network infrastructure to realise increased automation, productivity and efficiency.

Nokia Core Enterprise Solutions are an integral component of Nokia's private wireless solution and designed for enterprises and governments that have networking requirements similar to a communication service provider. They are tailored to the specific mission-critical network needs of public safety and power utilities, and include optimised footprint and operational requirements and streamlined deployment and support.

The solutions provide unified 4G and 5G data, voice and subscriber/device management capabilities, and create streamlined adoption paths across technology and application generations. These include use of broadband-enhanced communication tools for public safety and the introduction of IoT in power utilities.

The solutions are expected to provide important catalysts for accelerating digital transformation for enterprises in public safety and power utilities. They will modernise large-scale enterprise networks, as well as provide important broadband capabilities and a clear path to deploying private 5G for the WAN.

Nokia Solutions and Networks Australia Pty Ltd

www.nokia.com

MAXIMISE QUALITY AND PERFORMANCE OF PRIVATE NETWORKS

5G brings the possibility of faster and safer operations as well as new capabilities and efficiencies in industrial processes. Still, it comes with increased complexity and performance demands for the network. Accurate and insightful testing at every phase of the mobile network rollout helps to prepare, deploy, and operate smart factories faster while using network resources more efficiently and being aware of issues before they become critical.

For more info: www.rohde-schwarz.com/5G

ROHDE&SCHWARZ

Make ideas real

COMMS CONNECT
Events for critical communications users and industry

2023 NEW PRODUCT SHOWCASE

STAND 31

LTE/5G mobile network support

Choosing a partner for the support and development of private LTE/5G networks is a complex task. Private LTE stands out for its economic efficiency, flexibility and social responsibility, employing a full stack of qualified engineers to support end-to-end core, radio and operation subsystems from vendors such as Nokia, Ericsson and Huawei. The company specialises not only in building new networks but also in offering technical support for existing ones. Its high-quality service covers everything from small audits, to ad hoc activities (such as coverage checks and service verification), to medium exercises (eg, new base station planning and integration), and finishing with full 24/7 network control and supervision. Private LTE employs local experts and straight processes to offer services that are competitive with traditional equipment vendors without compromising on quality. The company's social policy means that 10% of the profits go towards supporting Aboriginal and Torres Strait Islander people, contributing to social projects.

The experts at Private LTE are quick to adapt to client needs, offering flexible and scalable solutions in the field of LTE/5G. With its high-quality services and participation in socially significant initiatives, Private LTE is a responsible pair of hands for private LTE/5G networks.

Private LTE Networks of Australia

www.PrivateLTE.com

STAND 32

Fibre infrastructure

Cambium Networks has released a comprehensive, all-in-one solution that integrates fibre technology with licensed and unlicensed fixed wireless, Wi-Fi and quality of experience (QoE) — all efficiently managed through the company's cnMaestro X management system — enabling users to economically build a futureproof network.

The solution features the latest Combo PON technology with simplified configuration. Optical line terminals (OLT) with 8- and 16-port options keep operations simple yet scalable, while indoor optical network terminals (ONT) and PoE-powered outdoor ONTs open up numerous options for deployment.

The infrastructure includes full-featured Combo (GPON/XGS-PON) technology; a user-friendly interface designed for service providers; zero-touch provisioning and configuration; live technical support; indoor and outdoor ONT options; and integration with existing fibre and Cambium wireless networks.

Cambium Networks Ltd

www.cambiumnetworks.com

STAND 25

Digital mobile radio platform

The Simoco digital mobile radio platform provides high-performance, flexible and resilient mobile radio technology, offering high audio quality and seamless, user-intuitive operation. It integrates fundamental radio technologies into a versatile multimode system, encompassing DMR, analog, MPT1327, P25 Phase 1 and the recent addition of P25 Phase 2. The mobile radio is suitable for all markets but particularly public safety, transportation, mining and local government customers.

The platform is P25 TIA-102 standards compliant, with P25 Phase 1 and 2 compatibility. The screen layout and menu are based on the SRM9000 P25 series mobile radio for easy user migration.

The product includes 3200 radio channels and has flexible GPS location service options. It is compatible with Simoco Velocity for custom IoT and applications, and offers integration with PTToC Velocity applications.

Other features include a large SDM630 console LCD display, a single control head multiple transceiver option, a dual control head single transceiver option and a handheld controller option.

Simoco Wireless Solutions Pty Ltd

www.simocowirelesssolutions.com

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www.heliosps.com.au

The optional Intelligent Controllers on Modular Power, Platinum Series and Distribution Series 3 include a secure, easy to use web browser interface which provides remote monitoring, alarm reporting, and control of the system over an Ethernet link. SNMP support allows integration of the power systems into your wireless network management infrastructure.

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COMMS CONNECT
Events for critical communications users and industry

2023 NEW | PRODUCT SHOWCASE

STAND 34

Telescopic, tilt-over and lattice section masts

NBS Masts & Accessories is now owned by ZCG Antennas, one of Australia's largest RF communication manufacturers. NBS's range features telescopic, tilt-over and lattice section masts, which are used across the emergency services, broadcasting and telecommunications industries.

The company's telescopic masts feature clear anodised aluminium telescopic sections that allow for a quick, lightweight mast solution for emergency communications, monitoring and conservation applications. The simplistic yet robust design of the telescopic masts allows for installation in a wide range of locations that demand varying height and head loading requirements. 3.4 to 16 m options are available with guy ropes.

Its tilt-over masts allow for a higher load rating over a standard telescopic mast; the NBS-Tiltmast also has a set 'fall-over' footprint allowing for narrow access without the need for elevated platform access. A three-piece, galvanised steel, fully welded tilt-arm includes above- and in-ground bases normally concreted in to support heavy loads. 8 m Duragal extensions and other mounting accessories are available.

The company's quad-sided open-lattice section masts are constructed of high-grade 6082-T6 structural aluminium, known for its good corrosive resistance. Supplied in 3 m sections, the NBS-SAL lattice section masts are suitable for guy-supported telecommunication towers or temporary quick-setup portable communication requirements. Each section simply joins together utilising the joining plugs and sockets.

ZCG

www.zcg.com.au

STAND 19

Multiband portable radio

The L3Harris XL Converge 200P is designed to provide coverage that goes beyond the call of duty. The product provides loud, clear audio over P25 radio systems in sound-challenged situations — and with data sharing over nationwide broadband networks, users have more ways and more places to connect in a rugged form factor.

Leading-edge connectivity across VHF, UHF, 700/800 MHz and broadband LTE keeps the user connected to the entire team. GPS, Bluetooth and Wi-Fi come standard. From wireless updates to a personal Wi-Fi hotspot, the XL 200P keeps working so users can stay focused on what's important.

Challenging environments are not a problem, as an amplifier and dual speakers with noise cancellation deliver crystal-clear audio. Engineered for high performance in severe environments, the ruggedised multiband radio meets tough MIL-SPEC standards. It also includes a 10-hour, all shift long-lasting battery.

Featuring expanded interoperability for seamless communications, advanced noise cancellation, and voice and data encryption for secure open-platform communications, the XL 200P is designed by and for those on the front lines.

L3Harris

www.L3harris.com

STAND 59

5G site testing solution

Site acceptance is by no means trivial, so well-defined test procedures and proper test tools should be used to create reliable and efficient results. After a 5G site is installed, fundamental cell site performance must be secured, all parameters must be inside a specified range and additional 5G capacity needs to be advertised in the related LTE anchor cells. Enter the R&S 5G Site Testing Solution (5G STS).

As soon as the operating bands are selected, it instantly detects the 5G and LTE signals on air and delivers detailed information about each of them: signal quality, power level, beam analysis, MIB and SIB content, spectrum and waterfall displays. 5G NR sites can thus be thoroughly tested.

The 5G STS is an important tool for verifying NSA 5G sites by simultaneously measuring 5G and LTE. In combination with the QualiPoc Android, functional tests such as voice, data and video streaming make it possible to verify the service availability of the site.

Rohde & Schwarz (Australia) Pty Ltd

www.rohde-schwarz.com.au

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ZOLEO.COM.AU

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2023 NEW | PRODUCT SHOWCASE

STAND 37

Rectifier

The Eaton HDR48-ES is part of the APS (Access Power Solutions) Series 8 modular power systems. A modular subrack system such as the APS9 allows the operator to start with only the capacity needed and then scale up with additional rectifier modules as the DC load increases over time.

The HDR48-ES rectifier is designed for communications network operators who are striving to cut energy costs and/or to meet aggressive carbon footprint reduction targets. Good power density, short depth and flexible mounting options make the device suitable for limited-space applications such as roadside cabinets.

The product features intelligent digital signal processing for enhanced control, producing peak efficiency up to 97% for typical operating loads. In addition, it is fully compatible with existing Eaton third-gen systems, with simple plug-and-go insertion. The rectifier operates under a wide range of AC power conditions and in temperatures up to 70°C.

Eaton Electrical (Australia) Pty Ltd
www.eaton.com/au

STAND 80

Quarter-wave stub EMP lightning surge protector

The Benelec LMR VHF and UHF Quarter Wave Stub EMP Lightning Surge Protector, available with N-Type and 4.3-10 Socket options, helps to protect valuable radio equipment from lightning strikes and surges. It is designed to provide a wide range of benefits over traditional EMPs, employing a quarter-wavelength short circuit stub-based technology.

The short circuit at the end of the stub is transformed into an open circuit at the bottom. Thus, the RF on the main line is inessentially uninfluenced, and the stub acts like a simple band-pass filter with the quarter-wave frequency as centre frequency. The configuration is an N socket at one end and N socket bulkhead at the other end. This facilitates the integration of this EMP onto earthing plates and feed-through panels. It is supplied with an L bracket for cable tray mounting.

The UHF device covers the full 380–520 MHz band and the VHF version covers 136–174 MHz bands. Other options are available for Cellular 5G bands. The device is available in other connector types including 7–16 DIN variants.

Because of the galvanic connection of the inner and outer conductor, a DC transmission or pass is not possible. Other hybrid models will cater for the DC pass requirements.

Within the product the stub is folded into the axis of the main RF line, resulting in an 'inline' design. This means the diameter of the device is not much greater than the diameter of 7/8″ feeder cable, allowing use in high-density feeder installations.

The product offers several benefits for radio system designers and integrators. The design eliminates any non-linear component (eg, a gas discharge arrestor), resulting in good intermodulation figures (typically -165 dBc). No parts will deteriorate over time, meaning the EMP is a set-and-forget, maintenance-free device, eliminating visits to site due to EMPs failing over time. The device is also RF power-independent, working at all RF powers up to 800 W.

Benelec Pty Ltd
www.benelec.au

STAND 70

Cybersecurity services

D2UNet, in partnership with EDAO, offers a comprehensive range of professional services, equipped with the tools and expertise needed for uninterrupted business operations.

The company collaborates closely with clients, focusing on their network structure, availability, provisioning and security requirements. Its approach involves seamlessly integrating cutting-edge cybersecurity technologies and methodologies, both on-premises and in the cloud.

D2UNet's service acts as a unified solution, bridging multiple interfaces to the client's assets. Its consultancy and managed cybersecurity services utilise leading technologies and proven methods, the company says.

Security services cover: vulnerability and threat management; email security and awareness; web and cloud security; identity and access management (Active Directory); device security (browse protection, URL filtering, file scanning, SaaS control, browser extensions and data loss prevention (DLP); penetration testing; and endpoint detection and response (EDR).

D2UNet is committed to delivering tailored cybersecurity solutions to fortify organisations against evolving digital threats.

D2UNet
www.d2unetworksolutions.com.au

CASE STUDY

Revolutionising connectivity: from farms to fire trucks

COMMS CONNECT
STAND 2

iStock.com/Stuart_Shaw

Pioneering wireless technology company Zetifi has been awarded a $1 million grant from the NSW Bushfire Commercialisation Fund, in a testament to the company's commitment to adapt its novel wireless technology — initially designed for farms — to the critical communications sector. This development marks a significant step forward in enhancing connectivity for emergency services.

Zetifi's journey began with a vision to bridge the digital divide in rural areas, particularly on farms, where reliable internet connectivity was a longstanding challenge. Company founder Dan Winson, a network engineer from Wagga Wagga, experienced firsthand the frustrations of limited connectivity in rural and remote areas and this experience inspired him to establish Zetifi in 2017, with a focus on developing cutting-edge wireless solutions for farms.

Zetifi's initial breakthrough was the creation of 'sleepy' solar-powered wireless repeaters, which extend the reach of existing Wi-Fi networks across vast agricultural landscapes. This allowed farmers to monitor their equipment, manage irrigation systems and gather crucial data remotely. With the support of more than $8 million in government funding to develop and commercialise the technology and a recently completed $12 million capital raise led by Telstra and GrainCorp, Zetifi's product line-up has expanded to include long-range Wi-Fi hotspots, vehicle and machinery gateways, and location-aware smart antennas.

It became clear that Zetifi's potential extended beyond the fields, with the company's technology having proven resilient and adaptable — qualities essential for critical communications, especially during emergencies like bushfires. The Bushfire Commercialisation Fund recognised this potential, leading to the recent grant award that aims to adapt Zetifi's technology for the needs of the critical communications sector.

The implications of Zetifi's adaptation for first responders are immense. Firefighters often operate in remote areas with limited connectivity, making effective communication a challenge during crucial moments. With Zetifi's technology, fire trucks can now be equipped with long-range Wi-Fi hotspots, enabling real-time communication, data exchange and information sharing even in the most remote locations from a small number of vehicles equipped with satellite connections out to the masses of vehicles and firefighters. This interconnectedness enhances coordination, situational awareness and resource allocation during firefighting operations, ultimately leading to more effective and safer outcomes.

The Bushfire Commercialisation Fund's recognition of Zetifi's potential underscores the importance of collaboration between the private and public sectors in addressing critical societal needs. As Zetifi's technology finds new applications in emergency response, it stands alongside a range of existing and emerging technologies that hold promise for safer and more efficient firefighting operations.

Zetifi will be showcasing its technology at Comms Connect Melbourne from 18–19 October. Additionally, Winson will be presenting a talk on 19 October titled "Unveiling Wi-Fi HaLow (802.11ah): Extended Range Wireless for the Masses", which promises to shed light on the transformative potential of Zetifi's technology in extending connectivity to previously underserved areas.

COMMS CONNECT
Events for critical communications users and industry

2023 NEW | PRODUCT SHOWCASE

STAND 21

MANET radios

Serving defence, public safety and commercial customers around the world, Silvus Technologies is a leading developer of StreamCaster mobile ad hoc network (MANET) radios, powered by proprietary MN-MIMO waveform technology. Together they deliver powerful mesh networking connectivity for mission-critical applications — on the ground, in the air and at sea — with high-fidelity video, voice and data communications.

The MANET radios are designed to meet a variety of platform requirements and mission scenarios — from traditional handheld battery-powered radios, to mountable and externally powered, to embeddable OEM radio modules that can be easily integrated into vehicles, aircraft, UAVs or other platforms.

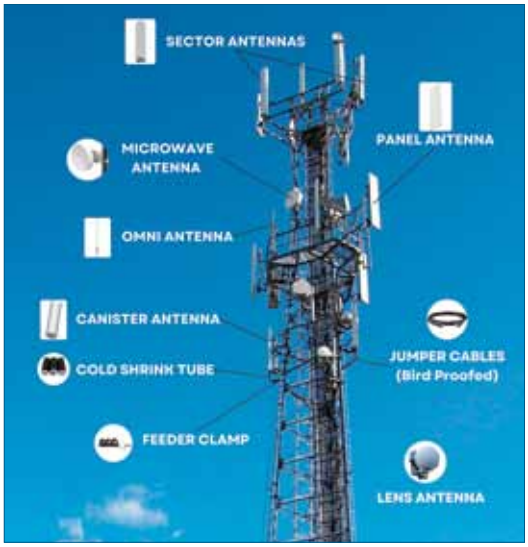
The StreamCaster 4400 (SC4400) delivers the power of 4x4 MIMO in a ruggedised software-defined MANET radio. Purpose-built for maximum performance in fixed infrastructure, vehicular, long-range and airborne applications, it delivers up to 20 W output power (80 W EIRP), with single/dual band frequency options (300 MHz–6 GHz) and up to 100 Mbps throughput.

The StreamCaster 4200 (SC4200) is a 2x2 MIMO radio, delivering good MANET radio performance and connectivity at the tactical edge. A low SWaP profile makes it suitable for use in portable and embedded applications, with up to 10 W output power (20 W EIRP), single/dual band frequency options (300 MHz–6 GHz) and up to 100 Mbps throughput.

Amber Technology Limited
www.ambertech.com.au

STAND 50

RF products for public safety networks



Maser RF Solutions is a one-stop shop providing an extensive range of products and solutions for building public safety networks.

The company's product range, sourced from tier 1 RF vendors globally, covers all bands and RF conditioning equipment. Products include antennas, cables, connectors, filters, combiners, and design and test tools which work across VHF, UHF and broadband wireless (cellular/Wi-Fi).

As well as helping with any type of hardware needed for public safety networks, Maser also specialises in EMF safety monitoring equipment.

Maser Technology Group
www.maser.com.au

STAND 81

Gigabit internet over coax and copper

Positron can deliver high-speed gigabit internet over twisted pair or coax. The company's GAM solutions leverage existing wiring for an efficient and cost-saving installation.

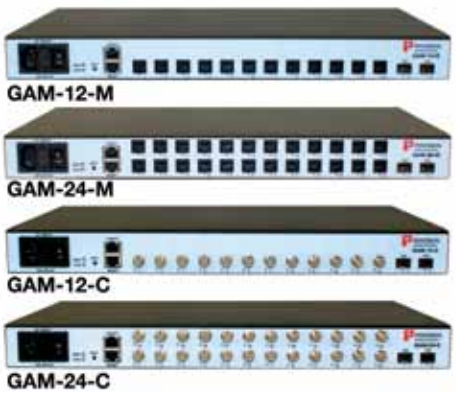
The Positron GAM-12-C and GAM-24-C for coax can deliver gigabit services to 800 m on RG-6 and to 300 m on RG-59. The Positron GAM-12-M and GAM-24-M for copper can deliver gigabit services on telephone wires either on a single pair in SISO mode (150 m) or using two pairs on a single port (250 m) in MIMO mode.

The ITU-T G.9960 G.hn Wave-2 standard is designed to leverage the existing telephone, UTP, CAT-3 or CAT-5/5e wiring and RG-6/RG-59 coaxial cable to deliver a gigabit internet service to each subscriber without the complexity and delays associated with in-building fibre installation.

G.hn is increasingly used as an access technology by operators looking to simplify their access network and backend infrastructure with an Ethernet-like technology that is highly scalable, without some of the inherent complexity of DSL-related technologies such as G.fast.

Each G.hn subscriber port supports up to 1.7 Gbps of dynamically allocated bandwidth for near symmetrical gigabit services over the existing cable. The Positron GAM solution is MEF CE 2.0 compliant and is suited to delivering Business Ethernet services in MDU and/or MTU deployments.

There is no need to wait on extensive rewiring infrastructure, as Positron copper solutions can be deployed easily and in a fraction of the time using cable already installed.



Streakwave Pty Ltd
www.streakwave.com.au

CASE STUDY

Starlink-connected drone provides a 'mobile tower in the sky'

Challenge Networks' LTE drone in flight.

Fibre and network solutions provider Vocus, in partnership with the NSW Telco Authority, has unveiled a new way of providing critical 4G/5G mobile connectivity in emergencies such as natural disasters, using a cutting-edge tethered drone.

Using high-speed, low-Earth orbit (LEO) satellite connectivity from Vocus Satellite – Starlink, the drone acts as a mobile tower in the sky, providing connectivity across an area up to 28 km^2. Challenge Networks, the Vocus company that specialises in building private 4G/5G networks, designed and built the solution after observing how LEO satellite connectivity, ground-based power, heavy-lift drones and compact mobile network equipment could be brought together to solve a significant problem.

The drone takes off from the ground carrying the equipment needed to establish mobile network coverage. A high-strength, lightweight tether cable supplies power and data from a ground station, which enables the drone to remain airborne indefinitely with just brief landings for maintenance checks every 12 hours.

The drone can be used as a repeater for public mobile networks (with the cooperation of local carriers), or to establish a private and secure mobile network for use by emergency services personnel. It can also carry up to 15 kg, hovering in the air with payloads that can include 4G/5G tower equipment, P25 two-way radio equipment and bright floodlights or cameras.

The drone's data feed comes from Vocus Satellite – Starlink, providing LEO satellite connectivity enabling clear, delay-free calls and data speeds up to and beyond 100 Mbps for connected devices. The drone is flown by a CASA-accredited pilot and can be operated remotely if permitted by CASA, enabling round-the-clock airborne operation.

The drone can thus be used to provide critical support to emergency services during rescue and recovery situations. For example, should a person be lost in a rugged mountainous region with no reception, first responders, in collaboration with the person's mobile carrier, could use the drone to establish a new coverage zone to make contact with the missing person. Likewise, the drone can serve as an airborne mobile tower in a natural disaster situation where mobile towers may have been disrupted or damaged.

Representatives of Vocus, NSW Telco Authority, Challenge Networks and members of ACT and NSW emergency services organisations with the drone flying overhead.

Emergency services organisations recently had the opportunity to test the solution during a demonstration at a NSW Rural Fire Service base in Bimbimbie. The demonstration, led by the NSW Telco Authority's Next Generation Digital Connectivity initiative, showed how the drone can provide critical communication services during natural disasters, especially where standard mobile networks have been disrupted. The extent of the drone's mobile coverage is directly proportional to its altitude and transmitting power; in the demonstration, coverage of 28 km^2 was achieved in dense bushland.

"This is an example of how Vocus is using its strength in satellite technology, and Challenge Networks' expertise in wireless and systems integration, to deliver a brilliantly simple solution for a particularly Australian challenge," said Ashley Neale, Development Manager Space and Satellite, Vocus.

Ashley Neale will be speaking at Comms Connect Melbourne on 19 October on the topic "The evolving landscape in LEO Satcom".

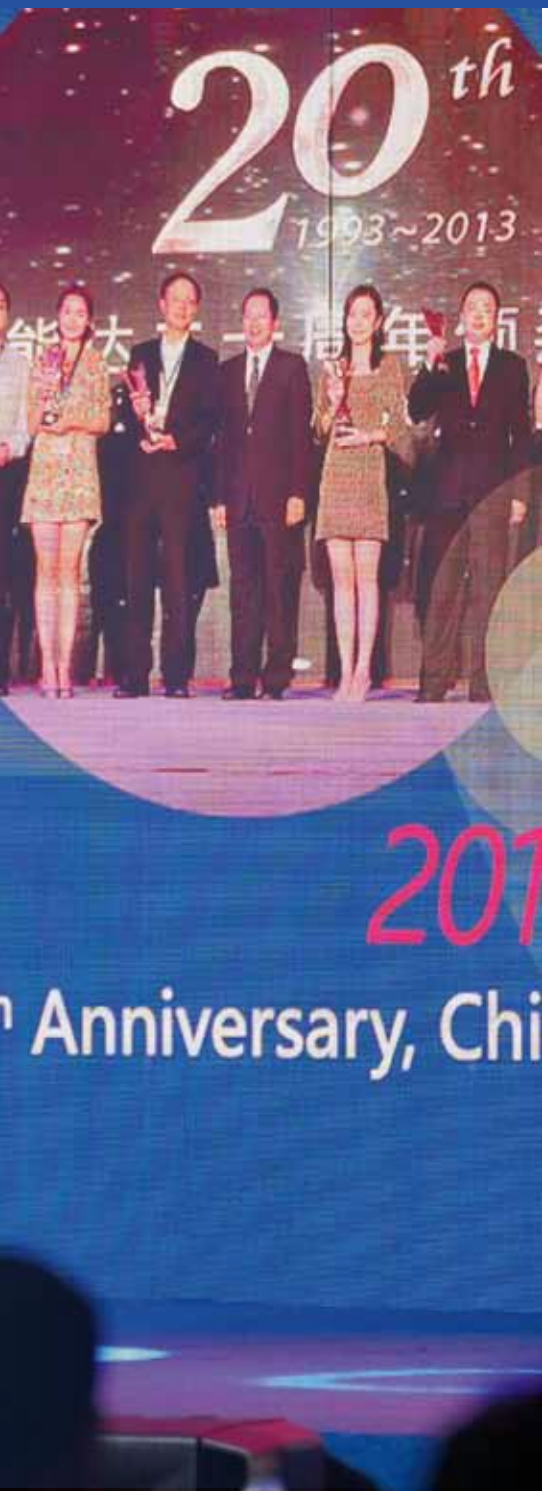
Forging New Horizons
The Road Ahead with Hytera

Professional Mobile Radio (PMR) technologies have traditionally dominated the markets for critical communications. As in many other industries, the technology is evolving fast. Broadband technologies supporting data-rich, multimedia services are starting to offer an alternative to voice-centric, narrowband PMR technologies.

The leading PMR provider Hytera is actively evolving its product development strategy to shape and lead the trend towards a broadband future.

At a recent global partner summit, Yelin Jiang, CEO of Hytera Group, explained that the company's development strategy is designed to facilitate this migration to new technologies while continuing to support customers who still want to use PMR networks.

According to Jiang, Hytera believes that TETRA and DMR provide the bedrock for voice-centric



Hytera Group CEO, Yelin Jiang, addresses the audience at Hytera Global Partner Summit 2023 in Bali Indonesia on May 11

systems for mission-critical users such as the police. PMR is also the most reliable and intuitive group communications solution for many industrial sectors. For this reason, Hytera is committed to investing in both its DMR and TETRA technologies and product series. It is also adding consumer-grade radios for the Chinese market to its PMR product line.

However, there is no doubt that emerging technologies capable of supporting data-rich communications can boost operational efficiency and enhance situational awareness for mission-critical users, thereby enabling better-informed decision-making in critical moments. Hytera will, therefore, continue to develop multiple product lines such as MCS, body-worn cameras, private 4G/5G networks, and next-gen control room solutions. The industry leader is also open to including more technologies when necessary.

As mission-critical users migrate to broadband they will be increasingly reliant on public or shared communications infrastructure, which may be vulnerable to serious natural or man-made disasters. It is essential that in extreme situations, mission-critical users have access to fast-deployable communications systems. Therefore, Hytera keeps its deployable systems portfolio at the forefront of technological progress, so its customers can cope with even the most challenging scenarios.

It's clear that broadband will be the future, so PMR vendors have to adapt to this changing technology environment to ensure they can continue to fulfill their customers' needs. The public telecoms world has already largely shifted over to 4G/5G technology and private PMR network users are moving forward likewise. The big question is how and when this will happen. This is where things get difficult, as there are multiple challenges that must be overcome.

Different customers in different industries have a wide range of communication needs that need to be specifically tailored to their operational requirements. For the past three decades, Hytera has worked closely with global customers and has accrued a deep understanding of their operational procedures and communications requirements. Mobile network operators and suppliers, usually good at catering to the universal demands of a huge consumer base, are still catching up with PMR vendors in terms of understanding vertical sectors and generating reasonable profit by serving niche markets.

Several developed countries have started to deploy mission-critical broadband solutions, in different ways, for their public safety users. Each country is unique in terms of spectrum availability, budgeting, and governance in general; therefore, there is unlikely a one-fit-all way of doing it.

A further issue is that consumer cellular technology moves very quickly with chipsets and consumers see a new generation of smartphones usually in two or three years. But mission-critical customers are used to a product life cycle of 5 to 10 years and they want that to continue.

For these reasons, while broadband will be the future, 4G/5G will not replace PMR overnight. There will be a fairly long period of coexistence between the two technologies. It means that narrowband TETRA and DMR technologies remain viable and while the market may not grow, it will remain vibrant. Emerging technologies powered by LTE broadband connectivity are converging to create value for mission-critical scenarios, and they iterate fast.

Hytera has positioned its product development strategy to meet the demands of this multi-technology world and the particular requirements of its mission-critical customers. Its product strategy, understanding of customer needs, and the ability to unify technologies will keep Hytera at the forefront of serving and empowering the users of mission/business-critical communications products and solutions.

CAELUS

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COMMS CONNECT
Events for critical communications users and industry

CONFERENCE PROGRAM

DAY 1 WEDNESDAY, 18 OCTOBER 2023

8.50am	**Welcome and opening remarks** ***Geoff Hird*** *– Events Director, Comms Connect, and MC,* ***Chris Stevens***		
9.00am	**KEYNOTE: Building the FirstNet house to provide first responders with the best PSBN experience, enabling them to protect the nation, and the future** ***Joe Wassel*** *– Executive Director, FirstNet (USA)*		
9.30am	**Leading a whole of government approach to digital connectivity** ***Kylie De Courteney*** *– Managing Director, NSW Telco Authority*		
10.00am	**Critical Communications across Australian industry** ***Sri Amirthalingam*** *– Commercial Engineering Executive, Telstra*		
10.30AM	**MORNING BREAK — EXHIBITION HALL**		
	Public Safety and Emergency Management – ***Theatre 1***	**Technology –** ***Theatre 2***	**Industry –** ***Theatre 3***
11.15am	**The power & potential of mobile networks & 5G in natural disasters & emergency situations** ***Louise Hyland*** *– CEO, AMTA*	**Routing data in multi-bearer mobile networks** ***Neil Jamieson*** *– Group CEO, Hypha*	**ACMA Regulatory Update** ***Dominic Byrne*** *– Executive Manager, ACMA*
11.45am	**Bringing the TasGRN to life: Game changer for emergency communications services in Tasmania** ***Tim Rutherford*** *– CIO/CTO, Dept of Police, Fire & Emergency Management* ***Nikala Parsons*** *– Inspector, Dept of Police, Fire & Emergency Management* ***Andrew Johns*** *– Head of Service, National Govt Radio, Telstra Purple*	**Exploring the cyber challenges in critical infrastructure and communications** ***Vanessa Leite*** *– Principal, Strategy & Risk, CyberCX (NZ)*	**Private LTE for oil & gas** ***Vishal Kohli*** *– LTE/5G Specialist, Commtel Network Solutions*
12.15pm	**Envisioning public safety incidents with next generation broadband technology** ***Brianna Huettel*** *– PSCR Strategy & Operations Lead, NIST*	**Accelerating digital transformation with modern networks** ***Jefferson Wang*** *– Global Network & 5G Lead, Accenture*	**Area Wide Licenses (AWLs) in the 3.4-4.0 GHz band** ***Andrew May*** *– Executive Manager, Spectrum Engineering*
12.45PM	**LUNCH BREAK — EXHIBITION HALL**		
1.45pm	**The Connected Firefighter** ***Richard Gibb*** *– Operation Communications Systems Officer, Fire & Rescue NSW*	**Delivering next gen critical comms at scale: completing the transition** ***Peter Clemons*** *– Head of Critical Communication, ENENSYS Technologies*	**Transforming urban operations: communications solution for Brisbane Council** ***Paul Elmes*** *– Managing Director, Tait Communications*
2.15pm	**The PIA and Canadian innovation in first-responder communications** ***Phil Crnko*** *– Director of Engineering, PSBN Innovation Alliance (Canada)*	**Private 4G/5G networks – high capacity & secure connectivity to remote areas** ***Malcolm Jones*** *– Principal Consultant, Wireless Business, Vocus Challenge Networks* ***Marek Jaworski*** *– Solutions Architect, Rio Tinto*	**Mission critical 3GPP in action – global case studies** ***Ahmed Laslah*** *– Global Business Director, Mission Critical Networks, Ericsson Business Area Networks*
2.45pm	**Unifying disparate networks across the country: Surf Lifesaving New Zealand** ***Andy Kent*** *– National Lifesaving Manager, Surf Lifesaving NZ*	**IWF: MC-PTT internetworking needs between LTE and LMR** ***Carsten Clemens*** *– Assoc Director Engineering PSMB, Digital & Technology, NSW Telco Authority*	**Infrastructure-free communications solutions** ***Peter Scarlata*** *– CEO, Simoco Australia*
3.15PM	**AFTERNOON BREAK — EXHIBITION HALL**		
3.45pm	**P25 for the future: new standards, interoperability and security for 2023 and beyond** ***Cheryl Giggetts*** *– Project 25 Technology Interest Group (USA)*	**Navigating interoperability: Bridging the gap in evolving critical comms systems** ***Paul Whitfield*** *– Research Manager, Omnitronics*	**How to deploy a 15-minute Smart City** ***Marcus Dowling*** *– CEO, Rising Connection* ***Roderick Aguilar*** – Head of Operations, Rising Connection
4.15pm	**PANEL DISCUSSION: The future of critical communications – from narrowband to broadband & everything in between** *Moderator:* ***Hamish Duff*** *– President ARCIA.* *Panellists:* ***Selim Bouri*** *– VP and Head of MEA & APAC, AIRBUS Secure Land Communications;* ***Jeff Bratcher*** *– CTO, FirstNet Authority, USA;* ***Chris Dowling*** *– Executive Director, Telecommunication, VIC Dept Govt Services;* ***Neil Jamieson*** *– CEO, Hypha;* ***Luke Marchant*** *– GM, Telstra Defence & Public Sector;* ***Matt Wormald*** *– Chief Super, Operations Communications, Fire & Rescue NSW*		
5.00PM	**NETWORKING DRINKS — EXHIBITION HALL —** ***sponsored by Hypha***		
6.00PM	**ARCIA ANNUAL INDUSTRY GALA DINNER —** ***Sovereign Room, MCEC***		

8.55am	**Welcome and opening remarks** ***Chris Stevens*** *– MC, Comms Connect*
9.00am	**KEYNOTE: Driving Innovation in the 5G Ecosystem – digital transformation and more** ***Julian Gorman*** *– Head of APAC, GSMA (Hong Kong)*
9.30am	**Unveiling the future of emergency services communication in New Zealand: Cellular Roaming and the Public Safety Network** ***Steve Ferguson*** *– Executive Director, NGCC* ***Vaughan Matthews*** *– General Manager, Hourua NZ*
10.00am	**Connecting Victoria – the journey to making Victoria the most connected state** ***Chris Dowling*** *– Executive Director, Telecommunications, VIC Dept Govt Services*

10.30AM MORNING BREAK — EXHIBITION HALL

	Public safety and emergency management – *Theatre 1*	**Technology –** *Theatre 2*	**Industry –** *Theatre 3*
11.00am	**PANEL DISCUSSION: Public Safety Mobile Broadband — lessons learned and the way forward** *Moderator:* ***Chris Stevens*** *Panellists:* ***Richard Carrizzo*** *– FirstNet Authority Board Chair;* ***Bradley Creevey*** *- Assistant Coordinator General, Operational Capability Brance, NEMA;* ***Phil Crnko*** *– Director of Engineering, PSBN Innovation Alliance Canada;* ***Jason Johur*** *– Broadband Industry Group Chair, TCCA;* ***James Pickens****, CTO, NSW Telco Authority;* ***Steven Tsikaris*** *– Infrastructure Executive, VIC Dept Treasury & Finance*	**Ensuring high performance of 5G networks** ***Senthil Sundram*** *– Head of Telecommunications, Rohde & Schwarz Australia*	**Enabling high-end military simulation through advanced telecommunications in an austere environment** ***Mark Horn*** *– Director Strategy, Cubic Defence Australia.* ***Alan Seery*** *– MD, Aqura Technologies*
11.30am		**Assuring public safety communications: verifying indoor network performance** ***David Adams*** *– Solutions Architect, PCTEL & President, Safer Buildings Coalition*	**Next gen comms and command centre solutions for emergency services** ***Martin Rampl*** *– Managing Director, Frequentis Australasia* ***Manuel Hintermayr*** *– Global Director of Public Safety Solutions, Frequentis*
12.00pm	**Unified comms — reducing WA Police black spots** ***Brett Pearson*** *– Radio & Electronic Services, WA Police* ***Steven Walker*** *– Capability and Development Coordinator, State Communications Division, WA Police*	**5G mission critical communications update** ***Mathew Simon*** *– Head of Sales Engineering APJ, Nokia*	**Hybrid LMR/LTE Update** ***Hamish Duff*** *– Managing Director, Mastercom and President, ARCIA*

12.30PM LUNCH BREAK — EXHIBITION HALL

1.30pm	**The future of pre-incident planning: from mapping to visualisation** ***Dereck Orr*** *– PSCR Division Chief, NIST (USA)*	**The evolving landscape in LEO Satcom** ***Ashley Neale*** *– Development Manager, Space & Satellite, Vocus*	**60GHz – gig backhaul for CCTV and Wi-Fi enabling Smart Cities** ***Roy Wittert*** *– Regional Sales Manager, Cambium Networks*
2.00pm	**Situational awareness tools for managing emergencies in the field** ***Jason Burt*** *– Public Safety Market Manager, L3Harris Technologies*	**Stratospheric Equipment Platforms – for real this time?** ***Daniel Field*** *– MD, SkySite*	**Is Paging really finished?** ***Brad Welch*** *– General Manager, TPL Systems Asia-Pacific*
2.30pm	**P25 panel session – Where to with P25 in Australia?** *Moderator:* ***Chris Stevens*** *Panellists:* ***Daniel Chivell*** *– Engineering Principal, Telstra;* ***Paul Elmes*** *– Managing Director, Tait Communications;* ***Paul Smith*** *– Relationship Manager, NGCC;* ***Cheryl Giggetts*** *– Project 25 Technology Interest Group USA;* ***Khalid Salim****, Associate Director Engineering Architecture NSW TA;* ***Nikala Parsons*** *– Inspector, Tasmania Police*	**Unveiling Wi-Fi HaLow (802.11ah): Extended Range Wireless for the Masses** ***Dan Winson*** *– Founder & CEO, Zetifi*	**Overcoming subterranean signal loss** ***David Lloyd*** *– Managing Director, Step Global*

3.00PM CONFERENCE & EXHIBITION CLOSES

CHANGE OF PROGRAM CONTENT:
Some sessions may change, so check back in with the website in the weeks leading to the event.

CASE STUDY

Andalusia's Digital Emergency Network a 'first' for Europe

iStock.com/MarquesPhotography

Tait Communications technology is at the heart of a large public-safety investment in Andalusia, in southern Spain, which is connecting the region's emergency response agencies and national bodies with a single mobile communication system. In announcing the project in late 2022, the Andalusian Regional Government (Junta de Andalucía) said its Digital Emergency Network (REDA) would be the largest in Spain and the first of its kind in Europe. Built on a Tait Digital Mobile Radio (DMR) system, the network is expected to include more than 6000 portable radio terminals in the field and is being engineered to work across more than 120 sites.

With a land area of 87,000 km^2 and almost 8.5 million people, Andalusia is Spain's most populous and second-largest autonomy. Junta de Andalucía said the Digital Emergency Network will provide a single umbrella system for communications among and between the region's frontline responders (police, firefighters and ambulance), other emergency groups such as specialist forest firefighting services, its water management agency and remote organisations such as ski fields which may need emergency support. Officers and managers outside the network coverage area can join in or monitor communications using broadband applications on smartphones and TAIT AXIOM equipment.

"[The network will] further strengthen our work with the state security forces and bodies, as it will allow interconnection with other networks such as those of the Emergency Military Unit (UME), National Police and Civil Guard," Junta de Andalucía said.

The network is designed to deliver high coverage and is encrypted. It includes a facility to record all calls during an event, a service which is often used to review event management and to support improvement. Terminals on the network will further support safety by logging each unit's location in real time and provide alerts if it detects the user has collapsed and may need help.

The Tait-engineered DMR Tier 3 mobile radio system purchased for the network also features support services; a large number of Tait's TP9300 portable radios built to the intrinsically safe standard; TAIT AXIOM mobiles (vehicle-mounted devices which switch seamlessly between mobile radio and cellular, depending on which provides the best carrier solution); 850 TAIT AXIOM wearable devices; instances of Tait's applications for smartphone users who do not need to carry a frontline radio; and Tait GridLink data terminals, which are used to remotely monitor and control fixed equipment in the field (SCADA use cases).

Tait Communications was represented on the project by its long-time Spanish channel partner, Sistelec, which is a supplier to the project's main contractor. Sistelec Chief Executive Iker Murillo said the fundamental role that communication technologies play in keeping people safe is a deep responsibility, particularly in complex projects such as this one. "For this reason, Sistelec always aims to use industry-leading technology and suppliers such as Tait Communications," he said.

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CASE STUDY

Rugged mounting solutions developed for military use

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One of RackSolutions' focus areas that people may not know about is creating mounting solutions to securely attach certain equipment, such as communication devices and sensors, to military vehicles, aircrafts and ships. The company is always prepared to customise its products to become ruggedised for the military — so when the military needed mounts for all of their shelf kits and KEV mounts, RackSolutions engineers specifically developed two rugged mounts that would fit military standards regarding stability and functionality.

When designing rugged mounts, RackSolutions engineers take into account key considerations such as material and construction, shock and vibration resistance, secure attachments, compatibility, ease of use, modularity and adaptability, maintenance and repair for the product and its components, and weight. Creating mounts that meet these criteria involves a multidisciplinary approach that includes mechanical engineering, materials science and thorough field testing. Once the design is finished, the prototype is sent out for testing. If that prototype requires adjustments, the company will immediately revise it until it is considered the perfect fit.

The first custom mount that the engineers designed for the military was a ruggedised shelf that could mount a PC. The company took inspiration from its shelf designs, such as the 1U 115 Sliding Equipment, and made alterations to create a shelf and mounting kit that is ruggedised to prevent the shelf from shaking.

The military provided the rails, so RackSolutions incorporated these into its shelf kit by installing the brace kit at the back of the shelf. The bracing kit consists of brackets that are installed in the back of the client's Cannes 2.0 server rack. By integrating a bracing kit to the shelf, the front, side and rear brackets were installed to secure the PC into place. This allowed the mount to absorb vibrations and shocks for harsh military conditions when on a ship or an aircraft. There is also no airflow obstruction to the PC, so the military can be sure that their device will last and not overheat. For additional security purposes, this shelf kit features a card reader and door to prevent unwanted access.

Another custom mount solution that the military needed was a ruggedised shelf kit for a switch. For this product, the shelf kit features a bracing kit made up of brackets to prevent the shelf from moving up and down or side to side. This shelf in particular had fixed rails, so the switch itself was fastened into the fixed rails. This ensures that the mounted equipment remains stable and functional. The military also requested the switch to be recessed into the server rack. This would help to prevent the network cables from protruding at the front of the rack. Additionally, a cable tray is integrated into the shelf assembly for efficient cable management.

Depending on the client's needs, RackSolutions engineers can create custom products that go beyond workstation equipment. For enterprise and commercial customers, the company builds all sorts of racks, cabinets and accessories that can be tailored to military standards. These products are designed to last in even the most extreme environments.

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Peplink and Starlink maximising resilience for critical communication

Australia's emergency and public safety agencies are at the forefront of safeguarding its citizens. But as the demand to respond to incidents and deliver life-saving services more efficiently increases, the need for constant and reliable network connectivity grows.

To date, critical communication systems have relied on connecting multiple and often disparate systems, devices and networks to deliver the resilience required, but many technical and physical challenges remain. They include insufficient bandwidth, unreliable network switching, congestion, and poor network coverage. They have also relied on a push-to-talk model, which will soon be superseded by data-led communication.

The arrival of Peplink's SpeedFusion technology in Australia represents a landmark moment for critical communication. When combined with Starlink, it paves the way for a new generation of unbreakable networks capable of delivering ultra-fast, reliable connectivity in any environment.

Embracing next-generation connectivity

To ensure communications remain resilient and responsive, agencies must continuously adapt and innovate to ensure seamless communication and coordination. In tandem, they must weigh up which solutions will deliver the best return on investment — now and into the future.

Two key trends are shaping the decision-making matrix in Australia. Firstly, the shift away from voice-led communication towards data-focused communication. And secondly, the affordability and availability of new communication technologies including network bonding and satellite communication.

To deliver the highest levels of redundancy, agencies need to draw on the greatest number of connectivity technologies and networks available at any one time. This includes cellular, wifi and satellite — dynamically drawn on to meet the unique technical and physical challenges of a particular environment or incident.

Historically, the way agencies have worked with technology vendors to maximise redundancy has been to run independent communication systems in parallel. The dilemma this creates is that there often is only a single point of connection per device which does not offer true redundancy. The use of VPNs to secure data also limits the effectiveness of network switching within these systems — impacting reliability especially when moving between network zones.

Today's shift away from running multiple systems presents agencies with the opportunity to reduce the risks associated with per device connectivity and opens new avenues including the creation of in-vehicle communication — further enhancing at-incident connectivity.

Creating the strongest connections with SpeedFusion

Network bonding, also known as link or WAN bandwidth bonding, directly addresses many of the connectivity challenges faced by agencies — including switching, reliability, privacy and data prioritisation. By combining multiple WAN connections into one data session, it enables the speed of multiple connections to be linked to create the strongest, fastest and most resilient connection available.

Peplink SpeedFusion is the leading bonding technology available in Australia today. It employs the concept of link bonding, which combines multiple WAN connections into a single, highly resilient virtual tunnel. This allows agencies to combine diverse connections, such as cellular networks, satellite links, and wired internet, to create an integrated and redundant network infrastructure. Continuous connectivity is achieved by drawing on the combined strength of networks and links available.

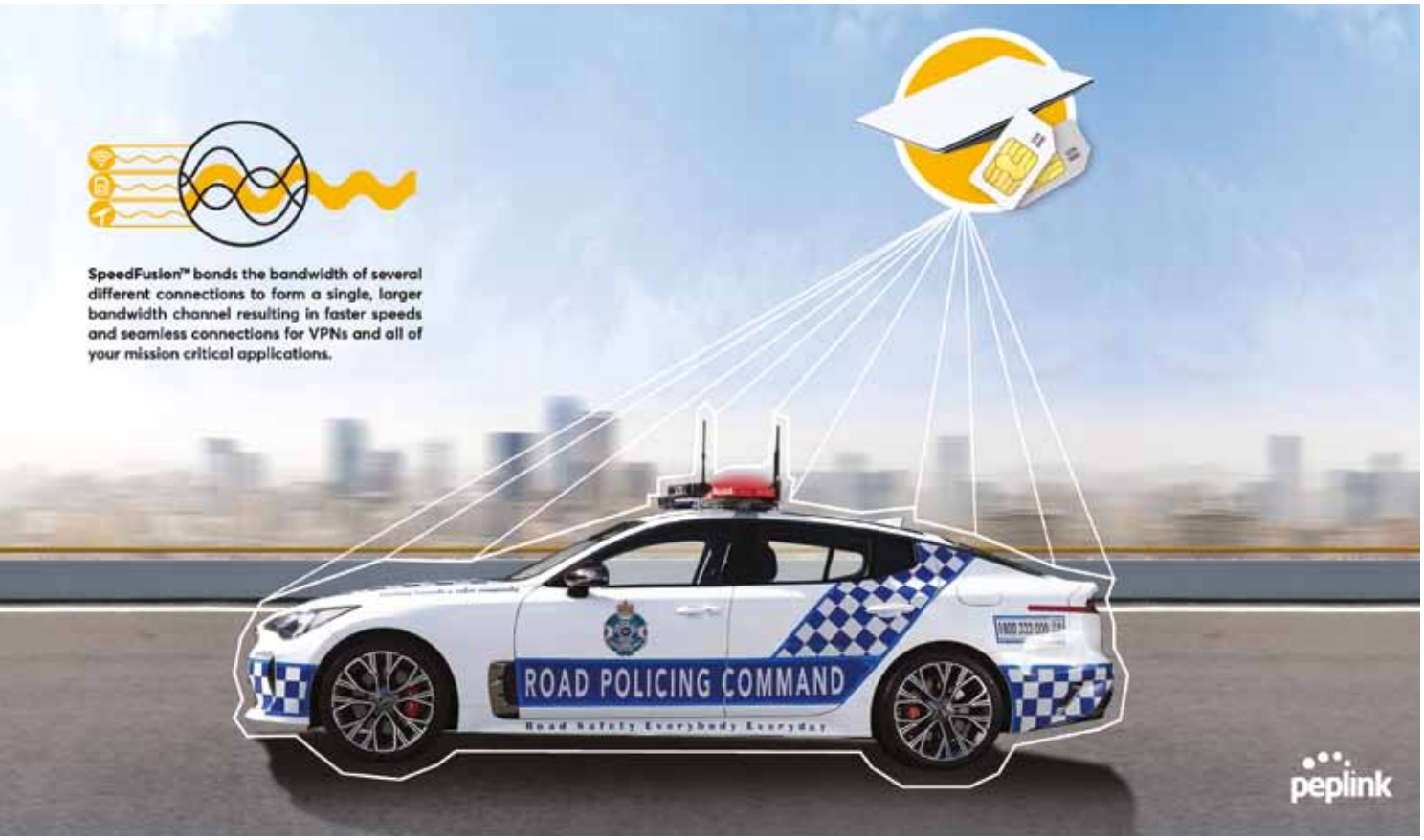
SpeedFusion's unique Seamless Failover feature ensures that these transitions are smooth and imperceptible. As emergency responders move from one coverage area to another, or as individual WAN connections become unstable, the system dynamically optimises the data flow, at a packet level, between the remaining available WAN to provide the best connection. The system also allows agencies to prioritise different types of data traffic, including time sensitive information over the stabilised pipe without dropping the session.

Recognising that security is paramount when transmitting sensitive data and communications, SpeedFusion also incorporates robust encryption protocols to safeguard all data passing through the network — protecting it from potential cyber threats or unauthorised access.

SpeedFusion's ability to bond different types of connections also allows agencies to establish remote command and control centers efficiently. With reliable and high-bandwidth connectivity, command personnel can monitor, coordinate and ensure seamless communication between teams.

Peplink with Starlink raising the bar

Recognising its advantages, Peplink SpeedFusion has been adopted by organisations to deliver critical communication around the globe. In the UK, Gloucestershire Fire and Rescue has deployed Peplink routers and access points to integrate satellite and cellular networks within range of emergency response vehicles. The agency



has also created a separate wifi network from their command vehicle to provide at-incident connectivity open to other agencies.

Don Mueang Airport in Thailand is utilising Peplink to manage its emergency response program. With no onsite internet or cellular connectivity in key areas including the runway, SpeedFusion has been utilised to deliver connectivity across eight live video feeds and deliver essential training across the facility.

In Australia, the uptake of Peplink SpeedFusion is in its infancy but public safety solution specialists including Hypha are leading the charge. In partnership with M2M Connectivity, the company has delivered a series of solutions to both police and ambulance. They have utilised Peplink routers in combination with Starlink satellite connectivity to deliver multi-layer resilience.

Neil Jamieson, Group CEO at Hypha, says: "It is becoming widely accepted that to solve Australia's future connectivity challenges, we need to focus on a multi bearer approach with intelligent routing. In a mobile, multi-bearer environment we have to choose carefully what routers we install today if we are to meet our objectives to deliver mobile mission critical data services everywhere. This must include combining LTE and satellite into a single network."

Ray Barnes, Group CTO at Hypha, says: "After many years using products from other vendors, Peplink has become our default choice for Starlink solutions. Its key differentiator is that it has been designed to work specifically with Starlink and integrates seamlessly with Hypha mesh networks. "For public safety agencies, the key USP of Peplink is its scalability and ability to mix and match bearers at will. For example, it can be deployed to multiple vehicles across multiple gateways, providing a huge pipe for critical communication and data," Barnes adds.

Peplink SpeedFusion allows multiple Starlink connections to be combined to create an unbreakable high-speed network. It also allows Starlink to be bonded with multiple LTE and ethernet solutions and provides automatic switching to cellular connections when Starlink gets cut off.

Bolstering capability to save lives

In the high-stakes world of emergency response, reliable network connectivity is crucial. Peplink's SpeedFusion bonding technology empowers agencies with a comprehensive solution to overcome the challenges of delivering reliable network connections in diverse environments. SpeedFusion equips agencies with the tools they need to respond effectively to emergencies and protect the safety of communities they serve. By leveraging this advanced bonding technology, and combining it with Starlink, agencies can bolster their operational capabilities and provide efficient responses — helping to save lives.

Partnering for success

M2M Connectivity, a Semtech company, is the major distributor of Peplink technology in Australia. They distribute SD-WAN devices with robust wireless capabilities, including the MBX, SDX, EPX as well as the Balance series — designed for organisations of any size. M2M Connectivity also specialise in the implementation of Starlink with Peplink solutions. To supercharge your connectivity, visit www.m2mconnectivity.com.au.

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CASE STUDY

France implementing the 'radio network of the future'

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Airbus is one of the major contributors to the Réseau Radio du Futur (RRF) project, which will set the scene for the future of critical communications in the domain of public safety and emergency.

This pioneering project, led by France, is key to modernising domestic security forces. It represents a major advance as it was designed for a large country and many users (at least 300,000). This includes several communities, each with its own particular needs, which will come together on a single system. The project will therefore offer added flexibility for all users and new requirements in terms of security.

The RRF will be a national, seamless, secure and high-speed (4G and 5G) priority mobile communication system, with a high level of resilience in order to guarantee the continuum of security and emergency rescue missions on a daily basis, including in the event of a crisis or major event. The system intends to equip over 300,000 users in the security and emergency rescue forces, such as the national gendarmerie, the national police force, firefighters and other civil security forces. It will allow the latter to benefit from an array of new data-centred services, such as video, geo positioning and group communication, amongst others.

Compared to the current solution, the range of services proposed as part of the RRF is designed to be very innovative. Today, most public security forces operate using voice-based, narrowband technologies. By contrast, the RRF will take advantage of high-speed (broadband) networks to transmit voice, video and large volumes of data. This is a move towards a multimedia solution with new uses.

The RRF also allows for greater pooling of resources, in accordance with international standards. The various security and operational forces will thus share the same tool, which greatly simplifies interoperability issues. These interoperability possibilities also extend beyond borders; this was the purpose of the 'BroadWay' project that Airbus carried out on behalf of the European Commission on the topic of interoperability of RRF systems between bordering countries.

The authorities of each country necessarily have specific constraints and specificities. Therefore, the solutions provided by Airbus in the context of the RRF are highly scalable and are tailored to fit the needs of each customer, with no compromise on security and resilience. They will allow the various stakeholders to communicate via this new network, with support from a variety of partners including Econocom, Prescom, Samsung and Streamwide. As part of its collaboration with Airbus, Capgemini will integrate the many sets of expertise provided by all the project partners. This includes cloud infrastructure provided by Dell Technologies and 5G telecommunications services from Ericsson.

The contract reinforces Airbus's position as a European leader of critical communications, as well as that of Capgemini as a trusted partner in the modernisation of emergency rescue and security forces, and supply of sovereign services. Considering the importance of the project, many other countries are following in France's footsteps and considering the implementation of such a system on a nationwide scale.

Global satellite communicator

The ZOLEO Global Satellite Communicator is more than a messenger device. Designed in Australia to handle harsh weather conditions, it's a solution to seamlessly work on all networks regardless of the user's location, especially when travelling in and out of mobile coverage.

The product offers an unlimited Check-in button, providing a constant connection between users and their loved ones or colleagues. With this feature, the worry of being unreachable to provide a quick update becomes a concern of the past. Moreover, it offers a crucial safety tool: 24/7 access to a trusted emergency response partner, as well as Medical Assist for non-emergencies, which should bring confidence to those in remote environments.

The GPS tracking capability is a useful feature that allows users to send their coordinates in pre-set intervals, providing a breadcrumb trail that can be shared with chosen contacts. On an enterprise level, ZOLEO Track allows users to view staff on a single web-based map, including historical location reports. This feature not only adds an extra layer of safety, enabling users to be located quickly in case of an emergency, it also aids in effective team coordination, particularly in remote or field-based roles.

A weather feature meanwhile provides real-time updates for any location. This is particularly useful for workers in field-based roles, who rely on accurate weather information for safety and logistical planning.

The ZOLEO Global Satellite Communicator is much more than just a messenger device; it's a critical piece of equipment that provides ongoing connectivity, safety assurance and useful geographical insights, bridging the gap between the connected and the remote.

Beam Communications Pty Ltd

www.beamcomm.net

Professional LCD displays for control centres

Austin Hughes is a design and manufacturing group that offers a broad range of solutions based around 19″ rack mount technology.

The company's commercial-grade LCD panels are specifically designed for many business applications. They combine advanced features with high video performance and image quality, helping users to communicate colourfully.

The LED displays are designed to meet environmental demands. Features include high brightness, front protection, anti-reflective/vandal-proof glass, DC power input, brightness dimming and a mounting kit for VESA-mount, universal-mount, overhead tilted wall-mount and desktop stands.

Control centres provide centralised management, monitoring and control of an organisation's network operations; whether this is in the IT arena where a network operations centre (NOC) is overseeing data centre and server room environments, or a command and control centre utilised by government, military and defence for wider applications.

Within large-scale data centre and server room environments, NOCs manage and oversee the network and IT infrastructure of the organisation 24/7 or outsource to NOC service providers who have remote access to infrastructure. The NOC support team improves facility uptime by detecting issues and implementing changes, and can use dashboards to monitor and manage equipment down to the rack level.

Command and control centres, sometimes referred to as situation rooms, usually refer to government and military applications. They are used to monitor, manage and respond to incidents as well as day-to-day events, using data to make informed decisions.

Command and control centres require both rack mount and industrial IT solutions, which Austin Hughes has extensive experience in supplying — including for air traffic control towers, mobile control centres for rapid deployment, aircraft carrier control rooms, and military, transportation and broadcast applications.

KVM Australia

www.kvm.com.au

COMMS UPGRADES FOR NSW AND QLD FIREFIGHTERS

Firefighters in eastern Australia will benefit from two new initiatives that are set to enhance their ability to communicate.

Queensland Fire and Emergency Services (QFES) has begun rolling out new helmets fitted with hands-free communications to improve frontline communication and safety. The Rosenbauer HEROS-titan AS structural firefighting helmet is being delivered to all Fire and Rescue Services (FRS) firefighters and senior officers across the state as part of a staged process, and is being paired with an audio device that allows hands-free communication and includes a noise-cancelling capability — even while the user is wearing a breathing apparatus.

A total of $6.2 million has been allocated to the rollout of the 'jet' style helmets, which includes training officers based around the state. In a trial conducted last year, the majority of participating firefighters indicating the helmets improved their communication capability and supported its introduction. The helmet is also used by fire and rescue services in Victoria, South Australia, Tasmania and the ACT.

Queensland Minister for Fire and Emergency Services Mark Ryan said the new helmets will improve firefighter safety and communication in noisy environments. He noted, "Firefighters put themselves in harm's way every day to protect their communities and it's so important we provide them with the best equipment to do their job. In emergency situations every second counts, and any new technology we can provide to improve the way firefighters go about their critical work has huge benefits."

QFES Commissioner Greg Leach added that FRS firefighters have started using the helmets while on shift and the early feedback has been positive. He said, "There are 42 dedicated training officers based around Queensland who are in place to ensure every firefighter is comfortable with the new technology. Our crews are trained to communicate in a variety of ways in the event of radio systems being unavailable and the introduction of the new helmets will have significant impacts on their day-to-day role."

Meanwhile, over the border, mobile Wi-Fi equipment has been installed in over 1300 Fire and Rescue NSW and NSW State Emergency Service (SES) vehicles to provide 4G or satellite communication access during incident responses. The technology will enable firefighters and SES members to continue using radios, mobile phones and other handheld devices anywhere and at any time, even when driving through communications black spots.

The 'vehicle as a node' systems will allow crews to connect to satellites when there is no land-based 4G or radio connectivity, meaning they will be able to stay in contact even if the communications infrastructure is damaged in a disaster. The technology, which is now standardised for any new vehicle acquired by Fire and Rescue NSW and NSW SES across the state, will thus enhance connectivity and voice clarity, leading to greater interoperability with other emergency services and improved situational awareness.

NSW SES Commissioner Carlene York said the technology will be a great boost in regional areas where coverage is limited. She explained, "When the mobile broadband connection or public safety network has an outage, our vehicles can now switch to satellite connectivity with ease to keep members in the field in

Image courtesy Rosenbauer.

communication with each other and with the State Operations Centre."

Now that the systems have been installed, work will commence on enabling Fire and Rescue NSW vehicles to be used as 'mobile Wi-Fi hubs', allowing for mobile phone and live video streaming connectivity for first responders. Video streaming allows emergency services to share live footage from the incident, heightening situational awareness for ground crews.

"This is the first big step in bringing the hubs' various functions online," said Fire and Rescue NSW Deputy Commissioner – Strategic Capability Megan Stiffler.

"The hub basically turns each fire truck into a modern communications node and also introduces the latest AVL [automatic vehicle locator] technology that allows Fire and Rescue NSW to deploy the closest firetruck to an emergency."

Richard Gibb, Operation Communications Systems Officer at Fire and Rescue NSW, will be speaking at Comms Connect Melbourne on 18 October on the topic "The Connected Firefighter — Critical communications capability for the 21st-century firefighter".

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Industry Talking

With ARCIA President Hamish Duff away at the time of writing, it has fallen on me to share with you some thoughts for the coming issue of *Critical Comms*, and as I reach the 12-month mark in my role at the association, there's no shortage of thoughts to share — it having been an incredibly busy year for the association so far.

I've been encouraged by the level of engagement that we've seen all around the country from members and non-members alike and from our partners, highlighting that what we do is valued and that the radio and critical communications community is keen to learn, share ideas and collaborate when and where possible.

With Comms Connect just around the corner, and with it our Gala Dinner and much-revamped Excellence Awards, the opportunity to continue to work together returns and we're looking forward to being part of the region's largest gathering in the critical communications community. If you haven't yet booked for these important events, there's no reason to delay further.

The association's conferences in Perth, Sydney and Brisbane in the last six months were very well supported, with excellent content delivered by manufacturers and end users, with the feedback received being extremely positive. Based on their success, the plan is for ARCIA to continue with these events into 2024, in conjunction with our popular state networking dinners, with the possible addition of a conference in Adelaide next year, which this year saw a very well-attended dinner on 7 September.

Training has been on the wish list for a long time and it's been great to see some traction with this for those who are able to commit the time to what's being offered. As is often the case, even for those who tell us they want and need the training, actually freeing up the space is the challenge, and we understand that, having delivered our first courses online in a flexible format to address this. We aim to add more courses in the months ahead and would appreciate your feedback around content and delivery methods.

Our AGM was held in August with, I'm pleased to say, all of our committee being nominated to continue with their roles for the year ahead. We did, however, also have a number of new nominations, giving us the opportunity to bring new ideas and energy to what we do and we welcomed Dina Rubis of Telechnics and Peter Dunkin of Unicom to our ranks, with our ex-officio committee members now as strong in numbers as our full members, which is great to see. The work our committee carries out underpins all that we do and I'm personally very pleased to see our numbers grow across the country.

And with new members also comes change, with our longstanding Treasurer, Andrew Wyborn of Radlink, stepping down after eight years of delivering the financial oversight that we require to operate as an association, as he passes the baton on to an equally committed member in Brad Welch of TPL Systems. On behalf of ARCIA I'd like to thank Andrew for his years of dedication to the role and look forward to his continued involvement with the association, where he remains on the committee.

The new financial year saw our partner agreements updated and we were extremely pleased to see that the very strong market support for what we are doing continues. Not only did we have an almost 100% retention rate, but we gained a number of new partners at various levels, with some existing partners pledging their support for the year ahead, but at a higher level. This very public support demonstrates their ongoing commitment not only to ARCIA, but to the market as a whole, investing for everyone touched by critical communications, as their significant contributions ensure we can continue to deliver what we need to — so a big thank you to all of our 2023–2024 Partners, we look forward to working with you throughout the year.

Paul Davis, CEO
Australian Radio Communications Industry Association

Empowering first responders through technology investment

First responders are under pressure to react faster and more efficiently to emergencies. To make better and informed decisions they need to be equipped and empowered by advanced information systems for situational awareness. Meeting public expectations is enabled by investment in the Public Safety industry for innovative technology.

Airservices Australia, Aviation Rescue Fire Fighting Service.

Frequentis' Manuel Hintermayr and **Andreas Heschl** explain the importance of next generation public safety control room solutions and mission-critical communication systems for protecting the public. They outline what to expect at Comms Connect in Melbourne.

Tell us about Frequentis and your work on mission-critical control rooms?

Manuel: We take immense pride in our commitment to delivering reliable solutions for Public Safety agencies worldwide. As the public becomes more connected and more vigilant, there is a great expectation placed on authorities and the emergency services' personnel. The digital transformation provides the public instant access to live data. They now expect to have access to accurate information about emergency incidents and be efficiently responded to by the authorities in emergency situations.

Frequentis safety-critical communication and information solutions leverage more than 75 years of cross-industry experience in public safety, civil aviation, defence, maritime and public transportation.

Andreas: Our Public Safety domain has been supplying emergency services organisations with highly reliable, easy-to-use communications and control centre solutions for over two decades and we have been privileged to work on many transformative projects across the world that have helped enhance emergency response, communication, and resource coordination.

What brings you to Comms Connect? Is this the first time you are exhibiting? And what will you be showcasing?

Manuel: Comms Connect Melbourne is the ideal event for us to showcase our critical communication technology in Australia. Frequentis is investing heavily in public safety in the region in order to respond to the ever-increasing demand within the public safety domain.

Personally, I'm very much looking forward to being there. It's my first time at a Public Safety event in Australia and therefore very excited to get a glimpse of, and compare it to, the rest of the world.

We will be showcasing Frequentis LifeX™, our multimedia communication and collaboration platform, and MissionX, our solution shaping future mission-critical broadband communications.

Multimedia mission-critical data services are essential to support crucial features for emergency response teams, such as situational awareness, position tracking, distribution of images and live video streams.

Andreas: Frequentis LifeX is a future-oriented public safety communication and collaboration platform designed to satisfy all the demands of a next generation control room and its multimedia handling. It provides operators with real-time information about incidents. This platform allows control room operators to access crucial data at a glance, enabling better coordination and a more integrated response amongst emergency responders. The software seamlessly integrates with existing IT infrastructure (on-premises, SaaS, or cloud).

MissionX is an integrated, end-to-end offering based on 3GPP standards. The offering consists of a combination of our LifeX, our MCX servers and Frequentis "OnSite" mobile client for First Responders. With this offering we will demonstrate the possibility of end-to-end, pure standard based mission-critical broadband.

Manuel: For us it is crucial to stick to the global standards to further drive innovation on a global scale and to avoid the vendor lock-in for customers and agencies.

What are some of the successful mission-critical projects you've deployed globally?

Manuel: We have worked with many emergency service organisations, including United Kingdom (UK) Metropolitan Police, German Hamburg Police and Fire Brigade, the Vietnam Fire Brigade dispatch centre, and Qatar National Command Centre, to name just a few.

In the UK we are also working on the Ambulance Radio Programme aimed at revolutionising Ambulance Service communication across

England, Scotland, and Wales. As part of this program, we provide our cutting-edge multimedia communication platform, 3020 LifeX, to 13 Ambulance Trusts. The system has been rolled out to Isle of Wight, Wales, Scotland, and West Midlands so far with nine more Ambulance Trusts rolling out during 2023.

Andreas: Our most recent project award is with West Yorkshire Fire & Rescue Service (WYFRS), the fourth largest fire and rescue service in the UK, responsible for the safety of over 2.2 million residents over a vast geographical area. Understanding the unique challenges presented by this diverse landscape, we offered a cloud-based mobilising solution that encompasses all communication and incident management requirements.

Manuel: The "System as a Service" approach ensures ongoing support and eliminates concerns associated with 24/7 mission critical IT operations, freeing our customers' minds to focus on their mission to saves lives, protect and maintain public order.

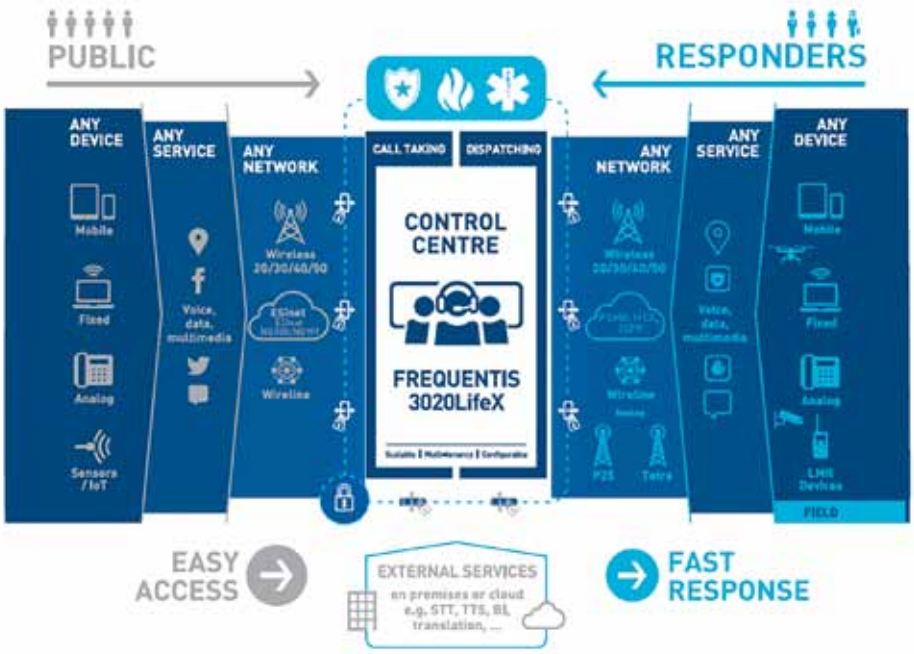
Our partnership with the Metropolitan Police in UK is another project which is a testament to our expertise in control room solutions. Since 2005, our Integrated Communication Control System (ICCS) has been the backbone of the Met Police critical communication operations. The ICCS handles vital radio transmissions and provides seamless coordination between over 500 working positions in the Met Control Room and Special Operations Room. The system can also be expanded depending on demand, for planned and even unplanned large events. An example of this was the London 2012 Olympic and Paralympic Games, the 2022 Queen Elizabeth's Jubilee and her funeral, and the Coronation of King Charles III in May 2023.

Another example of this strong Frequentis world leading technology is the second G7 summit in Bavaria supported by our LifeX control room solution.

This is where our communication systems have the capability to adapt to peak demands.

What about your work with customers here?

Andreas: We are absolutely committed to this region with ever expanding customer footprint and the expansion of our resources. We have provided critical communication solutions to the Australian region for two decades. Our long-term customers include the Airservices Australia, Royal Australian Air Force, Sydney Trains, Airways New Zealand, Canberra Parliament House, just to name a few. We have worked on the Australian combined civil and military air traffic management system project, OneSKY, providing our voice communication system. We are also providing our LifeX system to the Australian Aviation Rescue Fire Fighting Service (ARFFS), modernising fire and rescue operations across 27 airport control centres, Australia wide. By improving emergency communication and incident resolution, we aim to reduce response times and ensure the safety of residents, communities, and businesses across Australia.



Manuel: These are just a few examples of how our projects have helped Australia. Our mission is to positively contribute to the improvement of essential services and build strong partnerships that make a positive impact on the Australian population and critical infrastructure. Our technology can significantly contribute to enhancing safety and security across various sectors, which ultimately translates to a safer and more resilient community. As we continue to grow in this region, we are keen to provide next-generation communication and command centre solutions which are helping Australia stay at the forefront of safety-critical communication technology.

In Brisbane we have a purpose-built integration facility, warehousing, multiple training rooms, and space for the planned growth of regional staff. We have also established offices and teams in Sydney, Melbourne, and Perth, to provide direct support for our customers at their business locations. We employ over 130 staff locally.

You mention next-generation communication and command centre solutions — what makes them next-generation?

Manuel: Our next-generation solutions aim to enhance emergency response capabilities, improve coordination, and streamline critical operations. Through our integration platform, we enable seamless communication between different agencies and stakeholders, ensuring a unified and efficient response to emergencies. Our multimedia communications solution, LifeX, empowers operators to access vital information, including voice, video, and data, on a single platform, leading to better situational awareness and faster decision-making. With our omni-channel capabilities, first responders can communicate through various channels, including radio, voice, and social media, enabling them to receive and disseminate crucial information swiftly. Having these advanced technologies will be a step towards revolutionising emergency services, making Australia's communities not only safer but also more resilient.

How do we find out more about your solutions?

Andreas: We will be at Comms Connect at Melbourne Convention and Exhibition Centre from 18 to 19 October at booth 18, where we will be happy to explain more about the benefits of our solutions, or you can visit www.frequentis.com/public-safety.

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IMPROVING EFFICIENCY FOR BASE STATION INTEROPERABILITY TESTING

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As part of an R&D project from Japan's New Energy and Industrial Technology Development Organization (NEDO), NEC Corporation and Fujitsu are investigating technology for testing the interoperability of post-5G base stations compliant with O-RAN specifications. A connectivity testing environment using this technology was constructed at the companies' laboratories, and tests were conducted over a two-year period.

Background

As digital transformation (DX) advances in various industries, fifth-generation mobile communications systems (5G) are being deployed globally as the infrastructure for DX. In the post-5G era, ultralow latency, massive simultaneous connectivity and other 5G functions will be further enhanced and become more widespread. This will lead to even lower power consumption and wider support for virtualisation of networks, further driving the expansion of the telecommunications infrastructure market, including the replacement of existing base station equipment.

To provide customers with higher-quality communication services, operators are increasingly choosing the most suitable base station equipment from a variety of vendors for use in their own networks. In response, the O-RAN Alliance — an industry group composed of telecommunications carriers and manufacturers from around the world — has promoted standardisation for connections between multiple base station devices and has formulated conditions for connecting base stations from different vendors. However, testing the operability of connected devices is time-consuming because it must be performed by the operator, and an even longer time is required if retesting must be conducted to resolve defects. This, therefore, hinders the deployment of equipment conforming to O-RAN specifications.

To address this problem, NEC and Fujitsu have established test environments in the UK and North America, which are foreseen as upcoming O-RAN markets, as part of the NEDO project. From August 2021 to June 2023, NEC's UK laboratories and Fujitsu's US laboratories conducted operational testing using a combination of profiles and base station equipment vendors used by various international operators in actual commercial environments in efforts to develop a technology that streamlines the process and shortens the time required to verify interoperability.

Results of the joint efforts

NEC and Fujitsu jointly developed a technology to automate the testing of interoperability between base station equipment from various vendors at the O-RAN fronthaul. They have enhanced the functionality to support the actual connection conditions used by operators in different countries and regions. This technology includes proprietary technologies such as the FrontHaul Analyzer (FHA), which connects base station equipment to verify fronthaul protocol; the Pseudo-DU (P-DU), which performs unit testing of radio units (RU); a test scenario extraction tool that automates each verification process; a test parameter modification tool; and a test result assessment tool.

Interoperability at the O-RAN fronthaul was tested using multiple combinations of base station equipment from different vendors and operating conditions, assuming actual commercial environments of telecommunications carriers (operators) in Europe and North America at the two companies' laboratories in the UK and the US. Automation of testing using the technology developed through the project reduced testing time by more than 30% compared with conventional manual testing.

Reducing the interoperability testing time will enable operators to shorten the lead time for deploying systems that combine O-RAN compliant base station equipment from different vendors. This will contribute to the advancement of open configurations in 5G networks currently in widespread use, as well as the construction of new networks in anticipation of future post-5G deployments.

Future plans

Going forward, NEC and Fujitsu will further utilise the technology developed through this project for joint testing with operators and base station equipment vendors in Japan and internationally, in order to shorten the time required to deploy O-RAN compliant equipment. By doing so, they aim to contribute to the revitalisation of the telecommunications infrastructure market by supporting the global spread and development of open 5G networks.

Talkpod N5 SMART SERIES

The Talkpod N5 Smart series is exactly what the Australian PoC radio / Network market has been screaming out for: well-engineered, fast, great looking Android devices that look and feel like traditional two-way radios and function in a way that more than meets consumer expectation. Talkpod devices are extremely well engineered, deliver a great 'in hand' feel and provide a durability level that assures user confidence.

The Talkpod N5 Smart Series include Android 9.0, Open API, Google Play, Dual SIM, Man Down/Gyro, Vibration Feedback, Bluetooth 4.0/BLE, Wi-Fi 802.11 B/G/N, GPS, front & rear camera (N59 only), crystal clear audio, all Australian 3G/4G bands including Band 28, and an IP66/67 waterproof rating.

One of the many qualities that separate Talkpod devices from their competitors is their ability to roam between different cellular sites, bands and technologies for the best signal with the greatest bandwidth to rapidly deliver an optimal level of service. The speed at which this roaming occurs leaves competitors in their wake setting new standards in the Australian PoC market.

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UPS

Schneider Electric introduces the Easy UPS 3-Phase Modular, designed to protect critical loads while offering third-party verified Live Swap functionality.

Providing scalability and redundancy in a compact footprint, the robust uninterruptible power supply (UPS) is available in 50–250 kW (400 V) capacity with N+1 scalable configuration and supports EcoStruxure architecture, which offers remote monitoring services. It is an energy-efficient device with a high-efficiency design, intelligent battery management, real-time monitoring and control capabilities.

With scalability top of mind, the UPS enables users to lower their capital expenditures through an optimised capex model. Scheduled downtime is reduced through self-diagnosing Live Swap power modules and static switch, thereby increasing availability. The product is easy to select, configure, install and maintain, which helps make the deployment process seamless.

Schneider Electric
www.se.com/au

Cellular network technology platform

Druid Software's Raemis platform is a mature, 3GPP-compliant core network that supports 2G, 3G, 4G and 5G as well as integration with Wi-Fi.

Raemis is a set of cellular software assets originally crafted by Druid's engineers and designed for business use cases, harnessing 5G, 4G, 3G, 2G and Wi-Fi radios from any vendor to implement standalone cellular core network solutions. It also integrates with mobile network operators using standard interfaces giving access to all the radio resources of these operators. This means public safety users can take advantage of more than one radio network at a time to deliver their services, improving the coverage footprint and building in resilience to single operator failures.

The platform also enables first responders to create instant emergency mobile networks, allowing citizens to resume mobile communications and call friends and family in affected areas. It also opens up capabilities for first responder communications including push to talk, video and telemetry, and further enables search and rescue to locate injured citizens by locating their mobile devices.

The 4G platform can be installed on portable toughened platforms designed for either vehicular or battery-powered backpack deployment. It is a complete standalone solution that includes management, provisioning and reporting in a single software platform that can be deployed on a variety of commercially available hardware platforms. From power-up, the application can be in services serving users in less than 5 min and users can be configured and managed locally via an onboard GUI.

As well as public safety applications, for enterprises the solution delivers business-critical mobile communications services in combination with a leading-edge user device. In addition, the technology is used to connect mobile or remote autonomous devices to business applications for the IoT.

Druid Software
www.druidsoftware.com

Shoulder holster

Icom's IC-SAT100 shoulder holster has been specially designed with the IC-SAT100 Satellite PTT Transceiver in mind.

The shoulder holster holds the satellite PTT radio and positions its antenna in a suitable position, so it is pointed to the sky for optimum satellite communication. It also frees the operator to do other tasks.

Communication is as simple as pressing the PTT on the optional Icom speaker microphone.

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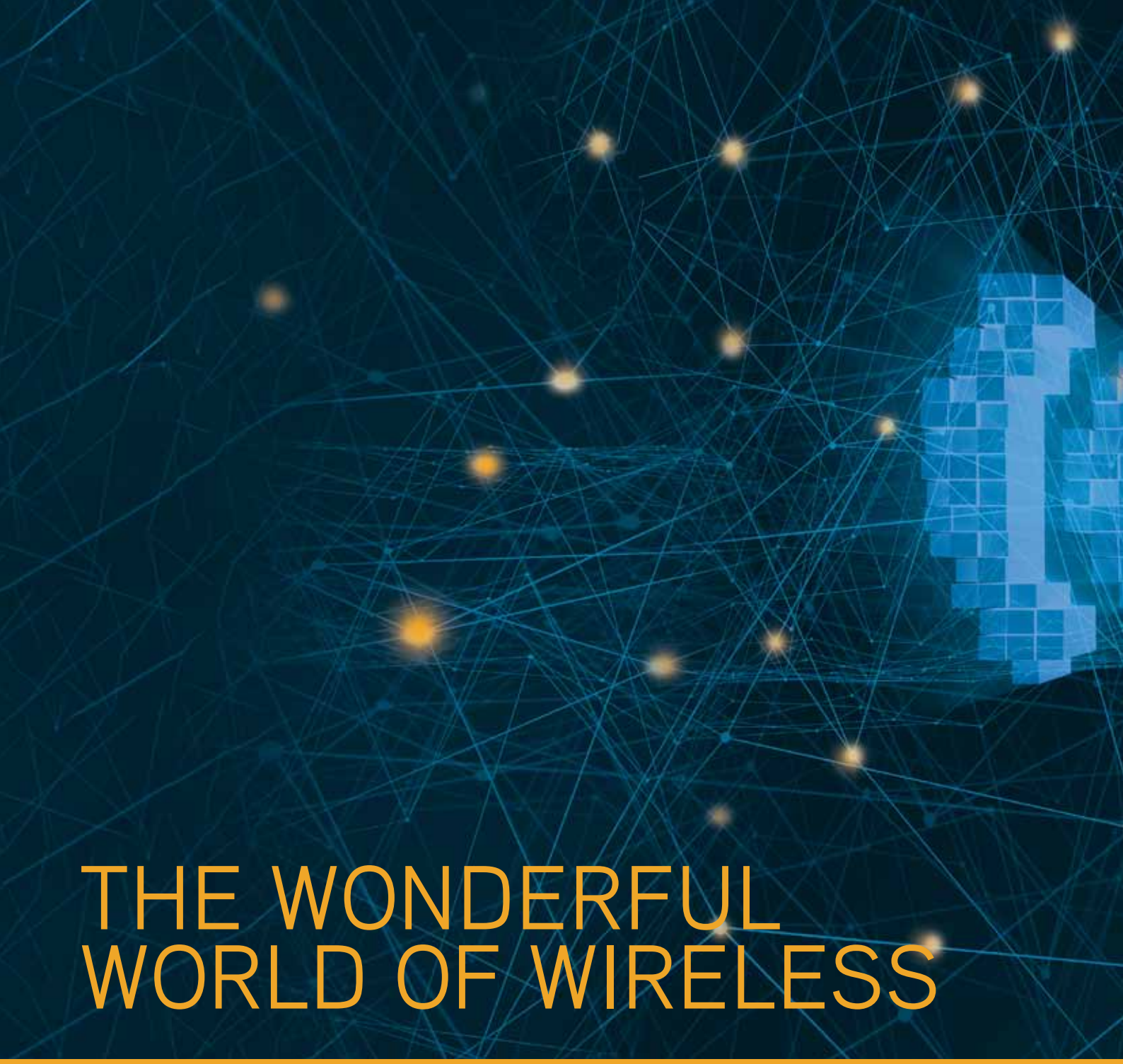
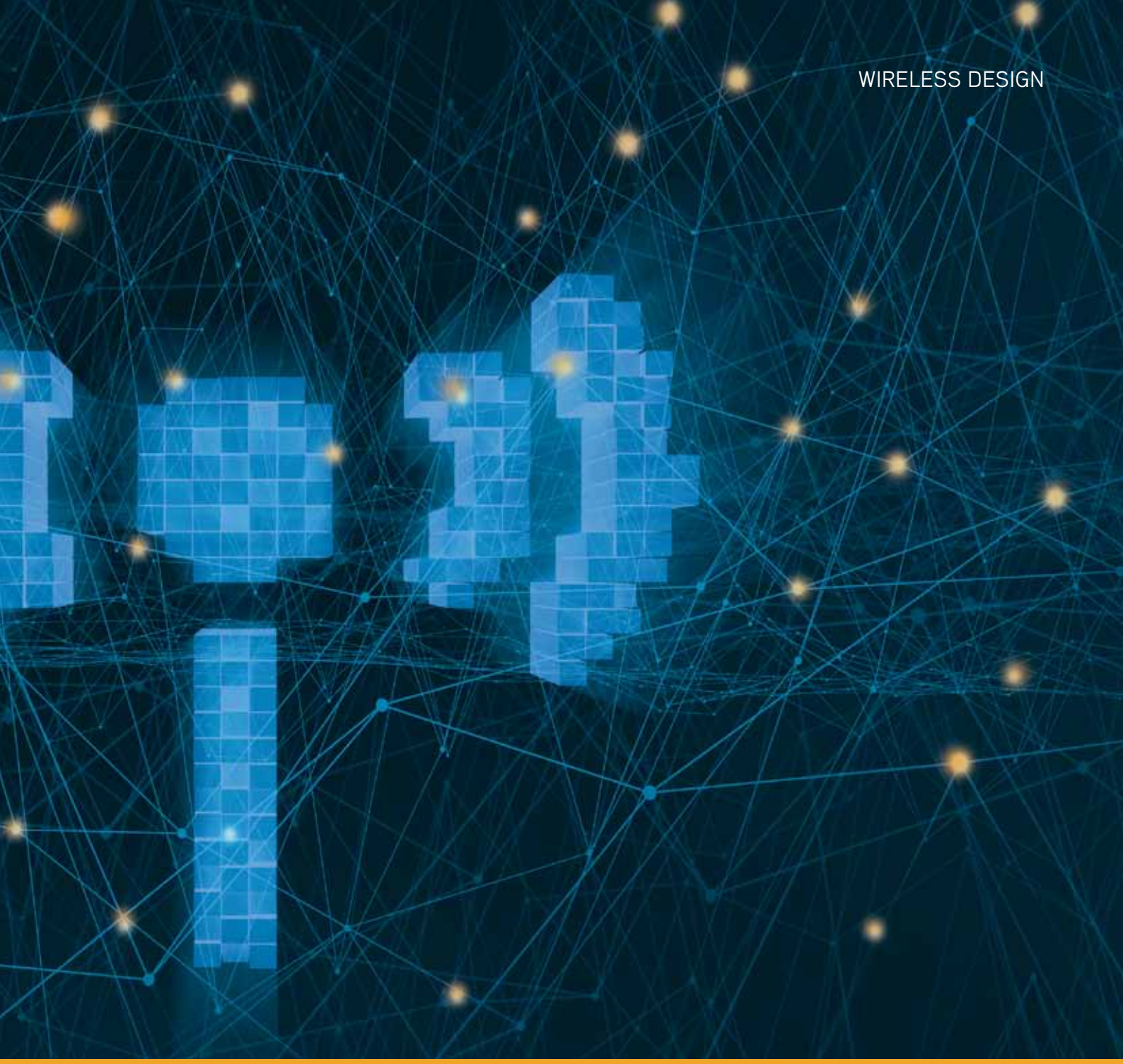


THE WONDERFUL WORLD OF WIRELESS

Q&A: WITH JOSH MICKOLIO

As part of his role as Supplier Business Development Manager – Wireless and IoT at DigiKey, Josh Mickolio* is responsible for identifying growth areas in the wireless and IoT space, which requires early engagement with new technologies and suppliers as well as a deep understanding of customers' needs. Josh recently spoke to *Critical Comms* about all things wireless, including emerging technologies and applications as well as design tips.



What are some emerging wireless technologies that are really making their mark in 2023?

This year is one of the most active I've been a part of, both globally and regionally. [Open-source connectivity standard] Matter had a big launch at the Consumer Electronics Show (CES) this year after the release of the specification late last year. As new versions of the spec are released, it will be exciting to see where developers can take the technology. DECT NR+ is a very interesting play in non-cellular 5G; it has the potential to support the high network density that IoT needs. In the mobile space, LTE Cat 1bis is giving us a single antenna for medium-throughput applications, which can result in big cost and space savings for many applications. 5G RedCap (reduced capability) is bringing us an efficient future replacement for applications that required the speed of LTE Cat-4.

Are there any wireless technologies that are currently on the way out as newer, more cutting-edge technologies take their place?

A common concern I'm hearing more of now as 5G matures is the sunsetting of 4G networks, and it shouldn't really be a concern for engineers. The pathway is there to operate into the next decade if not further. With Matter's strength in the smart home space growing, that may cause issues for some of the more niche technologies or it may be a

boost as those technologies bridge to the Matter ecosystem and the expected growth in user engagement. Wireless technologies tend to evolve versus fade away, so I'd expect to see that here as well.

Are there any particularly popular, or surprising, applications for which your customers require RF/wireless products?

20 years in this space, you would think it would be hard to be surprised, but as I've mentioned, wireless technologies evolve, while other 'new' technologies develop to serve new markets and demands. The combination of these things enables some incredible use cases. One innovative area is short-range radar and applications that require sensing very tiny movements like measuring heart rate, head tilt and more. Short-range radar's potential in health and safety is huge, and potentially life-saving.

What are some of the fundamentals that people should know when designing their own wireless network?

The fundamentals of wireless design are like any other design: component selection, board layout, testing and certification. Wireless makes it challenging at every one of these decision points. Selecting the right components is always important; in a wireless design every component can cause a failure in certification due to EMI and other issues. The layout and board design will directly impact the RF performance, higher frequencies can cause odd component behaviour, and placement and signal routing just become more challenging. Testing an RF design requires expensive equipment and software and can be overwhelming without experience. The most critical and painstaking part of any wireless design is certification. Depending on the technology used and the region the device will be used in, the certification requirements can change dramatically. Licence-free frequencies like those used by Bluetooth and Wi-Fi may only require certification on the operation of the radio. Licensed frequency bands like those used in mobile networks require testing for use on each of those networks, for example GCF and PTCRB certification, though each mobile network operator (MNO) might require devices to be certified for their network specifically.

What are some of the challenges of wireless network design that people may not be aware of?

One area that is overlooked and that impacts each of those fundamental areas is the antenna. Selecting the right antenna, choosing the right placement and properly testing the design will determine if your design will pass or fail certification. Choosing the wrong antenna or placing the antenna in a non-ideal location isn't an automatic fail but it may be the cause of intermittent failures, battery drain, transmission range limitations and more. We've talked to countless customers who had a design that performed well, passed certification, and then had performance issues in the field. This was despite impressive performance in the lab, which often unfortunately does not translate well to the environment the devices are being deployed in. These unexpected issues can be nearly impossible to address or diagnose. The best radio design won't help if it's mounted next to a noisy transformer or can't talk to the other devices because it is out of range, or the range is impacted with line-of-sight issues or was not mounted correctly. It is not possible to design for every scenario, though plenty of care should be taken to choose the technology and components that can perform to the demands of the application regardless of most environmental issues.

Are there any further resources you would recommend for people who would like further tips or training on all things wireless?

Most suppliers offer a wide variety of useful technical content like application notes and reference designs that provide recommendations on board layout and a good starting point for component selection, among others. For those new to RF, these resources are a great start. DigiKey has a lot of useful resources like our RF calculators, articles, videos, product training modules and the TechForum that offer great reference material for both beginner and experienced engineers. The standards organisations have a lot of material available to understand the technology as well, including the Bluetooth Special Interest Group, or SIG. The Bluetooth SIG manages the Bluetooth specification and is a good resource for understanding the underlying technology, its versions and any membership requirements. Another useful resource is the regulatory authorities; they provide the parameters you will need to conform to pass certification. Understanding the common reasons for failure during certification is helpful to begin to understand the steps you can take to avoid them.

**Josh Mickolio joined DigiKey in 2002 as a technical support specialist and has held a variety of roles with the organisation, including product specialist, product manager and senior product manager, working closely with suppliers and customers. He holds an Associate of Applied Science degree in Industrial Electronics and Networking from Northland Technical College in Thief River Falls, Minnesota, and has completed several advanced training programs in cellular technologies, wireless certifications, RF and Bluetooth technologies, among others.*

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COSMIC-RAY MUONS ENABLE NAVIGATION

WHERE GPS CAN'T REACH

A research team led by The University of Tokyo has used superfast, subatomic-sized particles called muons to wirelessly navigate underground, in what is reported to be a world first. Described in the journal *iScience*, the technology could be deployed in future search and rescue efforts to monitor undersea volcanoes and to guide autonomous vehicles underground and underwater.

Image ©2015 Hiroyuki KM Tanaka

GPS is a well-established navigation tool and offers an extensive list of positive applications, from safer air travel to real-time location mapping. However, it has some limitations. GPS signals are weaker at higher latitudes and can be jammed or spoofed (where a counterfeit signal replaces an authentic one). Signals can also be reflected off surfaces like walls, interfered with by trees and blocked by buildings, rock or water.

By comparison, muons have been making headlines in recent years for their ability to help us look deep inside volcanoes, peek through pyramids and see inside cyclones. Muons fall constantly and frequently around the world (about 10,000/m^2/min), and they can't be tampered with. They exist for only 2.2 µs, but because they travel at the speed of light in a vacuum (300,000 km/s), they have enough time to reach Earth from the atmosphere and penetrate deep into the ground.

"Cosmic-ray muons fall equally across the Earth and always travel at the same speed regardless of what matter they traverse, penetrating even kilometres of rock," explained Professor Hiroyuki Tanaka, from Muographix at The University of Tokyo. "Now, by using muons, we have developed a new kind of GPS, which we have called the muometric positioning system (muPS), which works underground, indoors and underwater."

MuPS was initially created to help detect seafloor changes caused by underwater volcanoes or tectonic movement. It uses four muon-detecting reference stations above ground to provide coordinates for a muon-detecting receiver underground. Early iterations of this technology required the receiver to be connected to a ground station by a wire, restricting movement, but the latest research uses high-precision quartz clocks to synchronise the ground stations with the receiver. The four parameters provided by the reference stations, plus the synchronised clocks used to measure the muons' 'time of flight', enable the receiver's coordinates to be determined. This new system is called the muometric wireless navigation system (MuWNS).

To test the navigation ability of MuWNS, reference detectors were placed on the sixth floor of a building while a 'navigatee' took a receiver detector to the basement floor. They slowly walked up and down the corridors of the basement while holding the receiver. Rather than navigating in real time, measurements were taken and used to calculate their route and confirm the path they had taken.

"The current accuracy of MuWNS is between 2 metres and 25 metres, with a range of up to 100 metres, depending on the depth and speed of the person walking," Tanaka said. "This is as good as, if not better than, single-point GPS positioning above ground in urban areas. But it is still far from a practical level. People need one-metre accuracy, and the key to this is the time synchronisation."

Improving the system to enable real-time, metre-accurate navigation hinges on time and money. Ideally, the team wants to use chip-scale atomic clocks, or CSACs.

"CSACs are already commercially available and are two orders of magnitude better than the quartz clocks we currently use," Tanaka said.

"They are too expensive for us to use now, but I foresee that they will become much cheaper as the global demand for CSAC for cellphones increases."

MuWNS could someday be used to navigate robots working underwater or guide autonomous vehicles underground. Aside from the atomic clock, all the other electronic components of MuWNS can now be miniaturised, so the team hopes that eventually fitting it into handheld devices, like smartphones, will be feasible. In emergency situations like a building or mine collapse, this could be a future game changer for search and rescue teams.

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Radio Matters

The Radio Frequency Users Association (RFUANZ) has identified for some years that the telecommunications industry is rapidly moving towards a crisis in the availability of skilled radio technicians. A lack of any formal training pathway for new or current staff in the industry and the high percentage of existing technicians and engineers approaching retirement age is likely to cause a severe shortage in the next few years. This was made more apparent due to the inability to recruit staff from overseas during the recent COVID lockdowns.

What RFUANZ wanted to see was a foundation course for new people entering the workforce or existing staff with no formal training who wanted to gain a qualification. With this in mind, RFUANZ has been supporting industry training provider E-tec in the development of a Level 4 NZQA qualification suitable for training radio technicians for the radio industry.

E-tec has now developed the New Zealand Certificate in Customer Premises Systems (Level 4) Wireless Systems Strand, with the following course overview:

- How to install, maintain and repair cabling, electronic communication equipment and devices for wireless systems.
- How to install, maintain, diagnose and repair wireless networking, wireless telemetry and control applications, such as GPS, two-way radio communications, satellite communications and broadcasting communications systems.
- How to install and maintain radio wireless systems, such as broadcasting systems, two-way radio systems, cellular communication systems, RF ID systems and telemetry monitoring systems.
- How to interpret electronic design systems.
- How to connect with telecommunication services.
- Knowledge of radio frequency legislation and standards.
- Technical knowledge of computer network engineering and networking infrastructure principles.
- How to identify and mitigate interference in wireless systems.

We understand that one training solution won't solve all the training issues affecting our industry but are confident that this course will become the new default qualification requirement for companies looking for staff in the coming years. The challenge for RFUANZ and industry (including government) is to build on this start and continue to develop a pathway that can take a school leaver and over time turn them into a highly skilled radio engineer.

David Johnston
Vice-Chairman
Radio Frequency Users Association of New Zealand

Satellite communication module

Quectel Wireless Solutions has revealed its latest innovation in satellite communications, the CC660D-LS module, designed to provide comprehensive global coverage for seamless connectivity. The product offers versatile connectivity options, including L-band, S-band and Band 23 connections. In addition, it supports 3GPP Release 17 IoT non-terrestrial network (IoT-NTN) connections.

The module addresses the need for reliable connectivity by supporting two-way communication. It facilitates not only data transmission but also SMS SOS functionality, allowing emergency notifications when needed. Additionally, it supports IP and Non-IP service networks, for enhanced connectivity and service availability. The module also features ultralow power consumption through the implementation of various power-saving modes, including discontinuous reception (DRX), extended DRX (eDRX) and power-saving mode (PSM), enabling efficient energy management.

Measuring 17.7 x 15.8 x 2 mm, the module features Quectel Enhanced AT Commands, supports SIM/eSIM and offers embedded internet service protocols, enabling low-latency satellite connectivity via the UART communication interface. By supporting IoT-NTN connections, it enables efficient data communications for low-bandwidth applications anywhere on the planet.

The versatile module can be effectively utilised across various industries, particularly those that traditionally struggle to maintain connectivity due to remote locations such as mining, smart grids, and oil and gas pipeline monitoring. It is also suitable for applications in the transportation sector to enable vehicle, asset, chassis and container tracking, and additionally offers potential for deployment in smart agriculture, environmental monitoring, heavy equipment monitoring and construction fleet management. Additionally, the module has valuable applications in the maritime sector, including vessel connection and maritime buoys.

The module is currently going through the CE and FCC certification processes, with mass production scheduled for Q4 2023.

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Test platforms for NTNs and HAPs

VIAVI has announced the availability of base station and end-to-end testing supporting non-terrestrial networks (NTNs) and high-altitude platforms (HAPs). As wireless technologies are increasingly augmenting traditional terrestrial communication networks, with satellite communications helping to provide near-complete coverage, the VIAVI TM500 and TeraVM test platforms can validate the conformance and performance of gNodeBs and entire networks under the service link conditions of NTNs and HAPs.

NTNs offer potential opportunities and partnerships for mobile and satellite operators; however, it is important that reliability, stability and performance testing are done to ensure success. NTNs need to be able to cope with the distance, speed and mobility of satellites, HAPs and user equipment (UE), while still delivering on performance. Test solutions are required not only to emulate different UE mobility and fading profiles, but to take the large Doppler shifts from fast-moving satellites and airborne platforms into consideration.

To validate the base station prior to non-terrestrial deployment, the TM500 can emulate a high volume of devices, new mobility patterns, signal propagation delays and other conditions unique to NTNs while TeraVM emulates the core network. This test scenario is suitable for early functional tests such as 3GPP protocol testing and can be applied to both regenerative and transparent architectures. Further test scenarios are focused on testing and optimising the network end to end, using a real core to validate the performance and reliability of the entire network.

VIAVI Solutions Inc

www.viavisolutions.com.au

In-vehicle communications platform

Handsfree Group has released its R5 fixed vehicle device (FVD) and integrated communications platform — an all-in-one solution designed to streamline vehicle space utilisation, thereby reducing installation costs. It comprises a control unit, a touchscreen and a variety of other accessories such as a telephone handset, speakers and antenna.

The product is a versatile in-vehicle solution for efficient and secure mission-critical communications, providing a range of core features such as PTT, voice, data and video services across LTE. Offering strong and unified communication, the system works seamlessly with essential vehicle functions and peripherals (such as lights, sirens, ANPR, PA systems, mapping and cameras).

It is suitable for police cars and motorcycles, fire engines, ambulances and marine vessels, along with coast guard, mountain rescue and other mission-critical users.

Handsfree Group

handsfree.co.uk

Ultra-wideband module

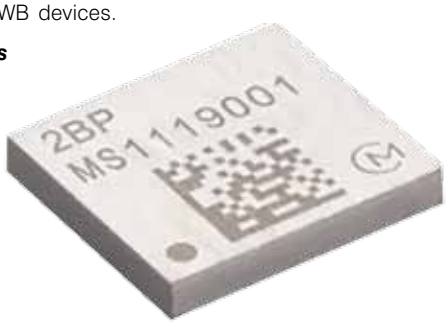
The Type2BP ultra-wideband (UWB) module, from Murata, is suitable for the growing ecosystem of spatial context awareness in IoT devices while simplifying wireless development by minimising the amount of RF expertise needed to wirelessly enable a range of applications. It is designed to provide secure and precise distance ranging using time-of-flight (ToF) measurements in addition to location detection.

The device is claimed to be one of the smallest UWB modules on the market, measuring just 6.6 x 5.8 x 1.2 mm, and is based on NXP Semiconductors' SR150 UWB chipset, clock, filters and peripheral components. Operating in the 6250 to 8250 MHz spectrum, it features low current consumption and includes channels 5 and 9 support with enhanced and secure ranging along with various antenna support configurations (3D or 2D angle of arrival).

The UWB module is suitable for the wireless enablement of larger infrastructures including access control, indoor positioning anchors and payment terminals, as well as consumer products such as televisions and gaming consoles. It features integrated physical layer (PHY) and medium access controller (MAC) functions designed to meet FiRa specifications, to enable interoperability with a growing set of UWB devices.

Mouser Electronics

au.mouser.com



WIRELESS RADIO TECHNOLOGY TO PROTECT LONE WORKERS

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People working alone are at particular risk of falling victim to workplace accidents. Therefore, it is essential that they are protected by systems that automatically detect threats, such as fall hazards, potential medical emergencies or time spent in critical areas, and notify first responders or trigger warnings in appropriate areas.

The systems that are currently in use are not capable of performing these tasks adequately. Wireless systems in particular have limitations in terms of real-time capability or range. Radio communication experts from the Fraunhofer Institute for Integrated Circuits IIS are now working with Swissphone Wireless to develop wireless lone worker protection with an integrated area alerting system.

The radio-based alerting and emergency call systems currently in use are often limited when it comes to range and latency. Both of these factors can be crucial in an emergency, as they allow information and assistance to be sent quickly and effectively to the required location.

"A major issue is radio interference caused by other radio systems, which hinders transmission," said Ferdinand Kemeth, researcher and group manager at the Fraunhofer IIS Positioning and Networks research area. "People working in hazardous areas or alone, however, must be able to rely on technologies such as wireless alarm systems no matter what."

Similarly, alternative technologies to mobile communications such as Bluetooth, Wi-Fi or DECT only offer a limited communication range. According to Kemeth, "None of these technologies are capable of providing coverage for large buildings or areas without installing costly network infrastructure first."

Together with Swissphone Wireless, Kemeth and a team of radio communication experts from Fraunhofer IIS are working on an emergency system for lone workers that is as fast as it is reliable. As part of the 'was4wos: Wireless Alerting System for Worker Safety' project funded by the German Federal Ministry of Education and Research (BMBF), the researchers are developing robust, customised radio technology for a reliable emergency alerting system. Their solution is a low power wide area network (LPWAN) connection based on the mioty radio protocol, which was developed by Fraunhofer IIS to set new standards in the field of wireless data transmission in terms of scalability, cost-efficiency, range, transmission reliability and battery life.

"By expanding this radio protocol, we hope to open up new applications such as lone worker protection," Kemeth said. "In such situations, there are defined guidelines as to when the alarm should be triggered. We want to meet these guidelines by achieving the lowest possible latency in transmission — both from the sensor, for example a fall sensor or alarm button, to the infrastructure, and from the infrastructure to the first responders, who are then alerted immediately by their pagers."

Real-time transmission and extensive range

Two important requirements, namely real-time transmission and extensive range, can be fulfilled by integrating mioty radio technology into the emergency alarm chains of lone workers. Kemeth explained, "The special telegram splitting transmission method used in the mioty protocol ensures that the message is transmitted reliably even when 50% of the message fails, as well as when there is interference from other radio systems or complex, reflective structures that you might find in industrial premises or halls or in rooms with limited network coverage, such as basements."

The Class B and Class C variants of the mioty LPWAN protocol offer further benefits; it is possible to connect a large number of sensors (in extreme cases up to 100,000) using just one base station. Not only can messages be sent to the base station, but the events that occur in the opposite direction — ie, wireless alerts or operations — can be executed simultaneously using the same system.

"This is particularly appealing in places where no mobile communications infrastructure is available, and several kilometres need to be bridged first," Kemeth said. "Using mioty, the distance to the next base station can be up to 15 km."

Greater safety in industrial environments

Wireless communication and positioning systems that use mioty can be an effective solution in industrial environments. After all, the wirelessly networked, energy-efficient or energy-autonomous sensors and actuators operate robustly even in challenging environments.

"The sensors can also be deployed in highly metallic environments with many reflections and in environments where there is a lack of radio coverage," Kemeth said. "We use energy harvesting to ensure that the sensors operate autonomously, meaning that small amounts of electrical energy are generated from sources such as ambient temperature, vibrations or light. As a result, the sensors are remarkably energy-efficient."

The radio technology offers considerable advantages for all first responders, especially in industrial environments. When combined with radio-based positioning that is as accurate as can be, these technologies should significantly improve lone worker protection.

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LTE-M/NB-IoT module with 2G fallback

The u-blox LEXI-R4 module has been customised for size-constrained application requirements. The compact (16 x 16 mm) module supports all LTE-M and NB-IoT bands with an RF output power of 23 dBm, also offering the possibility to operate on a 2G network. The most common use cases comprise small asset trackers, like pet and personal trackers, micromobility devices and luggage tags. Its versatility also enables it to encompass other applications, such as alarm systems, vending machines and stolen vehicle recovery.

The device was conceived for size-demanding designs that proved challenging for previous modules, although still providing the same capabilities. The compact size results from a 40% footprint reduction in dimensions compared to the previous u-blox SARA-R4. The gained space can be used to potentially host larger antennas, which can improve RF performance, or to accommodate larger-size batteries.

Another prominent feature is the module's 2G fallback capability. Whenever LTE-M/NB-IoT coverage conditions are not optimal, it keeps functioning by falling back onto a 2G network. This feature is convenient in countries where LTE-M/NB-IoT networks have yet to be fully deployed.

Natively designed to support GNSS AT commands, the product is also ready for GNSS bundling. Its dedicated port enables easy integration with any u-blox M10-based GNSS module, hence offering good performance and low power consumption. The module can also connect to additional positioning services such as AssistNow and CellLocate, and offers a single SKU with global LPWA coverage that simplifies logistics.

u-blox Singapore Pte Ltd
www.u-blox.com

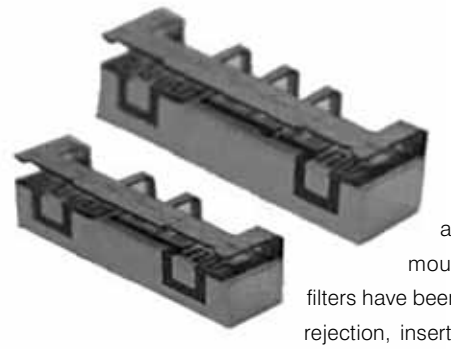
Antennas

Synzen has announced four additions to its enhanced Constellation Class Antennas range. The latest offerings have been created to challenge and redefine the traditional antenna landscape with compact, sleek and intelligent designs.

The antennas are optimised to provide good functionality with small ground planes in compact devices. Thoughtfully crafted to fit into various design structures, they show that connectivity isn't just about size, but about smart, efficient design.

The antennas offer strong connectivity for 4G, 5G and NB-IoT, enabling seamless communication no matter the location or device, with the 5G antenna designed to harness the speed of 5G technology. Synzen's team of experts is on hand to assist users in choosing the best-performing antenna for their specific design needs.

Synzen Precision Technology
www.synzen.com.tw



X-band filters

CTS Corporation's MTB and MXB series surface-mount, ceramic bandpass filters have been designed to offer good rejection, insertion loss, and peak and average power handling.

Providing high performance in a small footprint, the monoblock ceramic frequency-signal bandpass filters are suitable for X-band satellite communications and radar, as well as sensors, IF filters, and test and measurement applications.

They offer centre frequency of 6–12 GHz; bandwidth of 0.15–2 GHz; insertion loss of 1.2–2.5 dB; return loss ≥10 dB; stopbands ≥30 dB; and input power of 2 W average/20 W peak.

The MTB series has a footprint of 9 x 3 x 3 mm and MXB measures 11.5 x 3 x 3.5 mm. In addition to standard, off-the-shelf versions, the series can be customised to support alternative requirements.

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MICROSATELLITE TO ENHANCE MARITIME COMMUNICATIONS

A microsatellite for maritime communications, developed by the National University of Singapore's (NUS) Satellite Technology And Research Centre (STAR) and A*STAR's Institute for Infocomm Research (I^2R), was successfully launched into orbit earlier this year from the Satish Dhawan Space Centre in Sriharikotta, India. Compact in size, Lumelite-4 measures 20 x 20 x 30 cm (similar to the size of a laser printer) and weighs just 16 kg.

STAR designed and built the microsatellite using the university's patented modular and scalable satellite's bus system with fault-tolerant features, while I^2R developed the experimental satellite-based communication hardware. This collaboration signifies the pioneering effort by Singapore researchers to develop a satellite-based high-performance VHF Data Exchange System (VDES), which should significantly improve maritime communications as well as traffic management and analytics. This is also the first known demonstration of satellite-based VDES for maritime applications in Southeast Asia.

Currently, international voyaging ships are fitted with an automatic identification system (AIS), which is an automatic tracking system that uses transceivers on ships for collision avoidance by allowing the maritime authorities to track and monitor vessel movements using broadcast information on identification, location, course and speed. The VDES payload which Lumelite-4 is carrying has several advantages over the current AIS system, such as greater bandwidth, range, accuracy, capacity, security, flexibility and global coverage, making it an attractive solution for maritime operators seeking to enhance communication and operational efficiency.

I^2R and ST Engineering had previously developed the VDES Mobile Station, which can achieve an up to 32 times higher data rate than the current AIS system. Supported by terrestrial VDES, the VDES Mobile Station enables higher data throughput as well as higher-quality data delivery among ship-to-ship and ship-to-shore two-way communications. The latest satellite VDES complements the terrestrial VDES to enable a more robust maritime communications service, allowing the tracking of vessels not just in coastal areas but also in high seas and in areas without terrestrial network.

The NUS and A*STAR team started working on the Lumelite-4 project in December 2018, and this year completed the design, assembly, integration and testing of Lumelite-4 with VDES payload. As designed by I^2R, the VDES payload can reduce signal interference and increase tracking capability in an anticipated dense environment and low-complexity radio resource management.

The microsatellite was deployed by the Polar Satellite Launch Vehicle (PSLV) of the Indian Space Research Organisation in April and is now flying at 586 km above sea level on an orbital plane known as the near-equatorial orbit. The launch allows I^2R to demonstrate VDES and to validate potential applications of the technology, including real-time maritime traffic and asset tracking as well as two-way messaging, in contrast to the one-way reporting supported by AIS.

"The successful launch of Lumelite-4 marks a new chapter in NUS's journey into space, and STAR is excited to leverage our knowledge and expertise in satellite technologies in this collaboration with A*STAR's I^2R," said STAR Director Professor Low Kay Soon. "Over the next few months, the team aims to demonstrate the space-based implementation of high-performance VDES on a small satellite for maritime applications. The success of this mission will further strengthen Singapore's position as an innovative space technology hub for small satellites."

"With the Lumelite-4 launch, we are closing the gap to showcase the full operational capability of the VHF Data Exchange System (VDES) with both terrestrial and satellite components, advancing from our earlier development of the VDES Mobile Station," added Dr Sun Sumei, Acting Executive Director of I^2R.

"The experimental microsatellite in orbit will allow A*STAR to test and validate key

technologies of the VDES satellite mode, which includes helping maritime operators to monitor and analyse real-time traffic thus enhancing navigational safety and port efficiencies, even in areas without terrestrial network. We look forward to exploring further applications of A*STAR's technology with NUS and our partners in the ecosystem, to better support the maritime industry."

Dr Francois Chin, Division Head, Satellite, Aviation & Maritime at I²R, and Professor Low Kay Soon, Director of STAR, with a model of Lumelite-4.

Following the successful launch of Lumelite-4, I²R will carry out extensive in-orbit testing of satellite payload with its VDES Mobile Station on the ground to demonstrate the two-way data communication and vessel tracking capability, coupled with maritime traffic analytics, modelling and optimisation capabilities by A*STAR's Institute of High Performance Computing (IHPC). I²R will also continue to leverage capabilities in radio frequency and antenna designs to meet the requirements for compact satellite payloads and ground terminals. Through close partnerships with local and global ecosystem partners, the institute will develop further applications and integrated capabilities to improve e-navigation, port efficiency and shipping operations for maritime safety.

WAN link bonding is not a silver bullet

Ensuring stable connectivity for emergency services in the field

Nathan McGregor, Senior Vice President Asia Pacific, Cradlepoint

Demand for Low Earth Orbit (LEO) satellite connectivity solutions, such as Starlink, is expected to grow, given that it is now available for customers in rural and remote parts of Australia in partnership with some of Australia's leading telecommunications service providers. While Starlink provides high levels of coverage, there are disadvantages of using satellite for primary WAN communications, especially in emergency services. Limitations of satellite technologies compared with 4G/5G, especially in a moving vehicle, include penetration through objects, performance speed, performance latency, capacity, and cost.

Best of Breed Connectivity

Organisations looking to implement best practice when it comes to uptime, latency, and speed should consider cellular and LEO satellite technologies as complementary solutions. Cradlepoint enables enterprise organisations to seamlessly combine LEO satellite with 5G and other WAN sources such as 4G and Wi-Fi as WAN. Why is this important? Because in most scenarios, remote businesses need a combination of cellular and satellite solutions to ensure they have uninterrupted connectivity.

What is network bonding?

You may have heard about WAN bonding. WAN link bonding combines two types of WAN connections into one virtual connection, with the intent of providing more bandwidth and seamless failover if one of the physical WAN connections fails. WAN bonding generally consists of different features based on whether the organisation is looking to increase WAN resiliency for mission-critical traffic or increase the aggregate bandwidth available for bandwidth-intensive applications. These features include:

- Aggregated bandwidth — where the bonded link will offer aggregated bandwidth of all member links for higher throughput.
- Weighted flow distribution — traffic flows will be distributed based on % weights configured on each member link.
- Flow duplication — traffic flows will be

duplicated across the member links to ensure no traffic loss for mission critical traffic.

SD-WAN providers are touting the benefits of WAN bonding with satellite technologies; however, organisations need to know the facts when considering satellite with WAN bonding as their connectivity solution. WAN bonding is not a silver bullet when it comes to stability and bandwidth of connectivity. Here is why:

1. **Cost** — Satellite service providers like Starlink offer customers a data cap. So, when a customer bonds two connections together (cellular and satellite), that means that all data is running over both networks all the time. Data costs can max out very quickly and customers are faced with very high data costs.
2. **Loss of useable bandwidth** — With WAN bonding, data packets are sent via the different available networks, but the process isn't complete until the last packet arrives at the final destination, to allow for the data packets to be reassembled into useable data. Because of this, WAN bonding uses the slowest speed available (often the satellite speed) to deliver data.

Using Cradlepoint 5G with satellite for failover doesn't pose the same challenges as WAN link bonding. A couple of reasons for this:

1. Customers won't need to pay for unnecessary data usage. By using Cradlepoint 5G connectivity in use cases like emergency services vehicles, organisations will benefit from the high speed and low latency of 5G and only use satellite connectivity as failover, when and where 5G connectivity isn't available. This keeps data costs down and connectivity speed and availability up.
2. Cradlepoint's 5G-optimised SD-WAN solution, as part of Cradlepoint's NetCloud Exchange (NCX), enables organisations to set and have complete control over failover commands. IT teams can instruct the network to failover from 5G to satellite when 5G signal strength gets below a certain level. By moving the cellular WAN connection to satellite before it actually fails, Cradlepoint prevents data transfer sessions from breaking, resulting in smooth, uninterrupted connectivity.

Is there a use case where WAN link bonding is a good solution?

Yes. WAN bonding is useful where there's an emergency services vehicle for example, which is deployed in a metropolitan area where 5G signal drops in and out constantly over a specific area that is travelled, thus causing the network to switch from cellular to satellite and back ongoing over a journey. In this case, WAN bonding would be a good solution to ensure the best connectivity possible.

Primary vs Failover

Deciding whether cellular or satellite should be the primary connectivity solution for emergency services organisations depends on a number of things, such as locations they service and the environment of those locations (are there tall buildings that might block satellite view or are there few 5G towers operating in the area).

Cradlepoint can be used for primary connectivity by combining 5G, 4G, Wi-Fi as WAN and Starlink simultaneously. Cradlepoint's SD-WAN solution can be deployed to dynamically select the best performing WAN source based on user defined criteria to ensure real-time applications have the best user experience.

Cradlepoint supports load balancing options and application aware traffic steering to allow the simultaneous use of all available WAN sources. Critical application can be prioritised to use the best available WAN source and switch dynamically as conditions change. For example, emergency services in-vehicle telemetry traffic would always be prioritised to use the best available WAN source and noncritical traffic would be limited to the lower-performing links.

Cradlepoint's central network management platform, NetCloud Manager, features true Cellular Intelligence. It provides a single pane of glass to manage sites, vehicles, and IoT by orchestrating policies to ensure applications use the best available WAN source and have the appropriate security protection applied.

If using Starlink for primary connectivity, during a Starlink outage, using Cradlepoint for redundancy can seamlessly switch the connection to 5G, 4G or Wi-Fi as WAN.

So even as a failover option, Cradlepoint enhances the Starlink experience as an additional option when reliable connectivity is required for real-time applications (for example Telemetry, VoIP, and connected tools like fire protection masks or police armour holsters). Cradlepoint also enables critical applications to move seamlessly between Starlink and 5G and/or 4G when the Starlink service is degraded or unavailable due to challenges with getting a clear line of sight to the sky or if there are adverse weather conditions.

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SATELIOT AND TELEFÓNICA EXTEND 5G ROAMING CONNECTION TO SPACE

Satellite telecom operator Sateliot and telecommunications company Telefónica have successfully extended the reach of the 5G network to space, paving the way for massive access to connectivity everywhere on the planet. Testing saw the companies provide satellite coverage extension to Telefónica's cellular network through standard GSMA roaming, as witnessed by the European Space Agency (ESA).

Founded in 2018, Sateliot has set out to launch the first low-Earth orbit (LEO) satellite constellation based on the 5G standard, allowing unmodified commercial cellular NB-IoT NTN (non-terrestrial network) devices to connect from space. Sateliot says this is the first time in history that terrestrial cellular telecommunications will seamlessly merge with satellite connectivity, with the company's cost-effective technology and the ability to use low-cost commercial devices to connect to satellites opening up endless possibilities in the untapped market of massive IoT in remote areas.

Sateliot showcased end-to-end transmission over Telefónica's network using a regular SIM card provisioned on Telefónica Tech's Kite platform on an IoT cellular device, seamlessly switching it to the Sateliot network. The test demonstrated that a standard roaming connection can be authenticated by the Telefónica core through Sateliot networks. It also featured Sateliot's innovative 'Store & Forward' two-step authentication method, created to support standard roaming with a mobile network operator (MNO) and adapted to the NTN in LEO. Store & Forward technology stores data when the satellite is not in position to connect with a ground station and forwards it as it enters the coverage range; this is a particularly relevant feature for Sateliot's delay-tolerant IoT services for its early-stage constellation, in which the number of satellites is still limited.

"Sateliot has achieved an important milestone by successfully demonstrating the integration of low Earth orbit and NTN (non-terrestrial network) with roaming capabilities in Store & Forward mode, along with two-step authentication into a 5G cellular network," said Antonio Franchi, Head of Space for 5G and 6G Strategic Programme at the ESA.

"This significant achievement marks a disruptive advancement in the realm of standard satellite IoT services. The successful integration of these technologies paves the way for the digitalisation of the world, revolutionising how we harness satellite capabilities for the benefit of global connectivity and communication."

The positive results of the demo confirm that 5G IoT devices are able to transmit data through a standard roaming interface using the Store & Forward authentication method, putting Sateliot on track to enter commercial operations in 2024. The results also validate several agreements between Sateliot and stakeholders to improve millions of lives worldwide, with potential applications including the support of 43 million Americans reliant on private water wells; the generation of millions of dollars in savings in maintenance and repairs costs for shipping companies; assistance to South African livestock owners in their fight to stop poaching and improve herd control; and the provision of a more precise crop-monitoring system to farmers worldwide.

"This is the culmination of years of studies and developments of our Store & Forward two-step authentication procedure that gives Sateliot a unique position to establish roaming extension for NB-IoT NTN delay-tolerant applications," said Sateliot CTO Marco Guadalupi. "We are in front of a game changer in future 3GPP networks that will reduce costs based on low-density constellations and reduced ground segment infrastructure, minimising the impact in space and reducing time to market."

Starting in 2024, Telefonica expects to be the first MNO to provide to customers with NB-IoT everywhere-on-the-planet connectivity through a seamless combination of cellular and satellite standard NB-IoT networks and with inexpensive commercial standard NB-IoT devices. Carlos Carazo, Technology & Technical Operations Director of IoT and Big Data at Telefónica Tech, concluded, "This is a very important milestone for the industry in which Telefónica natively integrates the satellite network with the NB-IoT networks of Telefónica and Kite, the managed IoT connectivity platform developed by Telefónica Tech."

Simoco to Launch P25 Phase 2 for SDM Mobile Radio at Comms Connect

The proven multi-bearer platform upgrade opens up greater choice for public safety customers in Australia and USA.

In March of this year Simoco Wireless Solutions first announced support for the widely used P25 digital radio standard on its SDM mobile radio terminal with the promise of P25 Phase 2 to follow. Now, the Melbourne based manufacturer is delivering on that promise at this year's Comms Connect exhibition with the roll out of P25 Phase 2 on the SDM platform which already boasts a wide range of digital and analogue radio capabilities. Not only does this bring more choice to the P25 Phase 2 market but it also means existing customers can upgrade existing terminals to the higher capacity digital standard.

Healthy Competition for GRN customers

For a number of years, the P25 Phase 2 market in Australia, in particular, has been held back by a lack of competition, with only a handful of vendors of compatible terminals. So, organisations like the large GRNs (Government Radio Networks), that have invested heavily in P25 infrastructure, had to take what was on offer from the original manufacturers, usually an overseas supplier. Mike Norfield, Group CEO of Simoco Wireless Solutions commented: "The benefits and cost efficiencies that P25 Phase 2 offers requires an open market and we were encouraged by major customers to deliver an alternative. Not only can we offer more choice but our SDM terminal is a product of Australian engineering and manufacturing skills. The last few years have highlighted the importance of maintaining technical sovereignty, especially in critical areas like public safety."

P25 Phase 2: A Step Change for Public Safety Radio

P25 Phase 2 is a major step forward in the development of the public safety standard as it effectively doubles the capacity of Phase 1 which is vital in densely populated urban areas. With additional security features like AES encryption, P25 Phase 2 means that police, fire and ambulance services can safely collaborate over a common network. Peter Scarlata, CEO Simoco Australasia commented: "We have enjoyed remarkable success with the SDM as part of our DMR Tier 2 and DMR Tier 3 product range but given P25's dominance in the public safety market, we needed to offer a compatible product to give us access to this market. The move to P25 Phase 2 was however essential and it has been a heroic effort by our engineering teams to bring it to market in time for Comms Connect."

SDM — A Radio for all Seasons

The Simoco SDM mobile radio terminal has an excellent track record as a reliable and capable product in the two-way radio world, providing for multiple bearers from analogue to conventional radio through to digital standards like DMR Tier 2 / DMR Tier 3 as well as MPT1327. Sold all over the World and in use in a wide variety of sectors from government and public transport to mining, oil and gas, power and utilities, the SDM provides a clear upgrade path for customers at different stages of their mobile radio journey. The Simoco SDM range has a number of additional features that make it a strong contender for addition to any radio network, be that P25 Phase 2, P25 Phase 1, DMR or analogue. As well as being designed to high specification military standards to work in harsh environments, it offers customers a similar screen layout and menu based on the proven SRM9000 P25 series mobile radio for an easy user migration and high sensitivity so that it works more effectively in fringe, low signal areas. It also has the option of an API to allow users to develop bespoke applications and supports lone worker alerts.

Protecting Your Two-Way Radio Investment

As well as offering choice to existing users of P25 Phase 2 standard networks, Simoco is targeting customers looking to migrate to P25 Phase 2 in the future but not yet ready to make that move because of investment in other technologies like analogue or DMR, or budget restrictions. Scarlata continued: "With SDM terminals we can offer them a cost-effective migration path. They can equip their vehicles with SDM radios today for DMR or analogue networks. Then, they keep that investment when they can move to P25, without having to swap them all out again."

Integration With Velocity for LTE and Satellite Mobile Data

As well as being fully compatible with all the major P25 manufacturers the SDM mobile can also integrate with Simoco's intelligent edge computing device, Velocity. Also developed in Australia, Velocity can combine with P25 Phase 2 to provide data services for emergency services vehicles; effectively turning them into mobile Wi-Fi hotspots. A police car, fire truck or ambulance could be equipped with SDM radios for normal two-way radio but, with the addition of Velocity, this can open up a whole range of data services like video streaming for body worn cameras or 'push to talk over cellular' using LTE or satellite communications for use in areas where there is no P25 signal access.

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PHOTONIC FILTER
SEPARATES SIGNALS FROM NOISE TO SUPPORT 6G

The integrated microwave photonic filter helps to separate signals of interest from background noise or unwanted interference in complex electromagnetic environments.

Image credit: Peking University research team.

Chinese researchers have developed a chip-sized microwave photonic filter to separate communication signals from noise and suppress unwanted interference across the full radio frequency spectrum.

The device could help next-generation wireless communication technologies efficiently convey data in an environment that is becoming crowded with signals from devices such as mobile phones, self-driving vehicles, internet-connected appliances and smart city infrastructure.

"This new microwave filter chip has the potential to improve wireless communication, such as 6G, leading to faster internet connections, better overall communication experiences, and lower costs and energy consumption for wireless communication systems," said researcher Xingjun Wang, from Peking University. "These advancements would directly and indirectly affect daily life, improving overall quality of life and enabling new experiences in various domains, such as mobility, smart homes and public spaces."

Writing in the journal *Photonics Research*, the researchers described how their photonic filter overcomes the limitations of traditional electronic devices to achieve multiple functionalities on a chip-sized device with low power consumption. They also demonstrated the filter's ability to operate across a broad radio frequency spectrum extending to over 30 GHz, showing its suitability for envisioned 6G technology.

"As the electro-optic bandwidth of optoelectronic devices continues to increase

> TO BE COST-EFFECTIVE AND PRACTICAL FOR WIDESPREAD DEPLOYMENT, THE FILTER HAS TO BE SMALL, CONSUME LITTLE POWER, ACHIEVE MULTIPLE FILTERING FUNCTIONS AND BE ABLE TO BE INTEGRATED ON A CHIP.

unstoppably, we believe that the integrated microwave photonics filter will certainly be one of the important solutions for future 6G wireless communications," Wang said. "Only a well-designed integrated microwave photonics link can achieve low-cost, low-power consumption and superior filtering performance."

6G technology is being developed to improve on current 5G communications networks. To convey more data at a faster rate, 6G networks are expected to use millimetre wave and terahertz frequency bands. As this will distribute signals over a wide frequency spectrum with increased data rate, there is a high likelihood of interference between different communication channels.

To solve this problem, researchers have sought to develop a filter that can protect signal receivers from various types of interference across the full radio frequency spectrum. To be cost-effective and practical for widespread deployment, the filter has to be small, consume little power, achieve multiple filtering functions and be able to be integrated on a chip. However, previous demonstrations have been limited by their new functions, large size, limited bandwidth or requirements associated with electrical components.

For the new filter, the researchers created a simplified photonic architecture with four main parts. First, a phase modulator serves as the input of the radio frequency signal, which modulates the electrical signal onto the optical domain. Next, a double-ring acts as a switch to shape the modulation format. An adjustable microring is the core unit for processing the signal, and a photodetector serves as the output of the radio frequency signal and recovers the radio frequency signal from the optical signal.

"The greatest innovation here is breaking the barriers between devices and achieving mutual collaboration between them," Wang said. "The collaborative operation of the double-ring and microring enables the realisation of the intensity-consistent single-stage-adjustable cascaded-microring (ICSSA-CM) architecture. Owing to the high reconfigurability of the proposed ICSSA-CM, no extra radio frequency device is needed for the construction of various filtering functions, which simplifies the whole system composition."

To test the device, the researchers used high-frequency probes to load a radio frequency signal into the chip and collected the recovered signal with a high-speed photodetector. They used an arbitrary waveform generator and directional antennas to simulate the generation of 2 Gbps high-speed wireless transmission signals and a high-speed oscilloscope to receive the processed signal. By comparing the results with and without the use of the filter, the researchers were able to demonstrate the filter's performance.

Overall, the findings show that the simplified photonic architecture achieves comparable performance with lower loss and system complexity compared to previous programmable integrated microwave photonic filters composed of hundreds of repeating units. This makes it more robust, more energy-efficient and easier to manufacture than previous devices.

The researchers now plan to further optimise the modulator and improve the overall filter architecture to achieve a high dynamic range and low noise while ensuring high integration at both the device and system levels.

Cellular micro-modem for robotic vehicles

Cloud Ground Control, developed by Advanced Navigation, has announced the launch of its cellular micro-modem, CGConnect. Using 4G/5G networks, the modem links any uncrewed vehicle to the company's cloud-based drone fleet management platform, enabling live streaming, command and control from a web browser.

Enterprises that rely on drones and robotics for business operation often own a diverse range of uncrewed vehicles that may not be compatible with one another. CGConnect is designed to solve this pain point by linking them to Cloud Ground Control — a SaaS platform that supports multi-user and multi-vehicle operations — turning them into a holistic, connected fleet regardless of manufacturer or model. It is suitable for robotic enterprises with a myriad of robotic fleets for emergency, security, construction, asset inspection, agriculture and environmental purposes.

Weighing only 55 g with similar sizing to a credit card, the modem is easily integrated into any product design and makes multi-drone operation simple and accessible to users of every skill grade. Remote users will gain instant access to the SaaS platform's rich features, including real-time telemetry, cloud storage, video and payload data, all from a web browser simultaneously.

The flexible and customisable open platform operates on the MAVLink standard. This multiplies potential product applications and enables diverse autonomous vehicles and payloads to operate as a coordinated fleet. The platform runs AI algorithms in the cloud, relaying real-time camera feed data to the end user to support versatile missions such as object detection, tracking and thermal imaging.

The modem works flexibly with open-sourced libraries and is agnostic to the type of technology and vehicle enterprises may wish to use. It is available as a white label product, allowing users to rebrand the user interface in seconds to complement business branding and coding requirements.

The modem utilises military-grade encryption and authentication to safeguard data and IP from vulnerabilities and security breaches, helping users meet compliance obligations. It also supports edge AI to perform intensive object identification and classification directly on the vehicle for dynamic missions.

Cloud Ground Control

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P25 over Satellite has arrived

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Green Light for Blue Light Mission Critical Broadband

Simoco Launches Vehicle as a Node Solution for Public Safety

The mission critical communications world is changing fast with the rise of mobile broadband to complement existing radio technologies. Simoco Wireless Solutions is at the forefront of this drive with its VR-950, a combined multi-bearer router and onboard computer, effectively turning the response vehicle into a communications node, or VaaN (Vehicle as a Node). Built with reliability in mind and state of the art power management, it consolidates a whole range of different in-vehicle devices into a single compact unit that can integrate with 3GPPP compliant LTE, LMR (including P25 radio), satellite and Wi-Fi. As an evolution of previous VR-devices used extensively in the UK ambulance sector the VR-950 is being launched in Australia at this year's Comms Connect.

Public Safety Deserves Better Mobile Broadband

Public safety has been playing catch up in Australia for some time. And we don't mean catching up with criminals but keeping pace with the kind of broadband technology that every teenager has in their pocket, in the shape of a 4G or 5G enabled smart phone. And yet, the benefits of mobile data and video are clear to see for all blue light services, from body-worn cameras at the scene of a crime to ambulances being able to send and receive live data about a patient and speed up access to emergency care. So why do we rely on narrow band voice communications as our go-to technology for mission critical applications? Simoco Wireless Communications is addressing the issue head on with some breakthrough innovations in mobile data.

Parellel InStream Mobile Bearers with Five 9s Uptime at Control Centre

Police, fire, and ambulance users love their two-way radios because they are incredibly reliable. One of the obstacles to deploying mobile data in public safety is that it is prone to outages for a variety of reasons, and this is just not acceptable when lives are at risk. As a vehicle moves around it needs to find the strongest mobile signal but switching from one carrier to another introduces a delay in handover that you cannot afford in an emergency. So, the VR-950 gets around this by having several bearers running in parallel, known as InStream bonding. It's like betting on every horse in the Melbourne Cup; you don't mind which one wins because you have backed the lot. With room for up to four SIM cards this provides mission critical standard wireless performance. At the control room data centre the InStream Gateways are engineered to deliver 99.999% uptime or "Five 9s" reliability.

Declutter your Vehicle Dashboard

Modern emergency service vehicles have accumulated a whole host of mobile solutions and user interface devices, including mobile data terminals (MDTs), light and siren control, camera and voice radio control systems. The VR-950 is more than just a mobile data router, it has an onboard computer that can do all the heavy lifting of data system and device control from a single box. Instead of User Interfaces, the VR-950 runs a

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whole range of replacement applications that can be integrated with the OEM touchscreen that can be found on the majority of new vehicles. This makes better use of the limited space available, making the installation process simpler and less costly and cuts down the number of distractions for drivers, whilst reducing the power drain on the vehicle battery.

Power Management

And talking of batteries, you can have all the smart devices you like in a response vehicle but if you have no power then you are putting lives at risk. A response vehicle is a pretty harsh environment in terms of power supply with, sometimes, heavily used batteries and multiple devices pulling power at different times. The Simoco VR-950 fixes this problem. As well as reducing the overall power load by needing fewer devices, it uses built-in power management technology such as instant wake from sleep, and dual onboard power supplies with 9–36-volt range universal input and an internal UPS. This means that, not only can it access a wide variety of power sources, but critically, it can smooth out the changes in voltage from a vehicle battery when, for example, the engine is started. Without this feature the drop in power could effectively switch off all the devices in the vehicle, causing delays and risking lives.

P25, Satellite and Two Flavours of Wi-Fi

The Simoco mobile data solution takes account of the specific needs of the Australian geography and public safety communications infrastructure. Services rely heavily on P25 digital radio, which is reliable and optimised for narrowband voice, so it was important that the VR-950 offered P25 connectivity alongside the mobile data features. However, breaking news, Australia is a big country and the P25 and LTE networks have to be focused on population centres. So the unit's ability to integrate with satellite services like Starlink and OneWeb is a game changer. When out of range of P25 and LTE, the device can automatically switch to a satellite network and keep the data flow intact, whether it's two-way voice over IP, video or geolocation data, there can be no out of signal areas for first responders. As part of the InStream bundle of bearers VR-950 includes two Wi-Fi connections. This means that not only do you have an in-vehicle Wi-Fi hotspot but you can also use Wi-Fi to connect to the enterprise network when parked back at base. This can be useful for transferring large data files like patient reports, video evidence or mapping data.

Platform for Software Apps

Connectivity is vital in public safety, but Simoco is also at the heart of innovation to drive improvements in public safety. VR-950 is both a data router and a computer which means, unlike any other mobile router on the market, it can run a whole range of applications from a single device. In the UK Simoco has already developed a full mobilisation app for ambulances called Mobilize MDT which can run everything from booking in an ambulance crew and prioritising emergency calls to directing the vehicle to the most appropriate facility. Simoco's in house development teams can integrate existing apps or help develop entirely new bespoke apps for police and ambulance to further enhance safety and efficiency.

With you all the way on your MCX Journey

Mission critical is about saving lives and protecting the public so, with advances in technology, reliability is paramount. Simoco's VR-950 complies with the latest 3GPP LTE mobile standards with all its built-in provisions to prioritise public safety. Features like the InStream parallel bearers and power management to keep the lights on mean that it delivers on that core promise of protecting lives both of emergency workers and the public. At the same time, the innovations it enables in terms of new software applications will keep police, ambulance and fire services equipped to face the challenges of the future.

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5G'S GLOBAL 'TIPPING POINT' REACHED: VIAVI

VIAVI Solutions has released industry data revealing that 5G connectivity has reached a tipping point globally, as 5G networks are now active in 47 of the world's 70 largest economies by GDP.

In its seventh annual 'The State of 5G' report, VIAVI revealed that there are 2497 cities globally with commercial 5G networks, across 92 countries. A further 23 countries have pre-commercial 5G trials underway and 32 countries have announced their 5G intentions. This leaves just 48 countries, many of which are smaller island nations, that have not publicly announced plans for 5G.

A total of 18 countries announced their first 5G deployments in 2022. The new 5G countries include two of the largest developing economies, India and Mexico, as well as other emerging economies such as Angola, Ethiopia and Guatemala. The data also revealed several other major trends relating to 5G deployments.

US displaces China to top the 5G cities leaderboard for the first time

The United States has topped the 5G cities leaderboard for the first time, displacing China, which was the leader in previous VIAVI State of 5G updates since 2021. In the US, the number of cities with 5G networks has grown significantly to 503, compared with just 297 in May 2022 — a 69% increase. In contrast, the number of 5G cities in China has remained static at 356 since the June 2021 update.

The number of 5G cities is just one aspect of the relative success of the two nations' 5G evolution, with China ahead in other key metrics. The United States' breadth of 5G coverage contrasts with China's depth of 5G coverage, with China remaining ahead in data speeds, 5G subscribers and base stations deployed.

Manufacturing sector emerges as clear leader in private 5G

The manufacturing sector has emerged as the clear leader for private 5G networks globally, with 44% of the publicly announced deployments, followed by logistics, education, transport, sports, utilities and mining. This trend appears to suggest a clear pragmatism about how the business world is tackling private 5G, where organisations with the biggest connectivity pain points and greatest opportunities for smart applications are naturally emerging as the private 5G frontrunners.

Businesses within these sectors often operate in challenging environments where high-speed connectivity may not be a given. These verticals also cross over with the sectors where IoT applications have evolved most strongly, leading to discussions of smart factories, smart cities and so on. The close relationship between private 5G and IoT opportunities also coincides with a new realism among telecom operators about IoT being an almost entirely vertically focused revenue opportunity.

Standalone 5G gains momentum with 45 operator networks

5G Standalone (SA) networks, meaning networks that have been built using a new 5G core and which operate independently of existing 4G infrastructure, are rapidly gaining momentum around the world. As of January 2023, there were 45 5G SA networks in place, across 23 countries. This contrasts with January of 2022, when there were just 24 NSA networks globally.

Often considered to be 'true' 5G, 5G SA networks offer a wider array of use cases and monetisation models compared to non-standalone networks (NSA), which are relatively limited in their applications beyond enhanced Mobile Broadband (eMBB), meaning faster data speeds. With a near doubling of 5G SA networks, more operators will start to realise more of the long-promised commercial benefits of 5G, while consumers and businesses in those countries may start to notice improved network speeds.

Diverse and widespread interest in mmWave across the globe

Spectrum for 5G in the millimetre wave (mmWave) band, generally considered to be 24 GHz and above, has garnered a lot of interest from diverse countries. The spectrum range offers significant benefits with the highest speeds, lowest latency and highest capacity. However, it also comes with downsides such as lower ranges, higher equipment costs and the need for dense deployments.

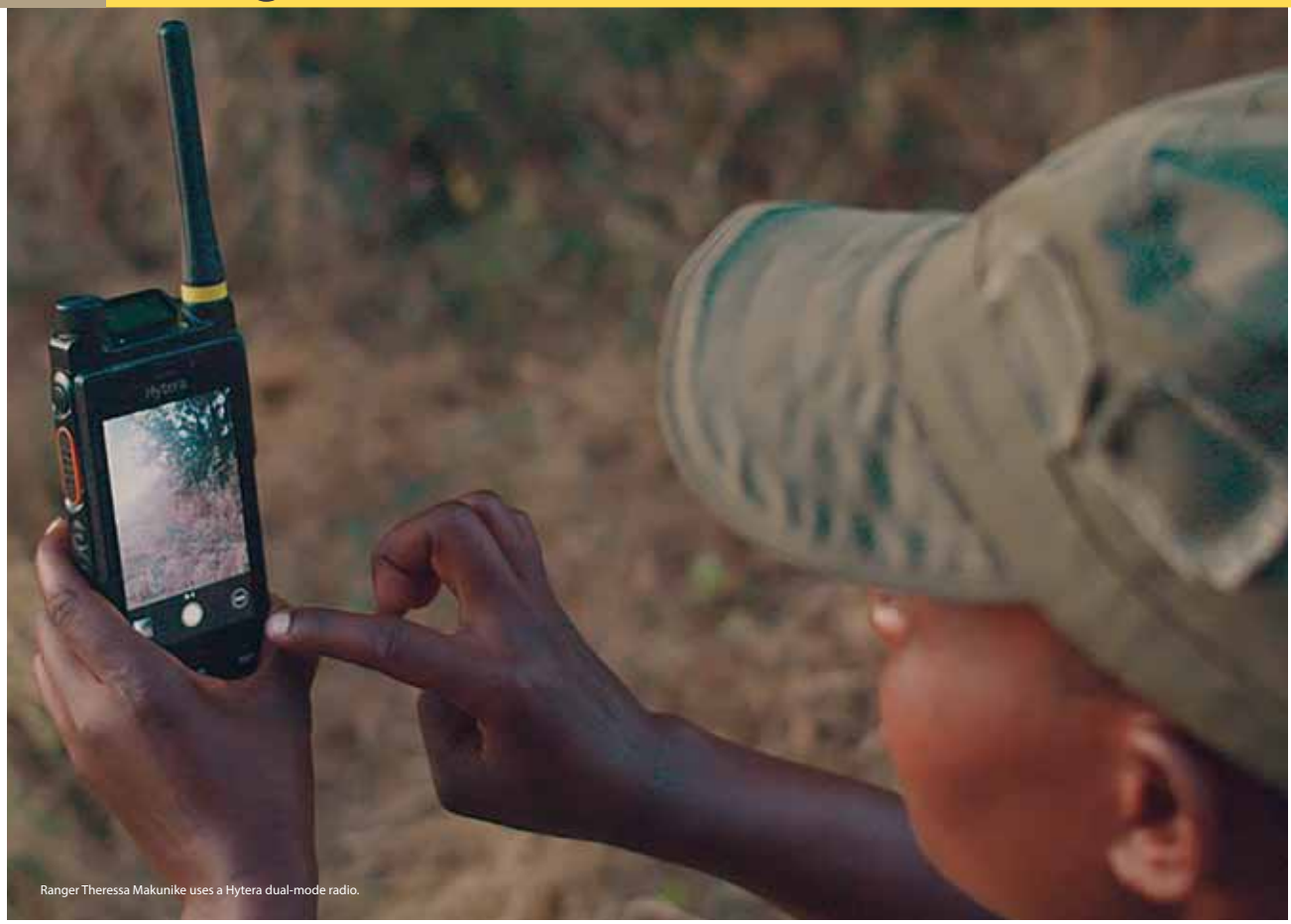
Countries that have made mmWave spectrum available span every continent and represent an extremely diverse mix of population sizes, economies and levels of technological advancement. Several of the largest mobile markets in the world, including China, India and the United States, have made mmWave available, as well as those with tiny populations such as Seychelles and Guam. The same pattern of diversity holds true across developed markets such as Germany and Japan through to emerging economies like Indonesia and Vietnam.

The diversity of countries licensing mmWave shows that there is a clear appeal from regulators combined with a natural interest from spectrum-hungry operators. Nonetheless, with clear benefits and drawbacks, the mmWave story is likely to have many twists and turns over the coming years.

"2022 was 5G's graduation year," said Sameh Yamany, CTO at VIAVI Solutions. "It evolved from being a developed markets phenomenon into a global phenomenon. On a technical level too, with a near doubling of Standalone 5G networks, the capabilities of 5G have expanded significantly and we can look forward to more sophisticated network and business capabilities from operators. In the coming year, a major focus will be network quality and the further development of Open RAN technologies — and we'll be playing our part in ensuring those are as successful as possible."

CASE STUDY

Hytera radios support park rangers in Zimbabwe



Ranger Theressa Makunike uses a Hytera dual-mode radio.

Hytera Communications has partnered with the Zimbabwe Parks & Wildlife Management Authority (ZimParks) to improve the safety of rangers working across the latter's wildlife parks and reduce poaching activities, by equipping the rangers with advanced digital mobile radios (DMR) and dispatching software.

As a government agency for wildlife conservation, ZimParks manages approximately five million hectares of land. From 2020 to 2021, widespread poaching was seen in the parks as a result of a pandemic-impaired local economy and an absence of tourists in the parks. Wildlife–human conflicts were also on the increase, causing more than 50 injuries and 60 deaths in 2020, according to ZimParks' records.

"We have rangers who are actually doing their jobs very effectively on the ground — they are our boots on the ground — but they are facing a lot of challenges as they do their work," said Dr Fulton Mangwanya, Director General of ZimParks. "The poachers want to kill them. The same animals they are protecting also want to kill and injure them.

"So the best way out, for us to actually deal with the first line of defence effectively, is to come up with effective communication, which is radio communication, given that GSM is not covering all the parks in most cases."

To better equip rangers with the essential tools they need to cope with the situation, ZimParks teamed up with Hytera to build a communication and dispatch system that allows the staff to be mobilised effectively and efficiently across the sprawling parks. The cooperation has also brought Hytera digital two-way radios to the rangers and provided them with the accessibility for park-wide radio communication.

"The remoteness of the area and absence of present-day cellphone signal coverage, coupled with … high chances of encountering armed and dangerous wildlife criminals as well as dangerous animals, reptiles and insects, make our work all the more challenging," said Theressa Makunike, one of ZimParks' rangers. "However, my training as well as reliable Hytera radio communication coverage in the area give me the confidence to engage the poachers, and even the excessive heat."

According to Mangwanya, Hytera's radio communication solution has been very effective in terms of helping to protect wildlife and supporting law enforcement. The result is that Zimbabwe recorded a decline in wildlife poaching in 2022, with a total of 36 key wildlife animals being poached in 2022, down from 42 in 2021.

"We are committed to supporting ZimParks' efforts to tackle poaching and enhance the safety of rangers," said Mark Zheng, Director of Hytera Southern Africa. "Wildlife conservation is crucial to a sustainable future and we are glad that our radios are making contributions to this. We wish ZimParks all the best in their efforts to protect wild animals and will continue to work with them closely."

Omnitronics **omni**core Enterprise Dispatch Interoperability Giving Surf Life Saving New Zealand

a Platform to Bring Together Multiple Networks

Surf Life Saving New Zealand (SLSNZ) is a not-for-profit organization dedicated to preventing drowning and injury in coastal, beach, and aquatic environments. With clubs nationwide, SLSNZ offers lifesaving services for patrolling, search and rescue operations and educational programs, ensuring safe and enjoyable recreational activities for all. As the leading beach and coastal safety authority, SLSNZ Lifeguards patrol over 15,000km of coastline across 92 locations each summer. Additionally, 40 Search and Rescue Squads across the four SLSNZ regions contribute to their efforts. Looking ahead, SLSNZ's 2024 Strategic Priority drives them to upgrade communications technology, offering greater benefits to local and national communities.

SLSNZ decided to operate a 24/7 control-and-command room at the Auckland Marine Rescue Centre, the heart of NZ's emergency water management: co-locating Surf Lifesaving New Zealand, NZ Police Maritime Unit, Coastguard New Zealand, and the Harbor Master under one roof. They watch over the nation's vast coastline and provide aid during water emergency response situations.

SLSNZ was facing the challenge of unifying disparate networks across 16 areas and required a new process for the organization to manage communications nationwide. In the past, local communications were isolated, making it difficult to cooperate with neighboring clubs or other agencies. Therefore, the key requirement was to find an agnostic system without vendor lock-in allowing communications across multiple agencies, different technologies, and large distances, hence including features like cloud-based radio dispatch, Radio over IP (RoIP), as well as technology, protocol, and vendor interoperability capabilities to unify disparate networks across the country.

*"One of the reasons we are using **omni**core Dispatch is because we have disparate networks including DMR Tier 2, MotoTRBO, Hytera, and Tait radios networks across the country that need to communicate with each other,"* says Andy Kent, National Lifesaving Manager | SLSNZ.

They selected an omnicore dispatch solution with five simultaneous user licenses shared by 25 operators on three fixed operator stations and two additional consoles installed on laptops. Using laptops means that if stationary operators are overloaded or had to vacate the Marine Rescue Centre, they can set up one of their laptops remotely and maintain full oversight over their operations and situational awareness all over the country.

Out of hours, Coastguard New Zealand operators are monitoring the SLSNZ channels to ensure 24/7/365 coverage across the country.

After the initial soft-launch of the system for the 2022/23 summer season and the new process requiring training of 4,500 team members nation-wide, SLSNZ are planning to slowly add further functionalities, planning to expand from voice-only radio communications to include Rapid Recall, PTToC, Voice Recording, GIS, alerts, and SIP telephony integration to allow patching of interagency communications with Police, Ambulance, and medical professionals directly to the radio channels.

"Surf Lifesaving NZ will hugely benefit from the new system, not just in terms of added functionality, but also expanding to 24/7/365 coverage and interoperability with other agencies. They now work with the best tools in the trade, and we're proud to have been part of their journey designing, installing, and commissioning the system," adds Chris Stevens, Managing Director | Control Centre Solutions.

*"We love the flexibility of the new **omni**core dispatch system, the fact that we can use a combination of different radio vendors and various technologies all-in-one. We can use the GPS tracking of our Tait DMR system and simultaneously communicate on other networks"* says Andy Kent, National Lifesaving Manager | SLSNZ.

Surf Lifesaving New Zealand's National Mission Critical Ecosystem has been shortlisted for the **"Best Use of critical communications in public safety"** award 2023 by TCCA Critical Communications World.

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CASE STUDY

Convergent comms enable efficiency at petrochemical plant

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The petrochemical sector, known for its meticulous division of labour, rigorous procedures and complex processes, demands utmost safety and protection of its production activities. Traditional wireless communication systems have struggled to keep pace, prompting the need for a comprehensive and efficient solution.

A Nanjing petrochemical plant had relied on a digital trunking two-way radio system in the past. However, the system's communication distance limitations, scarcity of spectrum resources and absence of data transmission services had become glaring shortcomings. Compounding the issue were the high equipment maintenance costs. Recognising the need for a transformative solution, the plant turned to solution provider Inrico and adopted a DMR-LTE convergent communication solution.

The implementation of Inrico's product enabled the petrochemical plant to achieve interconnection and unified dispatch between different systems, resulting in significant enhancements to work and maintenance efficiency. The key features of Inrico's solution played a crucial role in this achievement.

One of the standout features is the private deployment that ensures data security and control. Inrico strategically deploys servers in accordance with the enterprise's internal network environment, facilitating seamless intercommunication between internal and external networks. Operating over public cellular networks, the solution enables privacy and security of internal communications within the enterprise. With local hosting and storage options on either local or cloud servers, the owner maintains control over their data while minimising the risk of information leakage.

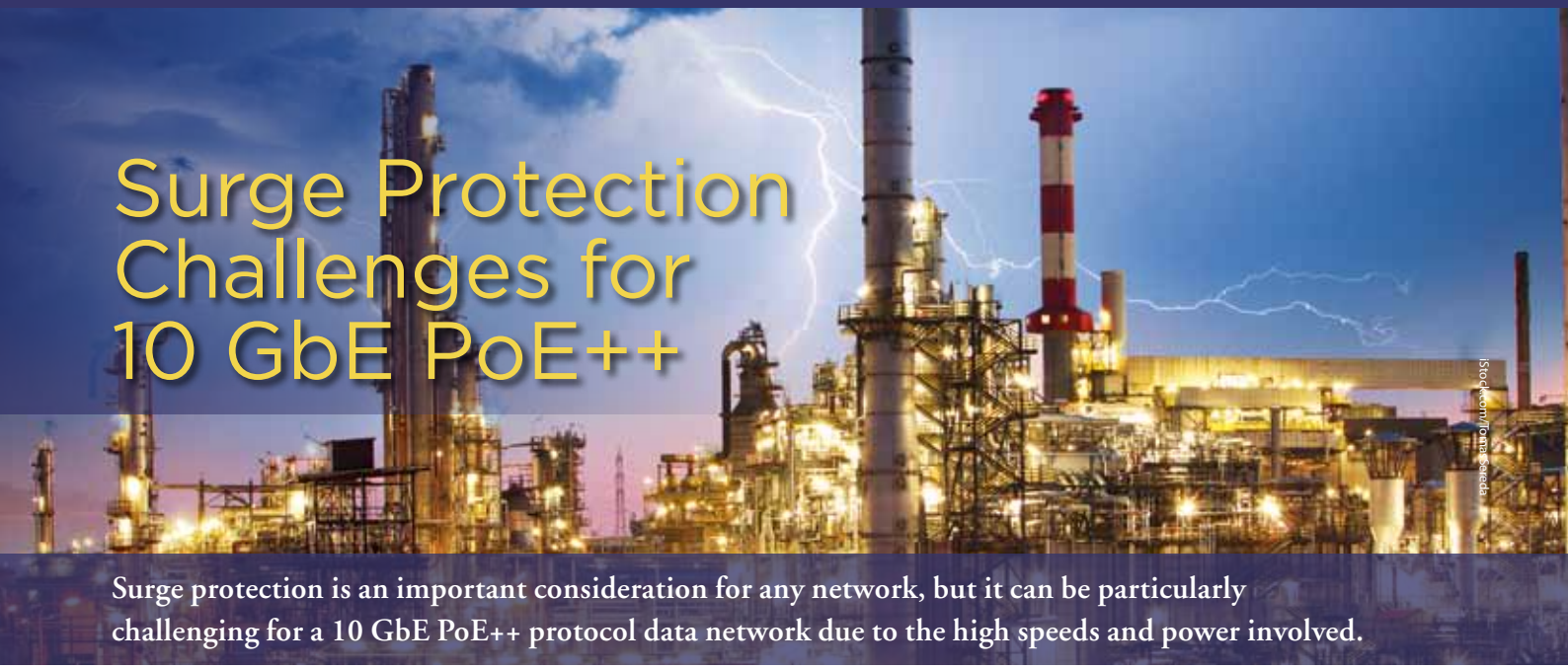
Inrico's integrated command and dispatch platform empowers real-time order dispatch to online terminals. Leveraging the terminal's positioning module, the command centre can conveniently visualise the location information of each terminal on a map, streamlining personnel management and dispatching. Moreover, the DMR-LTE convergent communication solutions allow for the common use of digital/analog push-to-talk devices and smartphones, resulting in unified management, improved work efficiency and reduced maintenance costs.

Full-coverage communication is a critical requirement for petrochemical enterprises. The DMR-LTE convergent communication system has been found to provide seamless communication across the entire plant area, meeting the mobile communication needs of operators and optimising production scheduling efficiency. Whether indoors or in outdoor work areas, employees can communicate effortlessly, facilitating instant collaboration and enabling a smoother and more efficient production process.

Efficient coordination between various departments is a key aspect of success in the petrochemical industry. Inrico's wireless communication solution allows employees from different departments to communicate anytime and anywhere. Whether it's transmitting production instructions, troubleshooting or reporting work progress, these tasks can be completed promptly and efficiently, improving cooperation and collaboration between departments.

To ensure safety supervision, Inrico's dispatching system includes video and audio data management. Communication data is stored and encrypted, serving as a valuable resource for future problem tracing and analysis. By reviewing stored communication data, petrochemical companies can monitor employees' calls, proactively identify potential issues and take corrective measures. Furthermore, this feature aids in maintaining the enterprise's reputation and complying with industry regulations, ensuring the communication process remains legal and transparent.

Inrico remains committed to providing more comprehensive and advanced solutions to meet the growing needs of petrochemical companies. The company aims to establish long-term partnerships with the industry, delivering a high-quality wireless communication experience to industrial professionals.



Surge Protection Challenges for 10 GbE PoE++

Surge protection is an important consideration for any network, but it can be particularly challenging for a 10 GbE PoE++ protocol data network due to the high speeds and power involved.

Challenges can include:

Voltage spikes: Voltage spikes can occur due to lightning strikes, power surges, or other electrical disturbances. These spikes can damage the sensitive electronics in the network equipment, leading to costly downtime and repairs. The intensity of voltage spikes can be much higher outdoors, where high-speed Ethernet links are now frequently deployed.

Power surges: Power surges can occur when there is a sudden increase in the electrical power flowing through the network equipment. These surges can cause damage to the network equipment, particularly the PoE++ switches and injectors.

Grounding issues: Proper grounding is essential for effective surge protection in a network. 10 GbE SPDs must provide a dedicated low-impedance connection to the grounding system, while maintaining the characteristic impedance of the system to maintain signal integrity.

Cable damage: The high power delivery of PoE++ can lead to cable damage if the cable is not rated for the high power levels. This can result in a loss of connectivity or even equipment damage.

SASD to the Rescue

Silicon avalanche suppression diode (SASD) technology is widely used to protect GbE PoE++ data networks from power surges. Silicon avalanche diodes are designed to trigger and conduct current when the voltage exceeds a certain threshold. When a surge of excess voltage and current enters the surge protector, the silicon avalanche diode conducts the current and creates a short circuit, which diverts the excess voltage and current away from the protected equipment and towards ground. This process of diverting excess voltage and current away from the equipment helps to prevent damage to sensitive electronic components.

SASD offers several benefits over other surge protection technologies including:

Low let-through voltage: SASD surge protectors allow very little voltage to pass through to the protected equipment. This helps to prevent equipment damage and downtime due to power surges.

Fast response time: SASD surge protectors can detect and respond to surges quickly. This helps to prevent damage to the protected equipment.

Long lifespan: SASD surge protectors can provide protection for many years. They are also designed to be maintenance-free, which reduces the need for costly and time-consuming repairs or replacements.

Compact design: SASD surge protectors are typically very compact and can be installed in tight spaces. This makes them ideal for use in environments where space is at a premium, such as data centers and industrial settings.

A Transtector Solution

Transtector recently began offering a surge protector that is designed for use with 10 GbE PoE++ networks. The ALPU-M150 outdoor data surge protector uses SASD technology to protect critical equipment while remaining transparent to data throughput. It will guard 10 GbE PoE++ networks from electrical transient surges that are generated by lightning strikes and by internal switching events. It supports long-term system reliability by absorbing high amounts of transient energy while maintaining a very low clamping voltage.

This versatile solution is housed in a weatherproof enclosure and works with Cat6, Cat6a and Cat7 cable types. It features a weatherized wiring grommet, dielectric lube to protect RJ-45 connections and a conformal coated PCBA circuit board.

Applications:

- Telecom base stations
- WISP/ISP
- IT and data centers
- Point-to-point links
- Control lines and sense loops
- Oil and gas industry

Summary

Fast, reliable 10 GbE/PoE++ data networks also need fast, reliable protection from lightning strikes and other causes of power transients. Surge protectors with SASD technology such as the Transtector ALPU-M150 are ideal for 10 GbE/PoE++ applications, because they respond quickly, last long, and can handle high current with low let-through. The Australian distributor of the Transtector ALPU-M150 is Streakwave.

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Celebrating a milestone for NZ's Public Safety Network

As somebody who helped build out the original First Responder Network Authority (FirstNet) that created the FirstNet network in the United States, it's exciting to help get another country set up with a nationwide public safety network. So it was pretty darn cool when, back in July, New Zealand's Next Generation Critical Communications (NGCC) announced its first Public Safety Network Te Kupenga Marutau solution — a national network with cellular roaming — was live, and even better, that it was delivered on budget and ahead of schedule. That was a big step in supporting New Zealand's public safety organisations through providing modern, secure, digital communications that help them stay safe and to serve the community.

I've been involved in the Public Safety Network journey for NGCC as a board member, and it's so great that cellular roaming is now actually stood up for the founding four agencies: Police, Fire and Emergency New Zealand, Wellington Free Ambulance and Hato Hone St John. They are all increasingly communicating with video and data and able to do all sorts of data-rich communications, so this new cellular solution is extremely timely to support that evolution.

If you were to look at your mobile phone to see the name of your carrier, first responders in those agencies will now also see the letters "PSN" on the screen of their phone or device showing them they are using the new Public Safety Network. Every device with a special Public Safety Network SIM has seamless connectivity across two major nationwide carriers and users can be confident knowing they have two large cellular communications networks to rely on. That means first responders get whichever cell site and whichever connection is best. They don't even have to do anything for that to happen — the Public Safety Network does it automatically so they can focus on doing their job.

NGCC has contracted Hourua — a new joint venture of Spark and One NZ — to deliver the Public Safety Network's cellular services. We're talking about two major carriers in New Zealand coming together with a single SIM, to provide access to both of their networks for the emergency services. That's a big deal. So the four major public safety agencies now have the same high level of capability to use a wireless, multi-carrier, public safety cellular network, which is wildly exciting and mirrors many of the improvements that were put in place for FirstNet.

The future evolution for the Public Safety Network's cellular services is what we refer to as QPP — or quality of service (QoS), priority and pre-emption. That additional capability is scheduled for delivery to the emergency services in late 2024. Priority and pre-emption means first responders will always be the front of the line for a connection, and if the front of the line is busy, the Public Safety Network makes room to put the fire, police or ambulance responder in the right slot to get all of the data and capability they need to operate successfully. Think about the packed stadiums in Australia and New Zealand for the FIFA Women's World Cup. In a situation like this, no matter how many people are in a stadium, if there's an emergency or a disaster, or even if somebody happens to have a heart attack in the crowd, New Zealand's first responders are now better supported through the Public Safety Network to communicate.

It really is a monumental time, and what is exciting to me is that New Zealand is not far behind what was done for FirstNet. It is in a leadership position, and way ahead of more than 200 countries around the world that do not yet have a national public safety network. Back in my public safety service days, police, fire and ambulance often had separate radio systems, separate paging devices; they didn't always talk to each other. Now, with one nationwide network that serves police, fire and ambulance — and others in the future — this will only become easier and that's good for all first responders and the public.

Every year there's more and more communication capability emerging, but while first responders deserve the best technology, we're often giving it to them last. I think the best technology should be given to first responders first, because that technology helps keep them safer and better empowers them to save lives and to make a difference in their communities. I'm proud to have a small part in trying to help make that happen and I look forward to the continued success of the Public Safety Network in New Zealand.

TJ Kennedy is an NGCC board member with 30 years of public safety and technology experience. From 2013 to 2018 he was President of the First Responder Network Authority (FirstNet) — an independent government authority charged with creating the first ever financially self-sustaining broadband nationwide network for public safety. He has advised on public safety networks in numerous international jurisdictions.

Representatives from NGCC and Hourua will be speaking at Comms Connect Melbourne on 19 October on the topic "Unveiling the future of emergency services communication in New Zealand: Cellular Roaming and the Public Safety Network".

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