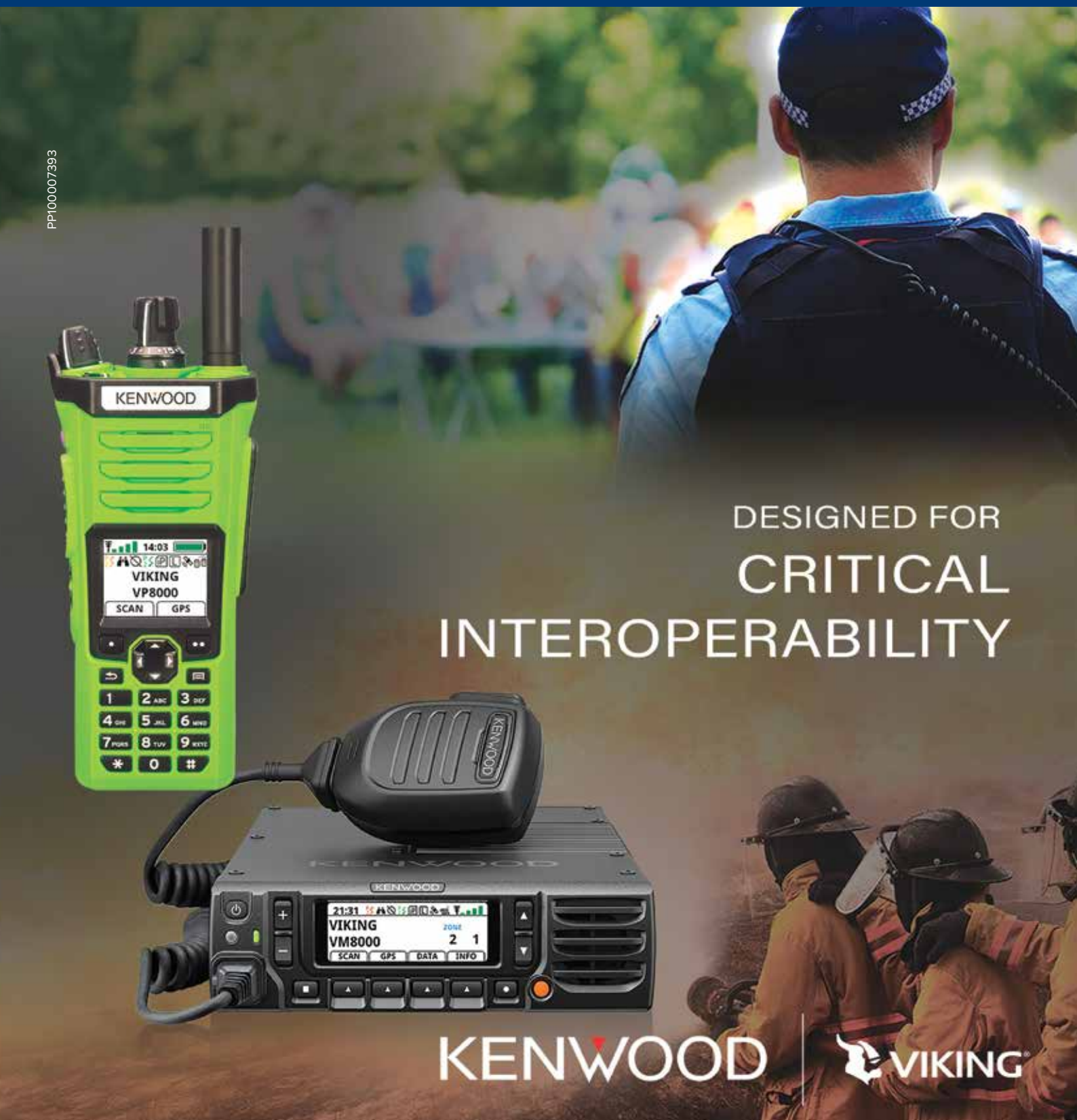
SEP/OCT 2025 VOL.12 No.6

comms critical

PUBLIC SAFETY | UTILITIES | MINING | TRANSPORT | DEFENCE



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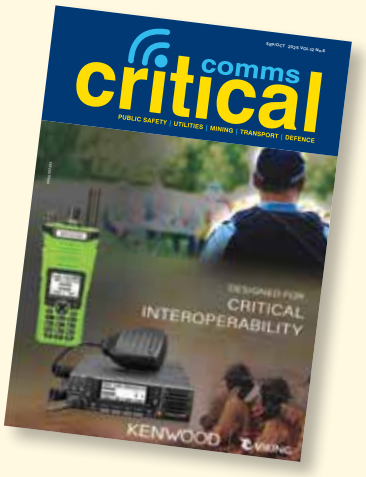

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Do you read me?

As this issue of ***Critical Comms*** goes into production, cybersecurity is very much top of mind. Officials recently revealed that the years-long Chinese cyber operation known as Salt Typhoon has infiltrated over 200 targets in over 80 countries by penetrating the core infrastructure of major telecommunications companies — meaning the phone calls, messages and even travel records flowing through those networks could be intercepted and tracked without individuals' knowledge. And it's not just personal privacy that's on the line, as these networks support emergency services, transportation, energy grids and more.

According to security researcher Mantas Sabeckis, these attacks exploited vulnerabilities that have been known but left unpatched for years, and therefore reflect a gap in how critical infrastructure handles cybersecurity. Telecom companies, regulators and governments must therefore work together faster and smarter to fix these weaknesses and share information about threats in real time, Sabeckis claimed.

Highlights this issue include the mission to build an Australian LEO satellite (page 50) and a look at some of the latest projects out of NSW's Connectivity Innovation Network (page 68). And in the aftermath of the GPS jamming attack on European Commission President Ursula von der Leyen's plane, we showcase a robust quantum navigation solution that has already been validated in airborne field trials and is now expanding into the maritime space (page 46).

Finally, we are excited to be providing our annual preview of Comms Connect Melbourne — beginning on page 14 — and so you'll find many pages filled with articles, editorials and case studies showcasing the products, projects and expertise of various exhibitors and speakers. I am genuinely disappointed that medical reasons will prevent me from attending this year's event, as it looks like there are going to be some real gems in the conference program. For those of you who are available, make sure you don't miss out!

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Calendar

October

Comms Connect Melbourne
14–16 October 2025
Melbourne Convention & Exhibition Centre
melbourne.comms-connect.com.au

ARCIA 2025 Gala Dinner & Excellence Awards
15 October 2025
Sofitel Melbourne on Collins
arcia.org.au/events/arcia-gala-dinner-2025-melbourne

ITU Regional Radiocommunication Seminar 2025 for Asia and the Pacific
20–24 October 2025
Chengdu, China
www.itu.int/en/ITU-R/seminars/rrs/rrs-25-asia&pacific/Pages/default.aspx

ITU Workshop on Modern Spectrum Management 2025 for Region 3
25–29 October 2025
Chengdu, China
www.itu.int/en/ITU-R/seminars/rrs/rrs-25-asia&pacific/Pages/default.aspx

Techritory 2025
22–23 October 2025
ATTA CENTRE, Latvia
www.techritory.com

2025 ACRNA Conference
28–29 October 2025
The Fullerton Hotel Sydney
acrna.org/conference

November

PMRExpo 2025
25–27 November 2025
Koelnmesse, Germany
www.pmrexpo.com/en

December

2025 IEEE Global Communications Conference
8–12 December 2025
Taipei International Convention Center, Taiwan
globecom2025.ieee-globecom.org

Critical Control Rooms World Congress 2025
9–11 December 2025
Madrid Marriott Hotel Princesa Plaza, Spain
congress.criticalcontrol.org

4th International Conference on 6G Networking (6GNet 2025)
17–19 December 2025
Paris, France
6g-conference.dnac.org/2025

Further event information can be found at criticalcomms.com.au/events

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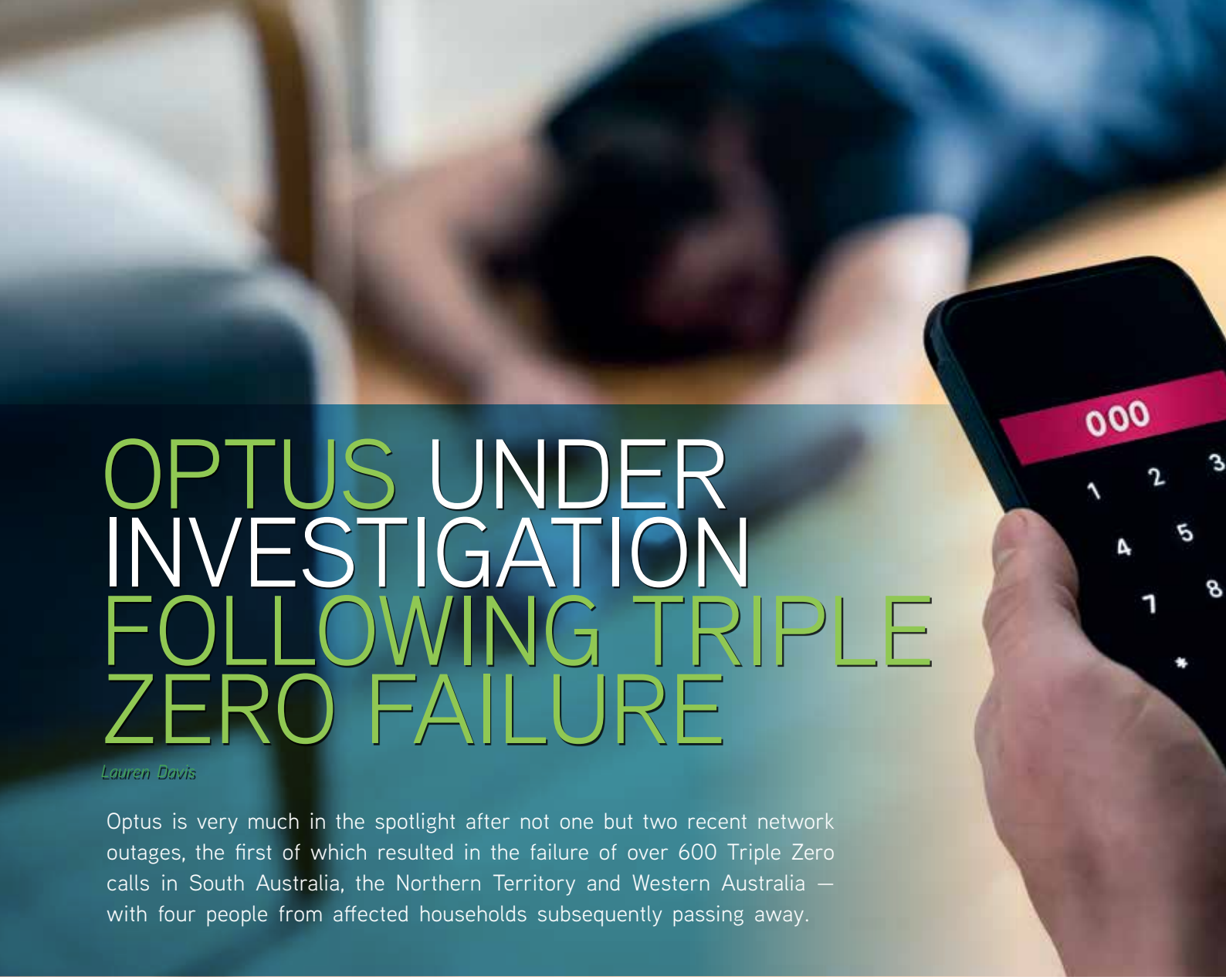

OPTUS UNDER INVESTIGATION FOLLOWING TRIPLE ZERO FAILURE

Lauren Davis

Optus is very much in the spotlight after not one but two recent network outages, the first of which resulted in the failure of over 600 Triple Zero calls in South Australia, the Northern Territory and Western Australia — with four people from affected households subsequently passing away.

In a series of statements that began on the evening of 19 September and continued over the following days, the company and its CEO, Stephen Rue, revealed that a regular firewall upgrade took place on Thursday, 18 September at around 12.30 am (Rue did not specify the time zone) — but it turns out that the first of three steps in the upgrade program was apparently not followed. In previous successful upgrades, calls were diverted away from the relevant part of the core network to a separate part of the core network, then re-diverted back once the upgrade was complete. This time, there was a deviation from established processes.

As a result of the upgrade attempt, 631 customers from the aforementioned regions — including at least two from NSW who live near the South Australian border — found themselves unable to get through to emergency services. It appears that the upgrade created a set of circumstances where the emergency 'camp-on' capability, which should have routed emergency calls to other networks, failed to function in this instance. Approximately 86 customers eventually managed to succeed through the Optus network and 65 by transferring to another carrier such as Telstra or TPG, which means there were approximately 480 customers who failed to get through to Triple Zero.

"When the upgrades and changes were implemented, initial testing and monitoring did not indicate there were any issues with calls connecting — normal calls were connecting as they should and call volumes at a national level did not raise any red flags," Rue said.

"[But] there was a technical failure in the system, and further, there were no alarms to alert us that some emergency calls were not making it through to emergency services."

Rue stated that Optus only became aware of the severity of the incident when a customer contacted the company directly at around 1.30 pm that day, followed by South Australia Police at 1.50 pm.

"Once notified we stopped the upgrade, restoring Triple Zero, and began to confirm with relevant stakeholders such as police and other regulatory and government agencies and departments that we had experienced an outage impacting Triple Zero," Rue said. This means the outage lasted for around 13 hours in length.

"Welfare checks [on affected households] commenced later that evening and into the following day, Friday (the delay due to the complexity of pulling records from the network)," Rue continued.

It was only after three fatalities had been confirmed that the company revealed the outage and its consequences to the wider public, with Rue claiming that Optus "was keen to be sure of the facts that were emerging and believed to be true" before making any statements. A fourth death was later announced, while one of the original three — an eight-week-old baby in South Australia — was deemed not to be connected to the outage, as the child's grandmother was able to contact Triple Zero on a different mobile phone shortly after her own device failed.

Rue said that Optus was unaware of the connection failure for "an unacceptable gap in time" — and yet, he also admitted that at least five separate calls were made to the Optus contact centre on Thursday morning to complain that the Triple Zero service was not working.

According to Rue, "this information was not surfaced with the relevant escalation at

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the time" as Optus itself had not detected any Triple Zero failures. Two of the callers went on to complain to the Telecommunications Industry Ombudsman.

"This is clearly not good enough, and we are implementing a new compulsory escalation process following any customer reports of Triple Zero failures through our customer call centre," Rue said.

Rue said the company had launched an immediate investigation into the incident, with plans to cooperate fully and transparently with all relevant government agencies and regulatory bodies and to share the facts of the incident publicly. In particular, the company will investigate why the Triple Zero calls failed to camp on other available networks during the outage and whether there are any patterns in the call failures.

"In the short term, I have put in place an immediate halt to further changes in our network system until we have a broader understanding of the events that have occurred so we can also introduce greater monitoring, testing and compliance and reviews of our change processes," he said.

"Further, our technical teams are monitoring Triple Zero call volumes and failure rates state by state 24 hours, seven days a week."

The trouble continued on 28 September, when Optus announced a second, unrelated outage — this time affecting a mobile phone tower site in the Dapto area of the NSW South Coast. In a statement that day, the telco said an issue with the mobile phone tower had impacted calls made between 3 am and 12.20 pm that day, including calls made to the Triple Zero network. The company has so far identified 12 Triple Zero call failures and said all callers who attempted to contact emergency services are okay.

Although the tower appeared active on the network, it transpired that calls attaching to it did not transfer to other networks. Initial assessments indicate that 5G services were operational at all times but 4G services were not, which prevented calls from connecting. Optus's ability to detect the outage was impacted as the equipment in the cell tower did not register that 4G services were not operational. Optus said it is working closely with its technical partner to understand the root cause of the issue.

Regarding the 18 September incident, Minister for Communications Anika Wells said she had spoken to the Chair of the Australian Communications Media Authority (ACMA), Nerida O'Loughlin, about ensuring there was a full and thorough independent investigation into what happened. "And I will be looking at what other requirements need to be applied upon providers to ensure that they alert emergency services properly, which it is clear on the facts that we know at the moment [that] Optus has not done," she said.

Wells said she found it hard to put into words how such a failure could have been allowed to happen again, with the so-called 'Bean Review' having made 18 recommendations to the telco industry following the nationwide Optus outage of 2023. According to Wells, "Many of the things that happened in this outage are failures to implement some of those recommendations, including alerting the public or emergency services authorities, and that is what I find to be particularly disappointing."

Wells said she was particularly "staggered by the way that Optus has navigated this with our governments", having only been notified of the full extent of the outage slightly before the rest of the nation.

"We and my department, and I believe the ACMA … were first emailed a notification that there had been an outage affecting 10 calls on Thursday afternoon, about 3 pm I think from memory," she said. "We didn't hear anything further until 3.40 pm Friday afternoon where we were told the outage had affected about 100 calls. And then shortly after 4 pm we were told the outage had affected 600 calls. And then we found out from our department that there had been three deaths and then we were told that there would be a press conference from the CEO of Optus shortly."

The ACMA has now commenced its investigation into Optus's compliance with emergency call service regulations and other related rules, which state that telecommunications carriers and carriage service providers (CSPs) must ensure that emergency calls are successfully carried to the emergency call service at all times. They must also undertake welfare checks on callers who made unsuccessful emergency calls during a significant network outage. These are the same rules that the ACMA found Optus breached during the 2023 outage; Optus was penalised $12 million by the ACMA for these breaches.

In this new investigation the ACMA will also investigate Optus's obligations to:

- communicate information about the outage to customers and the public, including putting relevant and up-to-date information on its website and using apps, email, SMS, other media or call centres to keep the public informed;
- notify the emergency call person (Telstra) as soon as possible about a significant network outage; and
- communicate information about the outage to other stakeholders, including the relevant ministerial portfolio department, the Telecommunications Industry Ombudsman, the National Emergency Management Agency and the ACMA.

Optus has also announced an independent review into the outage, to be headed by Dr Kerry Schott AO — an experienced executive and board director with a deep understanding of public and private sector organisations across the infrastructure, energy and telecommunications sectors.

The independent review seeks to identify the causes and canvass the applicable processes, protocols and operations of the incident. It will examine the management of Triple Zero calls in the Optus network, including the monitoring and operational effectiveness in relation to the technical failure. Actions taken by Optus in response to the incident, including adherence to policies, procedures and legislative requirements, will also be considered.

"The Optus board is working with Chief Executive Stephen Rue and his team to ensure we develop a full understanding of what went wrong and why, and what we need to do to prevent any repetition," said Optus Chairman John Arthur. "In the interests of transparency — and to promote greater community understanding of what went wrong and why — we are committed to sharing the facts of the incident. The appointment of Kerry Schott to conduct an independent review will support these objectives."

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STARLINK INTERFERES WITH RADIO ASTRONOMY

Curtin University researchers have revealed that Starlink satellites are significantly interfering with radio astronomy observations, potentially impacting discovery and research. This is because unintended signals from satellites — leaked from onboard electronics — can drown out the faint radio waves astronomers use to study the universe.

Researchers from the Curtin node of the International Centre for Radio Astronomy Research (ICRAR), hosted at the Curtin Institute of Radio Astronomy (CIRA), focused on the Starlink mega-constellation as it has the most satellites in orbit, at more than 7000 during the time of the study. The research team collected and analysed 76 million images of the sky using a prototype station for the Square Kilometre Array (SKA) radio telescope, with their results published in the journal *Astronomy & Astrophysics*.

PhD candidate and study lead Dylan Grigg said the team detected more than 112,000 radio emissions from 1806 Starlink satellites, making it the most comprehensive catalogue of satellite radio emissions at low frequencies to date.

"Starlink is the most immediate and frequent source of potential interference for radio astronomy: it launched 477 satellites during this study's four-month data collection period alone," Grigg said.

"In some datasets, we found up to 30% of our images showed interference from a Starlink satellite."

Grigg said the issue wasn't just the number of satellites, but the strength of the signals and the frequencies they were visible at.

"Some satellites were detected emitting in bands where no signals are supposed to be present at all, such as the 703 satellites we identified at 150.8 MHz, which is meant to be protected for radio astronomy," he said.

"Because they may come from components like onboard electronics and they're not part of an intentional signal, astronomers can't easily predict them or filter them out."

CIRA Executive Director and study co-author Professor Steven Tingay said there was scope for regulatory improvement to help avoid satellites interfering with research.

"Current International Telecommunication Union regulations focus on intentional transmissions and do not cover this type of unintended emission," Tingay said.

"We hope this study adds support for international efforts to update policies that regulate the impact of this technology on radio astronomy research."

GOVT INVESTS IN COUNTER-DRONE CAPABILITIES FOR DEFENCE FORCE

The Australian Government is accelerating the acquisition of counter-drone capabilities for the Australian Defence Force (ADF) to protect personnel and military assets as part of a $1.3 billion investment over the next 10 years.

Just six months after the establishment of Project LAND 156 to continuously deliver counter-drone capabilities for the ADF, the government appointed Leidos Australia as the project's Systems Integration Partner in a contract valued at $45.9 million. Leidos Australia will deliver and evolve the ADF's Counter Small Unmanned Aircraft System capability, which will address the increasing threat of drones in modern warfare, supporting the ADF's current and future operational requirements.

The government said it has adopted a continuous modernisation model as part of this project, ensuring the ADF will have access to cutting-edge capabilities as they're developed. Indeed, the project has already seen the rapid introduction of at least 120 of the world's most capable threat detectors and drone-defeating technologies.

The investment is set to accelerate the adoption of cutting-edge technologies, with the Australian Army planned to undertake an initial rapid demonstration of a minimum viable counter-drone capability by December 2025. This will include:

- an Australian command and control capability — the Cortex Command and Control System, developed by Acacia Systems;
- an Australian effector system, delivered by EOS Defence Systems;
- an Australian sensor system, delivered by Department 13;
- additional sensor and effector systems; and
- services including systems integration and capability assurance, which will be delivered in Australia by Australians.

Photographer: Rodney Braithwaite.

The government confirmed that the vast majority of the work under Project LAND 156 will be delivered by Australian companies, supporting over 160 Australian jobs and creating up to 80 new jobs. The open architecture approach to the project means more companies can be integrated in the future, providing more opportunities for the Australian supply chain.

"The structure of Project LAND 156 will ensure Australia stays ahead of the evolution cycle in relation to counter-drone technology, giving the ADF the capabilities it needs," said Minister for Defence Industry Pat Conroy.

"Counter-drone technology is critical to keeping our ADF members safe, and that's why the government is ensuring our soldiers, sailors and aviators are provided with the best technology to protect them."

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NEW STANDARD FOR EMERGENCY ALERTS ON NATIONAL MESSAGING SYSTEM

The Australian Telecommunications Alliance (ATA), the peak body of the Australian telecommunications industry, has published an updated mobile device Standard to enable future emergency alerts on smartphones in Australia.

"Australians are increasingly dependent on their mobiles during emergencies, including natural disasters, security threats and public health emergencies," said ATA CEO Luke Coleman. "This updated Standard will ensure that Australians can access the latest emergency alerts on compatible mobiles when the National Messaging System (NMS) is operational."

The NMS will utilise 'cell broadcast' technology, a modern and secure system to send emergency alerts to mobile devices in a targeted area. Cell broadcast can be used to send alerts to millions of devices almost instantly, with the ability to target devices in specific areas affected by natural disasters, or even nationwide.

Cell broadcast is an internationally proven technology with in-built privacy and security protections, no opt-in requirements, and the ability to bypass 'Do Not Disturb' settings to ensure emergency alerts are delivered. The NMS will thus provide a more modern technology compared to the current Emergency Alert system which is used to send basic text (SMS) messages to mobiles or voice messages to landlines in affected areas.

The ATA, as an accredited Standards Development Organisation, has worked with mobile network operators and mobile device providers to revise AS/CA S042:2025 Requirements for connection to an air interface of a Telecommunications Network; the Standard specifies technical requirements for mobile devices. Part 1: General focuses on Emergency Call Service access and now supports cell broadcasts for the NMS, meaning compatible mobile devices will be ready to receive emergency warning alerts when the National Emergency Management Agency (NEMA) launches the NMS in 2026–27.

"When bushfires, floods or cyclones hit, the first thing Australians do is reach for their mobile," Coleman said. "When the NMS is operational, people in affected areas will be able to receive time-critical alerts on compatible devices — which could have the potential to save lives during emergencies."

AS/CA S042 was first published in 1999 and is now in its 10th iteration, having been developed by nine different Working Committees covering five generations of technologies: CDMA in 1999, GSM in 2005, 3G in 2010, 4G in 2015 and 5G in 2022. The Standard is revised every two to three years, with the next iteration addressing non-terrestrial networks (NTN), including direct-to-device connectivity from satellites. The eventual integration of 6G will be dependent on work being carried out by international committees developing internationally recognised Standards.

The updated Standard can be viewed at www.austelco.org.au/publication/as-ca-s042-1-2025/.

MOBILE BLACK SPOT PROGRAM TARGETS KOSCIUSZKO TOURIST PARK

Kosciuszko Tourist Park has received a major connectivity boost thanks to the completion of a mobile base station which is providing new and improved 4G and 5G mobile coverage to the community, delivered through the Australian Government's Mobile Black Spot Program (MBSP).

The MBSP has been described as one of the largest ever mobile coverage expansions in regional and remote Australia, helping communities be more connected than ever across the country. Up to 1400 new mobile base stations will be delivered under the MBSP, which has generated a combined investment of more than $1 billion.

The new base station in the vicinity of Mount Kosciuszko — considered one of Australia's most popular inland tourist destinations — will provide better access to emergency services, improve data connectivity and support productivity at the nearby Tourist Park. The mobile base station was co-funded by the Australian Government, the NSW Government and Telstra under Round 5A of the MBSP.

"This investment is another example of how we are enabling Australians to be connected regardless of where they live," said Minister for Communications Anika Wells.

"Reliable mobile coverage is essential for safety, boosting the economy and the quality of people's lives in rural and remote areas, so I know this investment will make a real difference to local residents, businesses, emergency services and tourists alike."

Also commenting on the news was Member for Eden-Monaro Kristy McBain, who serves as Minister for Emergency Management as well as Minister for Regional Development, Local Government and Territories. She noted that Kosciuszko is a major tourist destination and that the mobile coverage upgrades will help boost opportunities in the region.

"This upgrade will make a huge difference to the mobile coverage at the Kosciuszko Tourist Park — supporting tourists and locals to run their businesses and to keep in touch with family and friends," McBain said.

"The Albanese government is delivering resilient communications infrastructure to help boost coverage and narrow the connectivity divide in regional areas.

"Upgrades like this are not only important to locals and visitors, but crucial for our emergency services during emergencies."

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NSW AND VICTORIA TO TRIAL CROSS-BORDER EMERGENCY COMMS

Frontline responders working between NSW and Victoria will soon be able to access improved communications when responding to natural disasters across borders, with a new radio communications trial announced at July's National Emergency Ministers Meeting in Darwin.

The trial will test first responders' ability to seamlessly switch between state radio networks, allowing teams to coordinate responses during emergencies even when crossing borders. It will see emergency service crews' radios automatically connect to the local network, enabling responders to stay in touch without needing to change devices or settings.

The trial will make use of Motorola Solutions' Critical Connect, a secure and scalable, cloud-based interoperability gateway that will connect the states' land mobile radio networks and allow radios to roam across coverage areas. The solution supports real-time voice communications across state lines, as well as location information and real-time status updates to help pinpoint resources in the field. These capabilities are essential for operational coordination and responder safety during large-scale emergencies and unplanned events like bushfires, floods and storms, where teams from multiple agencies and states often work together.

The trial builds on the success of Australia's first interstate radio roaming services, launched by NSW and Queensland in 2023. This service was critical during the response to Tropical Cyclone Alfred earlier this year when Queensland's radio infrastructure was inaccessible, and emergency teams were able to switch seamlessly to the NSW network and continue operations without disruption.

The trial is expected to begin later in the year and will be led by the NSW Telco Authority and Emergency Management Victoria, with a proof of concept running for a few months.

"This collaboration reflects a shared commitment to ensuring first responders have the tools to keep communities safe and connected," said NSW Minister for Emergency Services Jihad Dib.

"As technology improves, we need to look at new ways to harness it to improve our emergency response. This is yet another example of how we're improving communications to assist in a crisis.

"Through enabling seamless roaming and stronger network interoperability we're ensuring emergency responders can communicate clearly and stay connected when it matters most."

Victorian Minister for Emergency Services and Natural Disaster Recovery Vicki Ward added, "Our emergency service teams do an incredible job, and it's important they have the technology required to respond to emergencies regardless of where they occur.

"We're working alongside state government colleagues across borders, removing communication barriers and saving valuable time during emergencies."

$252M SATELLITE CONTRACT KICKS OFF NEXT STAGE OF SOUTHPAN

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A new, $252 million agreement between Geoscience Australia and communications company Inmarsat Australia marks significant progress in the delivery of the Southern Positioning Augmentation Network (SouthPAN), according to Minister for Resources and Northern Australia Madeleine King.

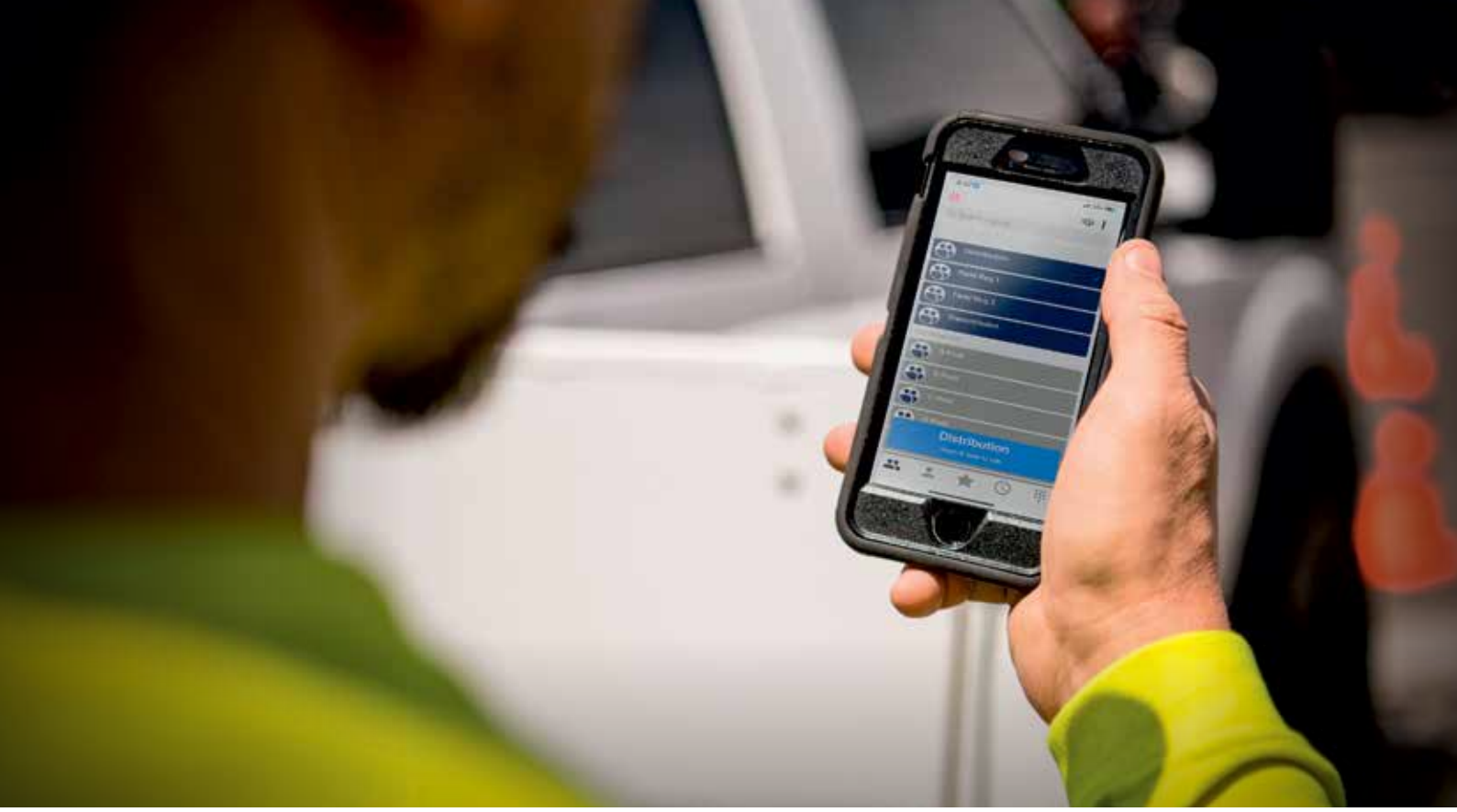
SouthPAN is a satellite-based augmentation system that is set to enable more accurate and reliable satellite positioning services throughout Australia and New Zealand, providing the precision needed to support sectors including aviation, maritime, agriculture, surveying and emergency response. For example, it can be used in agriculture through applications like precision spraying, yield mapping, controlled traffic farming, inter-row seeding and livestock management; and can improve safety on mine and construction sites by accurately identifying the location of workers operating vehicles and heavy machinery.

The Australian Government has committed $1.4 billion over 19 years towards the establishment and sustainment of SouthPAN, which is being delivered by Geoscience Australia in partnership with Toitu Te Whenua Land Information New Zealand. Inmarsat Australia, which has since combined with Viasat, won the first contract in 2023 to deliver a satellite payload for SouthPAN; the new agreement covers the continuation of services from satellites as well as a new payload to be carried on one of Inmarsat's I-8 constellation of satellites.

"This new agreement ensures we will have a robust, reliable satellite service working with our network of ground infrastructure to provide accurate precise positioning across the country and our maritime zones," King said.

Early SouthPAN services have been available since 2022, but the new contract means SouthPAN is one step closer to being certified as a safety-of-life service for aviation, which is expected from 2028. This capability would mean SouthPAN can be used in safety-critical operations where life could be at risk, such as medivac flights in a wider range of weather conditions.

The news was announced shortly after Lockheed Martin and Geoscience Australia successfully completed a Critical Design Review (CDR) for SouthPAN, confirming that all major risks have been identified and resolved and that system interfaces are sufficiently mature to proceed to development, integration and testing.



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A PACKED CONFERENCE PROGRAM PLANNED FOR COMMS CONNECT MELBOURNE

Lauren Davis

The 2025 edition of Comms Connect Melbourne, taking place at MCEC on 15–16 October, is set to feature the largest number of international critical comms and public safety experts the event has ever seen, complemented by a quality selection of local and regional speakers. There will be three concurrent conference streams to choose from — Public Safety, Technology and Industry — so attendees can build the program that best suits their interests.

Andrew Maxymillian, President of the Government Wireless Technology & Communications Association (GWTCA) in the USA, will forecast the future of land mobile radio (LMR), questioning whether or not there is still a need for LMR-based systems; he will also moderate a panel discussing the so-called 'LMR wireless workforce crisis' as LMR expertise becomes harder to find. Flying in from the UK, Dr David Lund will reveal insights from his role as Project Coordinator for EUCCS Preparation at Public Safety Communication Europe (PSCE) — EUCCS being the European Critical Communication System, a pan-European mobile broadband system that is planned to enhance the communication and coordination of emergency services during disasters.

Lieutenant Colonel Gustavo Dantas from the Brazilian Military Police will take a look at the Brazilian critical communications landscape, while Eliam-Jay Bendavid from French software company STREAMWIDE will examine how Mission Critical Services (MCX) solutions support a secure and seamless transition from traditional systems to hybrid operations leveraging broadband networks, including public or private 4G, 5G, satellite and Wi-Fi. International agency leaders will meanwhile feature in an International Public Safety Fireside Chat, following their attendance at the Global Public Safety Operators Conference (GPSOC) in Sydney, with the panel set to include Nordic know-how from TCCA Vice Chair Tero Pesonen and Swedish Civil Contingencies Agency (MSB) Project Manager Sara Olsson, among others.

In a Comms Connect first, the event will feature a Women in Critical Comms panel session, exploring the pathways, challenges and opportunities that present in an industry that has traditionally been male-dominated but is now becoming more diverse. Telstra's Head of Enterprise & Radio Networks, Natalie Kolodziej, will moderate the session alongside a group of successful local and international professionals: AMTA CEO Louise Hyland; P25 Technology Interest Group board member Cheryl Giggetts; ACCF Chair Bidar Homsey; NSW Telco Authority's Executive Director of Emergency Management, Rania Wannous; and Connectivity Innovation Network COO Genie Tan. Several of the panellists will also be partaking in additional conference presentations, covering the future of critical communications in Australia (Kolodziej); the importance of affordable access to spectrum (Hyland); a global update on P25 (Giggetts); and technological innovation for public safety and disaster resilience (Tan).

There will be plenty of insights from across the ditch, with Next Generation Critical Communications (NGCC) Senior Project Manager Matthew Hansen, Hourua's Sam Newton and NZ Police Inspector Kerei Gray revealing the lessons learned from New Zealand's Public Safety Network (PSN) cellular service journey. Separately to this, Gray will share best practice from NZ Police on strategies to improve connectivity and communication in emergency services, as well as the importance of rapid response during critical emergency events. Newton will meanwhile be joined by NGCC's new Chief Technical Director, Steve Lawrence, in a presentation

What:
Comms Connect Melbourne

When:
15–16 October 2025

Where:
Melbourne Convention & Exhibition Centre

Web:
melbourne.comms-connect.com.au

COMMS CONNECT

MELBOURNE CONVENTION & EXHIBITION CENTRE

15-16 OCTOBER 2025

on the PSN's newly launched Cellular Network Visibility Service — a digital tool for emergency services personnel that provides near real-time visibility of cellular network coverage across New Zealand, which has already proved useful to Fire and Emergency New Zealand when it was used in its testing phase during Cyclone Tam earlier this year.

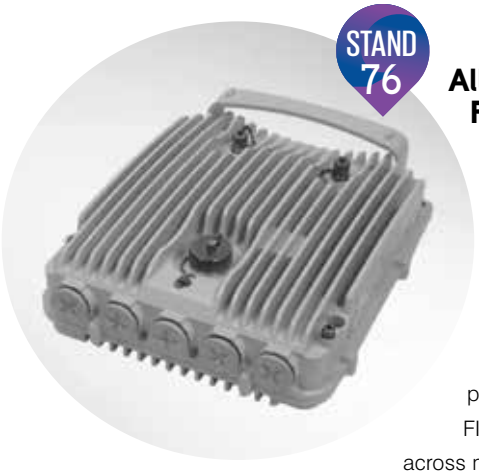
Speaking of cyclones, James Lowe from Ergon Energy will present some of the issues encountered, responses and subsequent learning outcomes from eastern Australia's encounter with Cyclone Alfred and its impact on Energy Queensland. The theme of connectivity during disasters will continue in a presentation from NSW Telco Authority MD Kylie De Courteney, Pivotel Head of Sales and Marketing Darren Cooley and former NSW Rural Fire Service Commissioner Shane Fitzsimmons, who will outline the use of cell on wheels (CoW) trailers to deliver rapidly deployable connectivity for communities and response agencies during major weather events. A separate presentation on CoW deployments will be delivered by Matthew Schultz from Gravelroad Group, while De Courteney will also deliver a progress update on the journey towards an Australian Public Safety Mobile Broadband (PSMB) capability, joined by Bradley Creevey — Assistant Coordinator General for the PSMB Taskforce at the National Emergency Management Agency (NEMA).

There will also be multiple presentations on the topic of cybersecurity, which appears to increase in relevance with each new edition of Comms Connect. Harry Brown and Barry Grek, both from Phronesis Security, will draw from recent cybersecurity assessments of two of Australia's largest LMR networks to provide a practical overview of the cyber risks present in P25-based environments, focusing on risks introduced by complex supply chains, vendor dependencies and long technology life cycles. Paul Whitfield, R&D Manager at Omnitronics, will explore the unique challenges and threat landscape facing mission-critical communication systems when digital radio and IT networks intersect. And Ericsson's Enrique Garcia will reveal how 5G is transforming public safety and cybersecurity through real-world case studies, including insights from Ericsson's global work with emergency services.

Comms Connect association partners ARCIA and ACCF/TCCA will be holding half-day preconference workshops across two streams on 14 October, covering subjects including an introduction to P25 standards; designing and planning microwave networks; and advancing critical communications for a safe and more connected world. These workshops will be able to go into more depth than is possible with a standard conference presentation, and can be booked as part of conference attendance or on their own. The exhibition hall will meanwhile showcase dozens of leading local and international critical communications and public safety technology vendors on 15–16 October, including Innovation Partner Telstra as well as Platinum Sponsors such as Etherstack, Hypha, Kenwood, L3Harris, RFI Technology Solutions and Tait Communications.

Networking drinks will be held in the exhibition hall on the evening of 15 October, and will be followed by ARCIA's Gala Dinner and Industry Excellence Awards just a short distance away at the Sofitel Melbourne on Collins. Featuring plenty of food and entertainment, the dinner provides the opportunity to celebrate all that is great about the radio and critical communications industry, including the achievements of some of its most outstanding individuals and organisations. To book for the Gala Dinner, visit events.humanitix.com/arcia-gala-dinner-and-awards-2025.

Flexible attendance options are available for Comms Connect, including one- or two-day conference packages, with or without workshops, or, if time is limited, a free exhibition-only pass. To register now, visit melbourne.comms-connect.com.au.



STAND 76

All-outdoor radio platform with FIPS 140-3 certification

Aviat Networks has announced the general availability of FIPS 140-3 as an enhanced security feature for its WTM 4000 all-outdoor microwave radio platform. Federal Information Processing Standard (FIPS) 140-3 is a benchmark for networking products, establishing a high level of security for data protection in mission-critical networks.

FIPS 140-3 means that sensitive data transmitted across microwave backhaul and transport networks is safeguarded with stringent cryptographic measures, providing a high level of protection for critical communications. Unlike its predecessor, it aligns with globally recognised international standards such as ISO 19790 and ISO 24759 for interoperability and cryptographic security measures across borders.

Utilising the FIPS 140-3 certified software module in WTM 4000 means users can expect enhanced security, with the rigorous testing protocols and advanced cryptographic techniques incorporated into FIPS 140-3 meaning that sensitive information carried on the platform is protected against sophisticated cyberthreats. By aligning with ISO standards, FIPS 140-3 facilitates interoperability and consistency in the implementation of cryptographic modules globally, aiding organisations in meeting international security regulations.

With updated requirements for non-invasive attacks, and vulnerability mitigation, WTM 4000 with FIPS 140-3 provides a high level of protection against data breaches and unauthorised access. It not only strengthens security but also helps in achieving regulatory compliance, thereby reducing the risk of penalties and improving trust.

FIPS 140-3 activation on the WTM 4000 is supported in R6.1. Users with older releases need to upgrade prior to loading the FIPS 140-3 licence; information on the upgrade process can be found on the Aviat Resource Centre (ARC).

Aviat Networks
www.aviatnetworks.com

STAND 61

Dual-mode speaker mic

With the arrival on the market of new communications networks based on 3GPP standards and 4G/5G networks, the integration of current LMR networks to these new MCX technologies is expected to take place gradually, with a long transition period. To help users with this transition, TPL Systèmes has developed a dual-mode speaker mic to bring MCX and LMR worlds together.

The MDR remote speaker microphone (RSM) can be connected to a smartphone with an MCPTT/MCX app and an LMR radio simultaneously. The user will be able to converse on these two vectors easily and maintain a quality Direct Mode with equipment already in their possession.

The connection between the mic and the Android or iOS smartphone can be made via USB-C cable BT, or custom cable to most makes and models of LMR radios. The product offers a 'gateway' functionality allowing it to relay communications from the smartphone to the LMR radio and vice versa.

TPL Systems Asia-Pacific Pty Ltd
www.tplsystems.com.au

STAND 71

Low PIM corner reflector

ZCG Scalar has expanded its Australian-made antenna portfolio with the RA4 series low PIM broadband corner reflector, designed to deliver dependable performance for UHF base stations across 400–520 MHz.

Engineered to provide 10 dBd gain with a high front-to-back ratio, the product enables focused coverage while minimising interference. Built from lightweight, fully welded, all-aluminium open grid, the antenna is designed to withstand harsh weather conditions while maintaining a compact 750 x 655 mm footprint. With up to 500 W input power handling and a 4.3-10 female connector, it integrates seamlessly into mission-critical networks for emergency services, utilities, mining and infrastructure operators.

The product was developed in collaboration with a leading global communications partner to overcome reliability issues experienced with the latter's existing network equipment. ZCG worked closely with the partner's engineering team to tailor the antenna's design to their specific operational requirements; this collaborative approach meant the antenna met the customer's requirements while optimising coverage and signal clarity. By combining ZCG's in-house manufacturing expertise with the partner's network insights, the project resulted in a high-performance, durable antenna solution that met both technical and environmental demands.

Designed and manufactured in-house at ZCG's East Gippsland facility, the antenna demonstrates the company's ongoing commitment to high-quality, locally made solutions.

ZCG
www.zcg.com.au

Delivering the future of critical collaboration

As a European leader with a 40-year legacy and a recognised expertise in mission- and business-critical end-users' needs, Airbus is shaping the future of critical communications. Our innovative platforms including Agnet facilitate the transition from narrowband networks to broadband solutions and services. We are leading the way in this digital transformation in Europe as three of the four major nationwide networks are making this transition with us: Réseau Radio du Futur (RRF) in France, Sistema de Radiocomunicaciones Digitales de Emergencia del Estado (SIRDEE) in Spain and VIRVE 2.0 in Finland. Standing at the heart of these transformation projects, Airbus is a trusted and field-proven technology integrator.

Learn more about Airbus in critical collaboration

AIRBUS

Wall/mast-mount antenna

STAND 3

Panorama Antennas' W[X]MM-6-60-[X] antenna is designed to deliver a futureproof solution for both 4G LTE and emerging 5G RedCap networks. With two ultra-wideband, separately fed elements in a single housing, it provides a robust 2x2 MiMo set-up — with the option to add L1 GPS/GNSS for enhanced location capability.

The product is supplied with integrated 5 m ultralow-loss, double-shielded, solid core CS32 coaxial cables which are halogen free, low smoke, flame retardant and meet the EU CPR with a Dca s2 d1 a1 classification, terminated with SMA plugs. The rugged, weatherproof housing is designed for wall or mast mounting and hardware is provided. A desk stand is also included to enable the antenna to be easily used out of the box and installed internally.

Featuring wide frequency coverage of 617–960/1427–6000 MHz, the antenna is suitable for network operators and service providers, offering a stable network connection with good data rates and retention.

Panorama Antennas Pty Ltd

www.panorama-antennas.com

STAND 91

RoIP gateways

Omnitronics' **omni**GatePⅡ25 and **omni**GateDMR digital radio gateway products, designed to provide scalable and robust interoperability for those that rely on high-performance radio communications, have successfully passed certification testing under the Tait Technology Partner Program.

The **omni**GatePⅡ25 RoIP gateway has been certified for interoperability with the Tait P25 TN9400, while the **omni**GateDMR has been certified with the Tait DMR TN9300. These certifications validate the compatibility of the gateways within mission-critical environments and public safety networks.

The **omni**GatePⅡ25 is a Linux-based software gateway that supports up to 128 dispatch consoles, 128 talkgroups and 48 simultaneous conversations over a single CSSI connection, making it a suitable choice for connecting public safety agencies into statewide P25 networks. It is compatible with both phase 1 and phase 2 P25 systems and includes features such as automatic failover redundancy and a web-based configuration interface.

Similarly, the **omni**GateDMR offers a DMR standard AIS implementation with the same scalability and performance, and is compatible with both conventional and trunked systems, enabling seamless integration with Tait's DMR infrastructure.

Both gateways are designed to eliminate vendor lock-in and support flexible deployment. They have been designed for use with the Omnitronics **omni**core suite of radio dispatch solutions, but they can also be deployed standalone or with other radio dispatch options.

Omnitronics Pty Ltd

www.omnitronicsworld.com

Standalone power system

STAND 92

The Valen ModX1 is a pre-engineered standalone solar power system designed for small remote loads in telecommunications and other critical communications applications. Available in 12 or 24 V configurations, it is suitable for both permanent off-grid sites and temporary deployments.

The pre-engineered system is supplied fully assembled, with lithium battery, MPPT solar charge controller, circuit protection and remote monitoring hardware installed. It is compatible with Victron and Morningstar components, enabling integration with a range of project requirements.

Its weatherproof cabinet includes equipment mounting, ventilation and layout features to assist with temperature management and battery life. This design simplifies procurement and deployment while providing the assurance that the site is powered by trusted components.

For small-scale remote power requirements, the product offers a ready-to-deploy option that can be relocated and reused for future projects.

Valen Power Pty Ltd

www.valen.com.au

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Join us at Comms Connect Melbourne, 15-16 October 2025, to explore how Sepura can support your broadband journey.

Find out more at sepura.com

CASE STUDY

$5m grant to globalise smart antenna platform

STAND 1

Image courtesy Zetifi

Australian technology company Zetifi has secured a substantial $4.98 million grant under the Australian Government's Industry Growth Program, which will support a $10 million initiative to commercialise the company's Smart Antenna platform globally. This is one of the largest grants awarded under the program to date, the company claims.

At the core of the project is Zetifi's patent-pending technology, which transforms antennas from passive components into intelligent edge devices for vehicles, machinery and infrastructure. By integrating advanced RF engineering with embedded systems and cloud connectivity, Zetifi's Smart Antennas enable seamless integration with third-party platforms — unlocking new capabilities such as real-time telemetry, remote diagnostics, enhanced mobile coverage using network data, and duress alerts for lone workers.

The project is being delivered in collaboration with global partners including Nextivity, Icom and Telstra, who are working with Zetifi to explore and develop new applications for the Smart Antenna platform across public safety, enterprise connectivity and regional mobility.

Technology integration with Nextivity

Zetifi has partnered with Nextivity, the company behind the CEL-FI ROAM and CEL-FI GO cellular boosters, to enhance performance through deeper integration. By leveraging the Bluetooth interface in CEL-FI devices, Zetifi's Smart Antennas can provide real-time location and network status information to the booster. This added information enables smarter band selection and improved system optimisation, making it possible for the booster to deliver signals to otherwise hard-to-reach places.

"Zetifi has reimagined the antenna," said Nextivity CEO Michiel Lotter. "By combining the intelligence in the CEL-FI booster with Zetifi's intelligent antenna design, we can ensure coverage everywhere in Australia. The merged system works with both the terrestrial network as well as upcoming satellite services, utilising the latest technology to maximise effectiveness. We're proud to collaborate with Zetifi to offer this transformative solution worldwide."

Enhancing safety with Icom

In collaboration with Icom, a global leader in radio communications, Zetifi's Smart Antennas will integrate deeply with mobile and fixed radio systems to deliver leading workplace health and safety (WHS) solutions. This integration includes GNSS-based location tracking, out-of-band duress alerts for lone workers, automated safety check-ins, and telemetry linked directly into enterprise management platforms such as Microsoft Power Platform.

"Our radios are trusted globally for their reliability in critical communications," said Aaron Camp, Executive Officer, Icom. "Zetifi's Smart Antennas present an exciting opportunity to build on that foundation — adding location intelligence, real-time duress alerts, and advanced telemetry that could further improve safety and connectivity for emergency services, utilities and field teams. This flexible Icom + Zetifi solution has significant potential across our land mobile, UHF CB and marine product lines."

Coverage optimisation with Telstra

Telstra and Zetifi are exploring opportunities to share network data to support improved mobile coverage and connectivity in remote and regional areas. This collaboration will enable Zetifi's Smart Antennas to make more intelligent real-time connectivity decisions and deliver enhanced performance for field-based users. Telstra's accelerator, muru-D, previously led Zetifi's $12.25 million Series A funding round and continues to support the company's commercial expansion.

"Zetifi's Smart Antenna platform represents the kind of innovative thinking needed to enhance connectivity for vehicles and field equipment," said Shailin Sehgal, Global Head of Networks and Technology at Telstra. "We're pleased to be working with Zetifi to explore how network data sharing can support smarter, safer, and more connected solutions."

Dan Winson, founder and CEO of Zetifi, concluded, "This is a defining moment for Zetifi. The support from the Industry Growth Program, alongside our strategic partnerships with Nextivity, Icom and Telstra, positions our Smart Antenna platform at the forefront of global connectivity innovation. This technology does more than extend coverage — it delivers critical intelligence and enhanced capabilities in environments where it matters most."

Zetifi will be exhibiting at Comms Connect Melbourne from 15–16 October on Stand 1.

Zetifi

www.zetifi.com

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STAND 12

Bluetooth communication kit

Users can enhance mobility and communication efficiency with CRS Accessories' CRS-BT1 Bluetooth communication kit, designed for seamless, unrestricted connectivity between the radio and earpiece. Containing a dongle, wireless earbuds and push-to-talk (PTT) button, the kit is suitable for industries where cables pose a safety risk or where discreet, covert communication is essential.

The wireless PTT button can be discreetly placed in the user's pocket or mounted wherever convenient. It features an IP rating of IP54 — making it dust- and water-resistant — and a battery life enabling up to 30 h of operation, with a charging time of 3 h.

The earbuds have a transmission range of over 10 m. A single earbud with charging case has a battery life of up to 24 h, while dual earbuds with charging case will operate for up to 12 h. The standby time is 30 h and the charging time is 1.5 h.

CRS Accessories

www.crsaccessories.com.au

STAND 94

Bluetooth speaker microphone

The Tait Nighthawk Bluetooth Speaker Microphone gives users the freedom to move without being tethered to their radio, providing a wireless upgrade that is compact, comfortable and built for critical moments.

With no cables, the product offers full freedom of movement. Its lightweight design provides all-day comfort, and its discreet communication makes it suitable for tactical and security roles.

Other features include: an emergency button, for when seconds matter; IP65-rated durability; clear, high-quality audio; and 12 h of talk time.

Tait Communications

www.taitcommunications.com

STAND 59

Outdoor enclosure

With reliability and uptime paramount in Australia's critical communications and public safety sectors, infrastructure design must meet rising technical and environmental demands. Rittal's CS Toptec outdoor enclosure with Blue e+ cooling is engineered to deliver scalable performance, environmental protection and secure integration in mission-critical applications.

The bayable outdoor enclosure is designed to deliver robust protection and operational stability in exposed, high-risk environments. Engineered for Australia's harsh climate conditions, the product provides robust housing for critical infrastructure in remote and unmanned locations.

The enclosure features double-walled construction for enhanced thermal insulation and system integrity, with high IP-rated ingress protection against dust, water and environmental extremes. Its corrosion-resistant materials make it suitable for coastal and industrial environments; it also has a modular expansion capability for future growth without major structural changes.

The product features Blue e+ outdoor cooling integration for energy-efficient climate control and reduced heat stress on equipment. Designed for resilience, flexibility and digital integration, and backed by Rittal's local support and engineering tools, the enclosure is suitable for critical communications environments.

Rittal Pty Ltd

www.rittal.com.au

RESEARCHERS DEMO REAL-TIME FLOOD-SENSING TECHNOLOGY

Left: Associate Professor Wenjing Jia demonstrates the flood digital twin.

Sydney researchers have proven the effectiveness of a real-time water-level and rainfall-sensing technology that utilises existing mobile phone networks, intended to combat the danger posed by flooding in Australia and overseas.

In a project supported by the NSW State Emergency Service (SES) and NSW Government, University of Technology Sydney (UTS) researchers working with industry partner TPG Telecom have completed field trials demonstrating the AI-driven processing of weather data derived from 5G mobile networks in conjunction with a flood digital twin — a virtual replica that mirrors its real-world counterpart. By extracting localised rainfall, water levels and river flows using signals transmitted on the network, the technology is claimed to deliver unprecedented accuracy in flood monitoring and prediction.

"By collaborating with NSW SES and TPG Telecom, we have become the first to translate research into practice, demonstrating that the technology works in the real world in the field trials that have been conducted on the Parramatta and Georges Rivers," said UTS Vice-Chancellor Professor Andrew Parfitt.

"The work continues in the TPG-UTS Network Sensing Lab, where researchers are advancing the next stage of research and development that will support large-scale deployment of the technology, for which both UTS and TPG have filed patents."

NSW SES Commissioner Mike Wassing said the Smart Flood and Sensing Intelligence project shines a light on the use of technology for operational intelligence and enhanced response coordination.

"This technology has the potential to provide the NSW SES with next-level capabilities such as accurate real-time information and predictive intelligence, which could help better inform our warnings and response," Wassing said.

"While there is more testing to be done, this could revolutionise our command centres, fast-track intelligence, better inform operational posturing and save lives in the future."

TPG Telecom CTO Giovanni Chiarelli said his company is proud to be UTS's partner to pioneer network sensing technology for flood management.

"The success of the Smart Flood and Storm Intelligence project provided us with a solid foundation to mature the technology in our commercial networks," Chiarelli said. "Thanks to the TPG-UTS Network Sensing Lab, we are now in a globally leading position to unleash the potential power of mobile phone networks to sense the world, manage risks caused by climate change, and enhance the resilience of our societies."

Project leader Distinguished Professor Jay Guo, Director of the UTS-based Global Big Data Technologies Centre, said the capacity of existing network infrastructure to sense what is happening in the physical environment provides both a highly accurate and sustainable solution to flood monitoring.

"Nothing new needs to be built; no dedicated sensors for this purpose need to be deployed," Guo said.

"We've proved that bouncing signals from mobile phone towers onto bodies of water can detect changes, and this data, when analysed and visualised using artificial intelligence, can predict risks to infrastructure and communities, paving the way for rapid and targeted alerts to affected communities.

"The next stage is to advance the reliability and adaptability of 5G-enabled flood-sensing systems, ensuring consistent performance in sparse-data and degraded-network environments through adaptive system design and resilient architecture.

"Integral to that will be extending the collaboration with NSW spatial services and potentially other major mobile network providers, ensuring sufficient spatial data, comprehensive 5G coverage, and long-term scalability of the sensing system."

Distinguished Professor Jay Guo will be speaking about this project at Comms Connect Melbourne on 15 October in his presentation 'Network sensing for flood monitoring and prediction'.

STAND 45

One-box tester for non-terrestrial network testing

NTN testing helps to ensure the reliable performance of communication links that extend beyond terrestrial networks. As demand for seamless ubiquitous connectivity grows, NTN testing helps operators validate network performance, optimise coverage and address potential challenges.

The CMX500 from Rohde & Schwarz is a one-platform solution for NR-NTN testing. It features multiband and multi-orbital support, as well as a dedicated NTN workspace that allows the user to visualise the deployed network and relevant parameters.

The CMX500 offers many features for NR-NTN testing on both network and device levels, such as: multi-orbit (LEO, MEO, GEO and GSO); multiband (L-band, S-band, Ku-band and Ka-band); transparent and regenerative payload; and internal RF fading and channel emulation.

Effective NR-NTN testing requires a comprehensive approach that addresses the challenges of satellite-based communication. The CMX500 is designed to meet the specific requirements of NR-NTN testing.

Rohde & Schwarz (Australia) Pty Ltd
www.rohde-schwarz.com.au

STAND 81

Radio earpieces

The N-ear 360 Original (RO-360+22-3.5-L) and Flexo (RO-360F-22-3.5) earpieces deliver discreet, secure and crystal-clear audio communication, making them trusted by frontline police officers worldwide. Built for professional environments, the earpieces are comfortable for all-day wear and use hearing-aid technology to enable vital transmissions to be heard with clarity, even in high-noise situations.

The N-ear 360 range is virtually invisible when worn, helping police and security teams maintain a professional, low-profile appearance during operations. The ultra-lightweight design and ergonomic fit allow for extended use without fatigue, and the acoustic technology delivers clear voice at regular listening levels — even in noisy environments — reducing muffled communications and protecting hearing.

Advantages of N-ear include the ambidextrous earpiece option — Flexo — which can be worn comfortably in either ear, and the durable earpiece cabling options designed to withstand wear and tear. The firm resin cabling suits users wearing uniforms over their protective gear, while the braided fibre cloth enables long-term durability while attached to molle vests for tactical teams.

Logic Wireless Pty Ltd
www.logicwireless.com.au

STAND 58

Satellite connectivity solution

Agnet by Airbus is designed for critical communications and offers secure and stable group collaboration over 4G/5G networks. Extended connectivity may be required when in remote areas with vehicle-as-a-node (VaaN) technology, disaster relief or in case of temporary power outages impacting 4G/5G availability.

Agnet over Satcom provides a solution to enable connectivity across the globe by supporting the use of deployable networks and satellite communications. Agnet is fully compliant with 4G/5G and compatible with LEO satellite services which can be set up for permanent or temporary use depending on the operational needs. Overall, Agnet satellite connectivity should improve the end-user experience with coverage and capacity, health and safety, security, seamless connectivity and flexibility.

The end-to-end Airbus and OneWeb satellite service offers stable connectivity anywhere. OneWeb offers high levels of security (AES256) and provides global coverage, low latency, high throughput, service level agreements and extensive footprint. In addition, OneWeb is working with technology and solutions providers to deliver LEO user terminals and Airbus provides support with new terminal commissioning, OneWeb services and training. Customers like Icon Water in the ACT use VaaN with Starlink and Agnet today, operating across the state where key water assets are located delivering ubiquitous coverage.

As the European leader in large nationwide public safety networks, with successful migrations from LMR narrowband to broadband, Airbus can help users navigate increasingly complex environments by delivering the future of critical collaboration.

Airbus Public Safety and Security
www.securelandcommunications.com

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SIGNAL GENERATORS: DOES ANALOG OR DIGITAL MAKE A DIFFERENCE?

*Andrew Herrera**

Fundamentally, a signal generator acts as the conductor of electronic testing, orchestrating a variety of signals to breathe life into circuits and systems for analysis. It produces controlled, precise waveforms — whether sine waves, square waves or complex modulations — to test, verify and troubleshoot electrical set-ups. Without signal generators, you'd lack a reliable means to simulate circuit responses to various inputs.

Imagine fine-tuning a high-fidelity audio system, debugging a digital communication channel, or developing advanced radar technology; in each case, a signal generator is your ally. It replicates real-world conditions, from audio frequencies to digital patterns and radio waves. From basic component testing to cutting-edge research and innovation, a signal generator is essential for problem-solving and forward-thinking development.

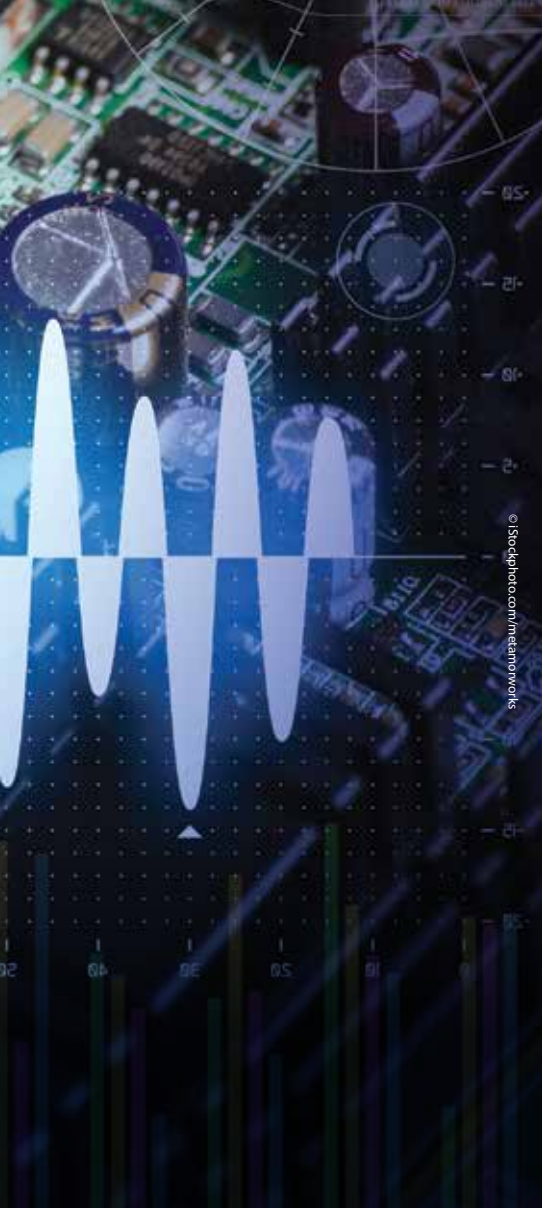
Grasping a signal generator's key characteristics and specifications is like understanding the ingredients in a recipe; attaining the desired outcome is only possible with the correct components. With so many options, it's important to understand which signal generator is best to achieve a project's goal.

Signal generator important features

Top-tier, carefully calibrated signal generators provide reliability and precision that can significantly impact engineering work. The instruments undergo extensive testing and fine-tuning to ensure their signals remain accurate and stable. It's critical that engineers have confidence in the accuracy to avoid incurring delays and escalating costs.

Understanding a signal generator's key characteristics and features is essential. An analog signal generator produces continuous waveforms, while a digital option creates waveforms using discrete values. To select the right solution, you must understand the different features and applications.

- **Frequency range:** This is essential for determining the scope of tasks your signal generator can handle, encompassing both low- and high-frequency applications. A wider frequency range allows the instrument generator to be used in various applications, making it more versatile.
- **Amplitude range:** A broader amplitude range enhances versatility and precision, enabling the generator to meet specific requirements of different applications and ensure accurate and reliable test results.
- **Modulation capabilities:** To accurately simulate real-world scenarios, signal generators must accommodate various modulation techniques, from AM and FM to more sophisticated digital modulations.
- **Output power:** Sufficient and adjustable output power allows you to operate the system or circuit at different levels, which is crucial for stress tests and other assessments.
- **Resolution:** Greater resolution leads to more precise test outcomes, enabling you to analyse and comprehend the system or circuit in detail.
- **Waveform format:** Different applications require specific waveform types, such as sine, square and triangle waves, so it's vital to ensure the generator can create the signal formats for accurate testing.



Analog signal generators

Analog signal generators provide sinusoidal continuous wave (CW) signals with optional capabilities for AM, FM, phase modulation (M) and pulse modulation. The frequency range extends from RF to mmWave. Most generators include step/list sweep modes for characterising or calibrating passive devices. These generators deliver metrology-grade frequency and level accuracy, making them essential for high-precision tasks.

Analog signal generators are crucial in Doppler radar testing under real-world conditions. The low phase noise characteristics make them ideal for high signal purity and stability applications, such as radar systems for weather forecasting and air traffic control. In these environments, any deviation or noise can lead to inaccurate data.

Digital signal generators

Unlike waveform, digital signal generators produce sequences of logic levels or digital patterns. These patterns are essential for evaluating the logic and timing of digital circuits and their performance under various conditions.

Typical applications include:

- **System-level testing** — ensuring that complex digital systems function as intended, verifying inter-component compatibility.
- **IC testing** — assessing individual integrated circuits, identifying manufacturing defects or design flaws.
- **Debugging** — assisting engineers in troubleshooting problematic circuits, focusing on issues related to timing or logic.

In the automotive industry, digital pattern generators are vital for ensuring the reliability of electronic control units (ECUs), which manage everything from engine performance to safety systems. By simulating driving conditions with pre-defined digital patterns, engineers can test ECUs under diverse scenarios. This helps identify faults or vulnerabilities, ensuring the vehicle's systems operate flawlessly, even under extreme conditions.

Different applications

There are various options for analog and digital signal generators, from RF to vector or function, so engineers must focus on the end goal to select the best solution.

- **General-purpose testing:** A signal generator with a broad frequency range and high output power is best for general-purpose testing. Additionally, modulation capabilities such as amplitude, frequency, sweep and burst should be considered when testing periodic signals.
- **Telecommunications applications:** An extensive frequency range and a low-noise floor is essential for telecommunications applications. This ensures accurate testing and the generation of signals with minimal interference. It is also important to consider complex modulation formats used in telecommunications, such as frequency-shift keying (FSK) and phase modulation (PM).
- **Audio and video equipment:** Low distortion levels are crucial for testing audio and video equipment as they guarantee that the generated signal is high-quality and free from distortion. Additionally, modulation capabilities such as amplitude-shift keying (ASK), frequency-shift keying, pulse code modulation (PCM) and quadrature modulation (QM) should be considered.
- **Automotive testing:** Vehicle electronics operate in harsh environments, requiring a wide frequency range and high output power. Therefore, the generator must produce accurate and reliable signals.

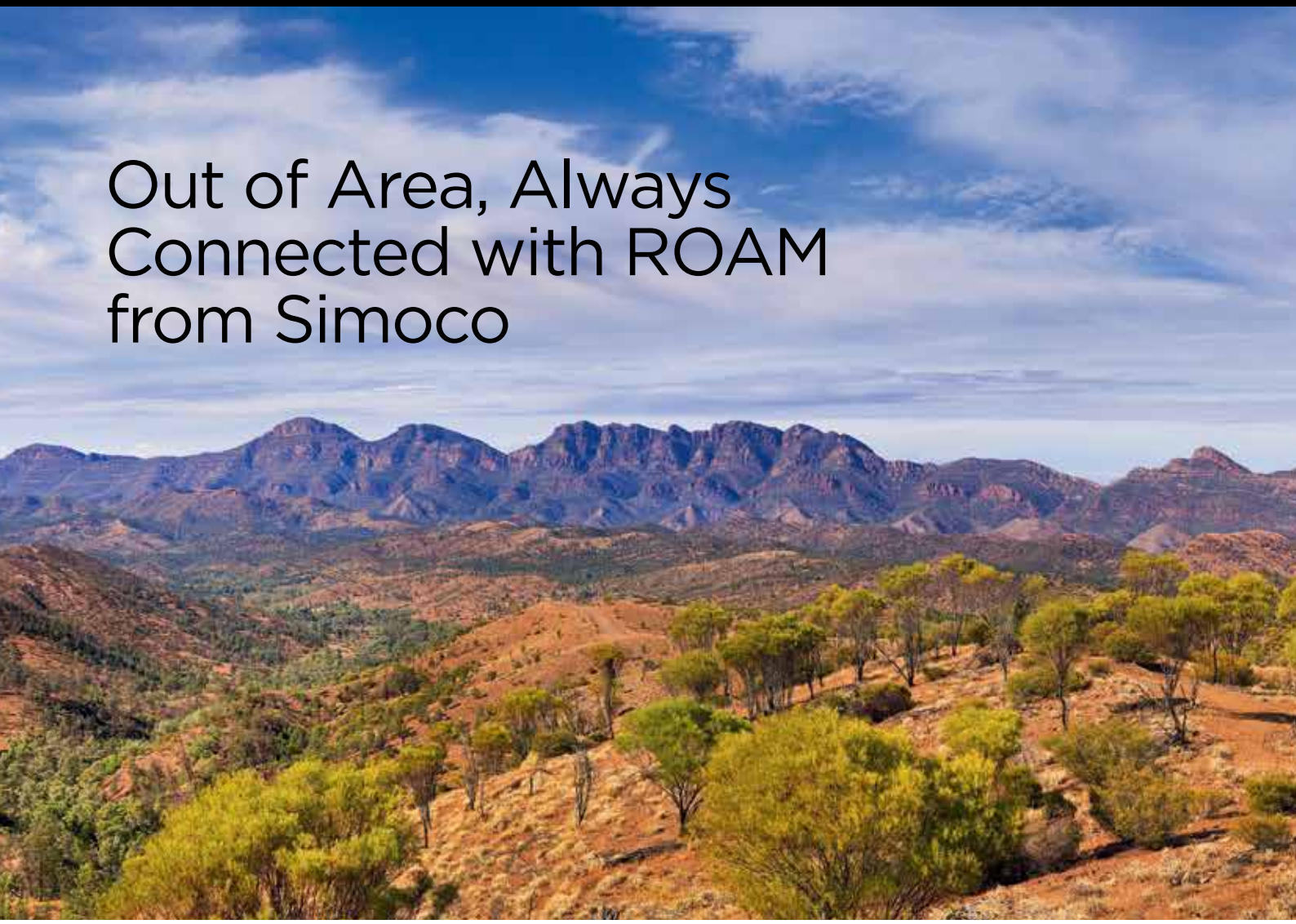
Selecting the right signal generator

Accurate and reliable testing is crucial for ensuring the quality and performance of designs. With the overwhelming number of signal generators on the market, finding the right one can take time. While the distinction between analog and digital generators might seem significant, the true differentiators are the features and their alignment with project requirements.

Analog signal generators are ideal for applications requiring high signal purity and low phase noise, such as RF and microwave testing. For modern communication systems and advanced research, digital signal generators are better as they provide greater flexibility and precision to generate complex waveforms. Choosing the wrong solution can lead to costly and time-consuming rework. So, it's critical to select the right signal generator to get the data needed to refine and enhance designs.

**Andrew Herrera is Product Marketing Manager for RF test software at Keysight Technologies. Keysight will be exhibiting at Comms Connect Melbourne from 15–16 October on Stand 40.*

Out of Area, Always Connected with ROAM from Simoco



Mission critical communications have, over many decades, been built on the bedrock of mobile radio; be that DMR or P25 or TETRA. It's a familiar user experience with few frills but with solid voice communication, where getting the message through is paramount. And for that reason, it continues to play a vital role to this day in sectors like emergency services, transportation and utilities.

But what happens when you need to operate across vast rural areas where there's patchy or zero radio coverage? You could decide to just extend the radio network by building more radio antennas, but this is an expensive exercise. When you account for securing the land, getting a building permit, ground works including access roads and providing power and data backhaul services, you are talking hundreds of thousands dollars per site plus ongoing rental and maintenance costs.

Broadband Matters

The issue is even more acute for providing LTE cellular coverage which is cost prohibitive in rural areas. And yet high bandwidth communications like LTE are vital for the kind of data intensive applications that blue light and other services rely upon to deliver an efficient service and secure the safety of citizens and employees on the ground.

LEO (low earth orbit) satellite technology like Starlink has a vital role to play in delivering broadband data but even this cannot offer 100% availability. Satellite only works in those places where you can see the sky. So, a vehicle going through a tunnel or entering dense woodland will not always be able to count on satellite links in an emergency.

Instant, Always-on Voice: a non-negotiable

So, the challenge is how do we leverage these broadband technologies like LTE and satellite to deliver mission critical communications without additional expensive fixed infrastructure? Remember; whatever we choose, you still need to have that instant always-on voice. You need to be able to communicate as groups and you need to have the safety solutions built into it such as: tracking, man down and lone worker welfare monitoring. You need all the benefits of radio from a user perspective over a wider area at an affordable cost.

Keep the Connection without the Fixed Infrastructure

Simoco's ROAM technology responds to this challenge without the need for expensive fixed infrastructure like mobile masts and radio towers.

Using an in-vehicle smart connectivity hub and some sophisticated wide area networking software, ROAM not only extends the reach of your radio outside the DMR network but can also deliver mission critical level broadband data anywhere in the country.

Velocity VR950 — Mobile Connectivity Hub with Added Edge

The beating heart of ROAM is the Velocity VR950 in-vehicle mobile intelligent router which delivers mission critical connectivity on the move and a platform for mobile office applications, while offering a small physical footprint in vehicles where space is at a premium.

As well as being able to integrate with in-vehicle DMR radio to extend radio communications up to 2km from the vehicle, it has four SIM card slots to give you a choice of LTE carrier and a satellite connection for areas without LTE or radio coverage. It can act as a Wi-Fi hotspot within and outside the vehicle, allowing a range of smart devices to be connected and used within the vehicle and at up to a radius of 50m outside.

As well as orchestrating all the connections to in-vehicle devices and mission critical communications networks, VR950 incorporates an edge computing device that can host any number of smart applications such as: out of area vehicle tracking, man down and lone worker safety features.

No amount of smart technology will compensate for a loss of power and VR950 has been designed with this in mind. It has built-in power management such as instant wake up and dual onboard power supplies and critically, its own internal back up UPS.

And VR950 is designed to keep you connected over many years as it can be easily upgraded to meet new standards as and when they emerge rather than having to replace the whole unit.

InStream Multiple Parallel Bearers: Don't Gamble on Safety

An essential requirement of mission critical communications is that the message must get through at all costs. To this end ROAM does not gamble on one bearer such satellite, radio, Wi-Fi or LTE but effectively bets on "all four horses" in the communications race.

Simoco's SD-WAN technology InStream is a Parallel Bearer System that uses multiple methods of getting the message through at the same time, switching in milliseconds between LTE cells or between LTE and satellite as required. All automatically. All virtually instantly and with no loss of data. This gives excellent reliability regardless of location or conditions.

InStream is a two ended "pipe" with intelligence, both in the VR950 mobile router and at the control room. The message-voice or critical geographical location data is broken down into data packets at one end, replicated across the four bearers and reassembled at the other end, which also discards any duplicate packets. This means that when there is a momentary loss of signal, such as when an ambulance goes under a bridge or through tree cover, or there is a mobile cell handover at the brow of a hill, the message gets through intact.

Life-Saving Integrations

Simoco has a track record for developing integrations for customers that leverage the power of always-on connectivity and on-board intelligence in the vehicle. Examples of these include: off-network vehicle tracking, and worker welfare applications which automate the process of checking in with workers in the field to ascertain their safety status.

Cross platform alerting is particularly powerful in mission critical applications. Imagine a scenario; a worker presses the duress button and the person who is supposed to respond has gone off duty. With the intelligence in the VR950 and the power of InStream you can set up an escalation tree so that the system can send an SMS message to the next available contact and keep trying until it gets a response.

With ROAM and Simoco's engineering expertise, mission critical customers have a limitless scope to innovate to drive ever higher levels of efficiency and safety even in the most challenging parts of the country.

simoco

Secure. Reliable. Adaptive.

Simoco Wireless Solutions Pty Ltd
simoco.com

STAND 51

Drive testing solution

GL Communications' Drive Testing for Voice Quality and Network Performance solution is designed to empower service providers, regulators and device manufacturers to assess wireless network quality across 5G, 4G and 3G technologies, identifying issues such as weak coverage, dropped calls and slow data speeds. Drive testing captures performance data while moving through various environments, enabling operators to pinpoint problem areas, accelerate resolution and enhance user experience.

The solution is powered by the ultra-portable vMobile device — a lightweight, handheld unit designed for both drive and walk testing. The system supports scalable, multi-device testing, connecting to two mobile phones via Bluetooth or a mobile radio via an analog push-to-talk interface. Through automated scripting, the product can place, receive and end calls while recording audio for detailed voice quality analysis.

One of the key features of vMobile is its embedded Wi-Fi and Bluetooth connectivity, which facilitates remote control and real-time streaming of test results to a centralised system. This eliminates the need for manual data collection and enables field engineers to monitor test progress and results live.

The device also integrates GPS for precise location stamping of all test events, so that network performance data can be mapped. For indoor environments where GPS signals may be weak or unavailable, GL's Indoor Tracking System (ITS) provides an effective alternative.

The vMobile solution offers flexible deployment — whether vehicle-mounted for drive testing, used in labs, or carried for walk testing. It captures collected data, including voice quality metrics based on ITU-standard algorithms such as POLQA, PESQ and DAQ, all transmitted to a centralised database. Along with the Mean Opinion Score, it records one-way and round-trip delays, signal and noise levels, audio dropout, frequency and power analysis, data throughput, success/failure/drop rates, network delays, and signal strength.

In addition to voice testing, the solution enables simultaneous data testing using GL's NetTest app, which runs TCP and UDP speed tests in parallel with voice calls. The company's WebViewer software meanwhile visualises test results using interactive Google Maps and graphical dashboards, helping operators and regulators identify coverage gaps, performance issues and areas needing improvement.

Maser Technology Group

www.maser.com.au

STAND 62

High-performance antenna

The Benelec 02461H is a high-performance antenna designed for extreme environments requiring reliable LTE and 5G cellular coverage. Operating across 617–960 MHz, 1710–2700 MHz and 3.4–3.8 GHz, it delivers 2–3 dBi gain across the tuned bands and is optimised to support both current and future LTE and private LTE networks.

Purpose-built for demanding applications such as mining operations where robust data and video transmission is critical, the antenna is engineered to withstand high-vibration conditions and harsh environments while maintaining stable performance. Constructed from durable electropolished stainless steel with a matte black fibreglass radome, the 02461H combines strength with a compact, unobtrusive profile that allows for discreet installation without compromising capability.

The design incorporates versatile mounting options, enabling quick and secure attachment to vertical or horizontal poles as well as direct mounting to flat vertical surfaces, for maximum flexibility for deployment in the field. A fixed N socket connector provides stable, secure connectivity, while factory tuning eliminates the need for further adjustment. For installations requiring different mounting solutions, variants without the integrated bracket are also available, offering greater adaptability to site requirements.

Designed and manufactured in Australia by Benelec, the 02461H represents a rugged antenna solution backed by a three-year warranty, for long-term confidence and performance in mission-critical operations.

Benelec Pty Ltd

www.benelec.au

CASE STUDY

CommTel powers comms for Western Sydney Airport rail link

The $11 billion Sydney Metro – Western Sydney Airport project, currently under construction, is a public–private initiative that seeks to transform Western Sydney. The 23 km rail line includes 9.8 km of twin-bore tunnels and 10.6 km of elevated track, connecting six new stations from St Marys to the new Bradfield City Centre via the Western Sydney International (Nancy-Bird Walton) Airport. The project also features 12 new metro trains, core rail systems, and a stabling and maintenance facility at Orchard Hills.

Integration staging in the CommTel facility.

CommTel is deploying cutting-edge solutions for the driverless metro line, providing uninterrupted 4G and 5G mobile connectivity throughout the passenger journey. An advanced fibre-based repeater system, deployed across tunnels and station interiors, supports all frequency bands from 700 MHz to 3.8 GHz and leverages advanced MIMO technology for high-speed connectivity. The system is designed to ensure continuous indoor and outdoor coverage for all mobile carriers along the entire corridor. Key components include radio base stations (eNodeB and GNodeB), central nodes, remote units, hundreds of indoor antennas, and kilometres of radiating cables in tunnels — all seamlessly integrated with existing outdoor networks.

In addition to delivering the public underground mobile network, CommTel plays a key role in providing a private, mission-critical O&M radio network. This system supports essential voice and data communication services and includes radio base stations across outdoor tracks, tunnels, stations and depots, as well as an onboard radio system for 12 new trains and maintenance vehicles. It also features a centralised network management system and dispatch functionality, integrated with the broader Sydney Metro operations.

CommTel worked in close alignment with Sydney Metro and rolling stock manufacturers to ensure the new onboard radio systems deliver cutting-edge performance for both front and rear cabs. These systems should support efficient train, station and depot operations, boosting reliability and safety. CommTel is also extending the NSW Public Safety Network (PSN) into all underground sections of the metro, for uninterrupted emergency services communication; this is achieved through an indoor fibre-based repeater distributed antenna system.

This ambitious development comes with stringent wireless network performance requirements for coverage and capacity, compounded by the complex tunnel environment. Challenges include long-distance RF transmission, confined spaces, reflective surfaces, signal multipath issues, interference from electrical systems, and risks of passive intermodulation (PIM), and voltage standing wave ratio (VSWR) anomalies. CommTel has worked closely with civil and electrical engineering teams from the design phase to mitigate these challenges, strategically placing antenna systems to meet in-train signal threshold expectations while minimising interference, PIM and VSWR problems.

CommTel's design team says it has successfully delivered on key performance indicators (KPIs) across all the relevant technologies, including TETRA (mission-critical O&M radio), P25 (PSN), and 4G and 5G (public carrier), providing uniform signal coverage by deploying a smart fibre-based repeating distributed antenna system for the 4G/5G network and PSN and distributed base station architecture for TETRA to cover this extensive network of a 20 km tunnel (twin-bore), six stations and one depot with high availability. The company is delivering the project as a turnkey solution — covering the entire spectrum of communications needs, from public and mission-critical networks to 4G/5G carrier-grade systems.

The scope of deployment includes:

- radio base stations;
- a fibre-based repeating system for the PSN and public cellular network;
- radiating cables for tunnel environments;
- outdoor trackside monopoles;
- antenna systems;
- train and maintenance car radio systems; and
- core telecommunications infrastructure.

With tunnel boring now complete, the project enters its next major phase: constructing six state-of-the-art metro stations. CommTel says is proud to contribute to this transformative project, helping position Western Sydney as a future global economic powerhouse.

Vishal Kohli, Technology Sales Specialist - Wireless Networks at CommTel, will be speaking about this project at Comms Connect Melbourne on 16 October in his presentation 'Sydney Metro – Western Sydney Airport Metro Link'.

CommTel Network Solutions Pty Ltd
www.commtelns.com

Lithium iron phosphate battery for telecom energy storage

STAND 86

PowerPlus Energy and RFI Technology Solutions recently announced their collaborative efforts in bringing the LiNET4835 lithium iron phosphate ($LiFePO_4$) battery to the telecommunications industry. This Australian-engineered and Australian-made battery offers efficiency, longevity and capacity, directly addressing the critical demands of modern telecom infrastructure.

The LiNET4835 is designed to deliver over 250% more usable power (200 Ah) than a standard 120 Ah lead-acid string, all while maintaining the same physical footprint. This significant power increase, combined with the high charge/discharge efficiency inherent in $LiFePO_4$ chemistry, translates to reduced energy loss and cost savings through less frequent battery replacements and lower maintenance.

Designed for seamless integration, the battery fits standard telecom racks, enabling straightforward installation and scalable backup power solutions. Safety is a core advantage of $LiFePO_4$ technology, known for its good thermal and chemical stability, which minimises risks in mission-critical environments. Furthermore, its environmentally friendly composition, free from toxic heavy metals, actively supports sustainability goals.

Through this collaboration, PowerPlus Energy's advanced manufacturing expertise is combined with RFI Technology Solutions' deep understanding of the telecom market and its trusted distribution network. Investing in the LiNET4835 should allow telecom operators to enhance network reliability, optimise operational costs and contribute to a more sustainable future.

RFI Technology Solutions
www.rfi.com.au

Communications service monitor

STAND 52

The VIAVI CX200 SiteXpert is a rugged, handheld test instrument designed for mission-critical radio infrastructure field testing.

This portable, all-in-one field and lab tool for radio infrastructure testing is used across sectors such as emergency services, public safety, utilities and transportation to enable ongoing operation of analog and digital radio systems. Compact and durable, it enables technicians to efficiently diagnose and validate radio networks across multiple technologies.

The product supports analog (AM/FM/PM/SSB) and digital (P25, DMR, NXDN, TETRA) across 1 MHz–3 GHz. It is a rugged 8″ touchscreen unit, built for field conditions, and includes an integrated cable and antenna analyser plus spectrum analyser. It features a browser-style interface with customisable meters and Auto-Test apps. Other features include cloud-based StrataSync support and Smart Access Anywhere remote control.

Vicom Australia Pty Ltd
www.vicom.com.au

Emergency help point system

STAND 32

In an era where public safety is paramount, Guardian Telecom's emergency communication technology — including the OGP-10 emergency help point system — provides innovation in security infrastructure. The company achieves this by combining robust, weather-resistant hardware with cutting-edge features such as anti-condensation systems, remote monitoring capabilities and seamless integration with existing security networks.

Guardian's systems are designed to go beyond mere communication devices, instead acting as comprehensive safety hubs. With features like high-definition surveillance, weather-resistant construction and intuitive user interfaces, these products offer a robust first line of defence in various environments, from university campuses to industrial sites.

A recent incident at a Canadian university demonstrates the immediate impact of Guardian's technology. On its first day of installation, the OGP-10 system played a crucial role in rapidly addressing an assault, preventing further crimes, and aiding law enforcement.

CoverTel is proud to bring Guardian Telecom's technology to Australia, helping organisations safeguard people and infrastructure with confidence.

CoverTel Telecommunications Group
www.covertel.com.au

Auto test and alignment feature for P25 radios

Anritsu has released its latest advancement in land mobile radio (LMR) radio testing technology, developed in partnership with Motorola. The Auto Test and Alignment feature on Anritsu's LMR Master S412E — the only test instrument approved by Motorola for both infrastructure (base station) and subscriber (mobile handset) testing — supports Motorola's APX and APX NEXT P25 radios, providing a comprehensive solution for radio frequency testing across a wide range of applications.

Motorola P25 radios provide critical communications to first responders and security services, and reliable communication in challenging environments requires radio systems that are operating to their peak performance. The Auto Test and Alignment feature provides a fully integrated solution to retune the radios to Motorola's specification and automate essential measurements on the radio's RF performance.

Running on a standard Windows PC, the simple one-button test feature initiates retuning of the radio and validation of performance against Motorola's specification. By automating complex tasks, such as frequency and power measurements, modulation analysis and alignment adjustments, the system enables radio technicians to conduct rigorous testing and alignment procedures with ease and confidence, accelerating the testing process while minimising the margin for error. The software automatically records test records for each radio, providing a fully documented service history.

The feature provides automated testing and alignment to Motorola's specifications, as it has been approved by Motorola for automated maintenance process. It automatically generates detailed reports after each test and alignment session, providing insights into the radio's performance and maintenance history. It also offers an enhanced view of each radio's maintenance records over time, enabling strategic planning and life cycle management. It has been designed with simplicity and efficiency in mind, making it accessible to technicians of all skill levels.

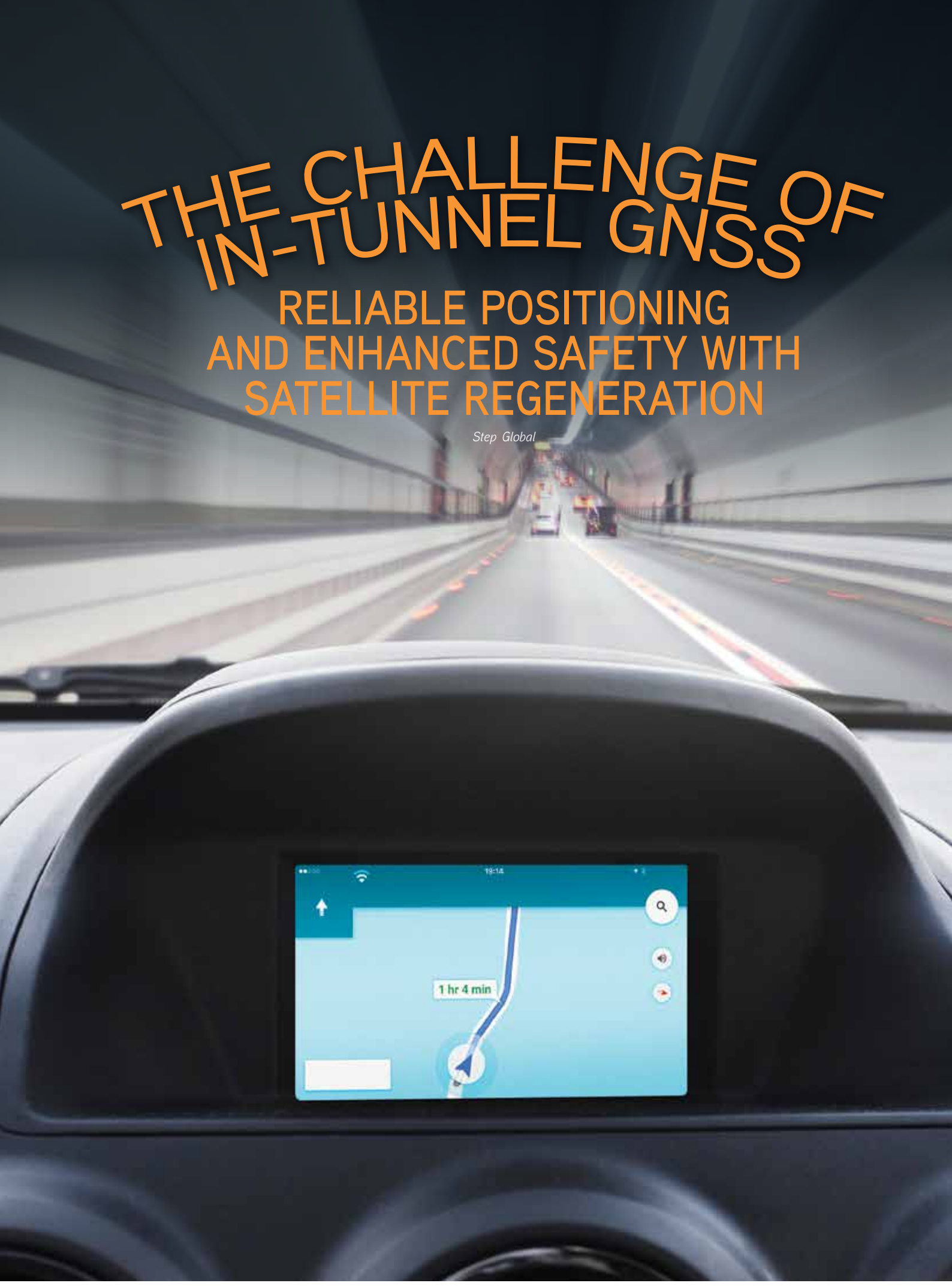
Anritsu Pty Ltd

www.anritsu.com

THE CHALLENGE OF IN-TUNNEL GNSS

RELIABLE POSITIONING AND ENHANCED SAFETY WITH SATELLITE REGENERATION

Step Global



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Modern traffic management and control systems require accurate and reliable location services. However, global navigation satellite system (GNSS) signals, which are a cornerstone of modern navigation, are rendered useless in tunnels and other subterranean environments. This creates a critical 'black hole' in navigation and location tracking, impacting everything from traffic flow monitoring to emergency response.

An effective solution is to regenerate real-time GNSS signals within tunnels to ensure continuous, accurate positioning. Enabling standard GNSS receivers to function seamlessly in these environments, this technology enhances safety, improves traffic management, and provides crucial location data for emergency services.

The 'black hole' of underground navigation

While consumer vehicle GNSS navigation systems typically provide an accuracy of around 2–4 m in open-sky conditions, the technology falls short in areas without a direct satellite view, such as in underground roads or mining tunnels. In order to understand why, it's essential to grasp how a GNSS receiver calculates its position. The process relies on decoding four critical types of data from satellites:

- **Almanac**: Information about the satellite's orbit and status.
- **Ephemeris:** The satellite's precise position.
- **Pseudo-random code:** Used to calculate the signal's travel time from the satellite.
- **UTC (Universal Time Code):** For accurate timing.

Clear line of sight to a minimum of four satellites is required to calculate a precise 3D position (latitude, longitude and altitude). When a vehicle enters a tunnel, this line of sight is instantly lost, and traditional GNSS navigation becomes ineffective. This results in a critical loss of data that can impact operational efficiency and, more importantly, safety. The vehicle's last known position is the only data available, leaving a significant gap in real-time tracking.

A common but fundamentally flawed approach is to use an external antenna to capture a signal from outside a tunnel and simply rebroadcast it inside. This method is ineffective as a vehicle's GNSS receiver will only calculate one position throughout the entire length of the tunnel: the location of the external antenna on the surface. This remains true even if multiple repeaters are used. Furthermore, this method is fraught with significant logistical and cost challenges, often requiring boreholes to be drilled to run cables to each repeater. Not only does the resulting inaccurate location data impact potential navigation applications, but the calculated altitude will also be entirely incorrect, posing a major issue in multi-level tunnels.

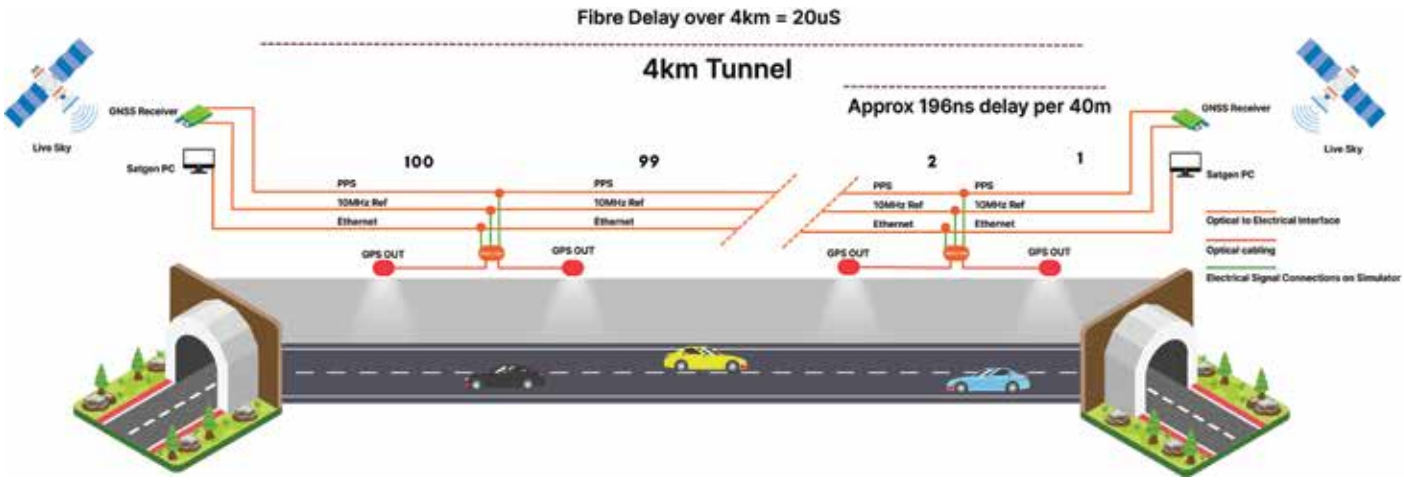
GNSS signal regeneration: an emerging solution

An effective solution to this problem is to regenerate modified satellite signals that are specific to the vehicle's location within the tunnel. This is achieved by installing a series of radiating antennas in the tunnel ceiling. The signal from each of these antennas is relative to its precise position, including its longitude, latitude and altitude.

This ensures that as a vehicle travels through a tunnel, its receiver calculates its position relative to the nearest radiating antenna. To the vehicle traveling through the tunnel, its tracking unit will 'see' the same almanac and ephemeris data as if it were under an open sky. As the vehicle passes from the signal range of one antenna to the next, its position is seamlessly updated, providing accurate, real-time location tracking. The positional accuracy achieved is determined by the spacing of these antennas. In general, an AVL or telematics system will report between 10 seconds and 30 seconds; this knowledge in conjunction with the tunnel's travel speed can be used to calculate appropriate antenna spacing. In an emergency, a vehicle's stationary position will be precisely pinpointed to the location of the nearest antenna.

The technical components of GNSS signal regeneration

- **Precision Time Protocol (PTP):** A highly accurate PTP server with an external GNSS antenna that has an unobstructed view of live signals is needed to feed current and synchronised timing data throughout the system. This server's time clock must be accurate to within a few nanoseconds of UTC for a seamless transition of live to simulated signals. This ›



nanosecond-level accuracy is critical for avoiding timing glitches that could disrupt navigation systems. The PTP server acts as the master clock, ensuring that all signals broadcast in the tunnel are perfectly synchronised, a non-negotiable requirement for accurate positioning.

- **GNSS simulation software:** The PTP server feeds this satellite data to a computer running dedicated simulation software. The software is meticulously configured for the surveyed location within the tunnel, taking into account the precise location and elevation of each radiating antenna. This software is the brain of the operation; it calculates the precise signals that need to be generated at each antenna point. Each tunnel environment's unique bends, slopes, and number of radiating antennas all need to be accounted for to ensure a consistent and reliable signal across the entire length of the tunnel.
- **Dedicated RF signal generators:** The software outputs specific parameters to dedicated RF signal generators. These generators use the settings and the precise timing signals from the PTP server to generate the satellite radio frequency (RF) signals for each radiating antenna. The RF fields from these generators can be precisely tuned to match the specific tunnel environment, preventing signal leakage and ensuring safety. These generators are the physical manifestation of the software's commands, broadcasting the simulated signals that are interpreted by standard GNSS receivers.

Benefits and use cases of GNSS signal regeneration

Road tunnels

The absence of GNSS in road tunnels poses a direct threat to public safety and traffic efficiency. Signal regeneration provides a comprehensive solution with several key benefits. It offers a way to enhance traffic management by providing accurate, real-time location data as well as insights for traffic flow monitoring, which assists in managing traffic congestion and improving overall operational efficiency. This information enables intelligent traffic systems to make data-driven decisions about lane closures, variable speed limits and incident management. Furthermore, signal regeneration significantly improves emergency response times. In critical situations, accurate and precise accident location data allows emergency services to navigate to the exact site of emergency in tunnels and other inaccessible subterranean areas, which can save lives by reducing response times. This technology is also universally compatible, providing true GNSS signals, unlike systems that rely on proprietary Bluetooth or Wi-Fi beacons that only work with modern devices and smartphones. This ensures true compatibility with all standard GNSS-enabled devices — including those found in transport fleets, commercial vehicles and emergency services — without requiring any new hardware.

Rail tunnels

For rail networks, the consequences of a loss of location data can be catastrophic. The high precision and reliability of GNSS signal regeneration make it an ideal solution for modern rail operations. Accurate GNSS signals enable continuous tracking of trains, locomotives and maintenance vehicles, which is crucial for efficient scheduling and management. Real-time location data is fed into control systems, allowing for granular control over train movements and congestion prevention. This ability to provide a precise location for every vehicle in a tunnel at all times can also be used to prevent collisions and ensure the safety of personnel working on the tracks, providing an additional safety net beyond traditional signalling systems. Seamless handover is also essential for rail signalling systems to prevent any timing glitches that could lead to signal failures or communication breakdowns.

Mining tunnels

Mining operations are complex, dangerous, and often take place in a network of underground tunnels where traditional navigation is impossible. GNSS signal regeneration provides a vital layer of safety and efficiency. Continuous GNSS signals are essential for the safe and efficient operation of autonomous vehicles and robotic systems used in modern mining. These systems rely on precise positioning to navigate, transport materials and avoid obstacles, and a loss of signal could bring operations to a halt or, worse, lead to a safety incident. The ability to precisely locate personnel and heavy machinery in this complex environment significantly enhances safety and allows for rapid response in case of an incident, where search and rescue teams can pinpoint a location with a high degree of accuracy. Real-time location data also allows for the optimised routing of vehicles and resources, improving productivity and operational efficiency by helping to manage the flow of equipment and materials, thereby reducing bottlenecks and downtime.

GNSS signal regeneration offers a comprehensive solution for road authorities and traffic management systems, as well as rail and mining operators that require reliable location services in challenging environments. Systems that embody these principles already exist; NoSky SatNav from Step Global is designed to provide GNSS signals in areas where seamless navigation is mission critical. By regenerating real-time GNSS signals, it resolves the critical problem of in-tunnel navigation, ensuring continuous tracking for operational efficiency and, most importantly, enhancing public safety.

Step Global will be exhibiting at Comms Connect Melbourne from 15–16 October on Stand 54.


The radio we wanted to show you is behind his gloves.
Nevermind.
Let's focus on what really matters.
MAKING YOUR MISSION POSSIBLE.
tait

BASE STATIONS IN THE SKY

HAPS TELECOMMUNICATIONS SERVICES LAUNCHING SOON

Sceye's HAPS platform.

In order to help bridge the digital divide and provide emergency communications during disasters, SoftBank has been actively conducting research and development into high-altitude platform station (HAPS) stratospheric telecommunications since 2017, achieving its first stratospheric flight in September 2020. Now, the company has announced a new development that will bring HAPS services closer to reality.

In 2026, SoftBank plans to launch pre-commercial HAPS services in Japan in partnership with Sceye, a New Mexico-based aerospace company that develops lighter-than-air (LTA)-type HAPS vehicles. In addition to making an equity investment in Sceye, SoftBank signed an agreement that gives it exclusive rights to provide HAPS-based services in Japan using Sceye's platform.

HAPS, which SoftBank also refers to as 'base stations in the sky', operate in the stratosphere at an altitude of approximately 20 km to provide wide-area communications coverage. While conventional mobile networks have focused on 2D coverage for smartphones and vehicles, the coming 6G era will demand telecommunications infrastructure with 3D architectures to support connectivity for drones and uncrewed aerial vehicles (UAVs) in the sky. Building on its history in non-terrestrial network (NTN) solutions, SoftBank is investing in Sceye's HAPS-based stratospheric telecommunications as a highly scalable solution to complement its existing terrestrial towers and satellite constellations.

Sceye's HAPS platform uses the buoyant force of helium, a gas lighter than air, to remain airborne for long durations. The aim of the platform is to provide connectivity to underserved areas, enable real-time detection and response to weather-related disasters, and support advanced environmental monitoring, all to contribute to a better future for people and the planet.

Using Sceye's LTA-type HAPS platform, SoftBank plans to provide pre-commercial HAPS services in Japan that will support communication recovery during disruptions due to large-scale disasters, such as major earthquakes, and deliver connectivity to mountainous regions, remote islands and other areas that are hard to reach with traditional ground-based (terrestrial) networks. Leveraging the advantages of HAPS — including faster speeds, greater capacity, lower latency, and more flexible deployment capabilities compared to satellite-based communications — SoftBank expects to strengthen its network resilience and promote universal service nationwide.

In parallel, SoftBank will continue to develop its large-scale heavier-than-air (HTA)-type HAPS platform — which uses fixed-wing aircraft for aerodynamic lift to stay aloft — with the aim of utilising it for commercial services in the future. By providing HAPS-based commercial services, the company aims to build a next-generation telecommunications network with 3D architecture to support stable and reliable connectivity for drones and UAVs in the 6G era, in addition to providing telecommunications services during large-scale disasters when terrestrial networks are disrupted.

"Originally, commercialisation was targeted for 2029, but thanks to significant progress, we're now able to begin pre-commercial operations in 2026," said SoftBank President and CEO Junichi Miyakawa. "We plan to first deploy it as a disaster preparedness measure.

"Until now, telecommunications have focused on connecting devices like smartphones and cars, and a 2D communication framework has been sufficient. In the future, however, 3D communication will be required to support drones and flying cars. Looking ahead to the 6G era, we believe HAPS will become a core infrastructure, and we're taking the lead in making this a reality.

"The stratospheric-based, wide-area telecommunications of HAPS will play a key role in expanding network area coverage to areas that are difficult to reach with existing mobile network infrastructure, and it will also provide a means of restoring communications when large-scale disasters strike. Furthermore ... HAPS will be key infrastructure to support society when 3D telecommunications networks will be needed to support sky-based mobility."

Mikkel Vestergaard Frandsen, founder and CEO of Sceye, added, "SoftBank has an extensive track record in non-terrestrial network technologies and has long viewed the stratosphere as the next frontier to tackle pressing global issues. Their investment reinforces the viability of our HAPS platform. We are proud to welcome SoftBank as a strategic partner and look forward to accelerating the commercialisation of our services together."

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THE IMPORTANCE OF THE INTERWORKING FUNCTION: ENSURING CRITICAL NETWORKS WORK TOGETHER

Harald Ludwig and Sylvain Allard^*

Operators of land mobile radio (LMR) systems can derive substantial benefits from the early adoption of Mission Critical Services (MCX) built on open 3GPP standards. Interworking LMR networks with 4G/5G-based MCX solutions requires leveraging the standard-defined Interworking Function (IWF). The aim of this integration is to strengthen communication capabilities, achieve seamless interoperability, and enable a gradual adoption of broadband technologies.

Depending on the specific architecture of the LMR system, interworking may be implemented natively through integrated software components in the LMR and MCX systems or via an external IWF. However, several key challenges must be addressed to ensure successful integration between LMR and MCX systems, including service mapping, system performance, scalability, user training and acceptance, operational continuity, and security concerns.

Land mobile radio networks

LMR systems are designed for two-way voice communication, primarily using handheld devices, vehicle-mounted units and dispatch consoles. These networks are extensively utilised in sectors such as public safety, transportation, utilities and industrial operations.

Their core functionality centres on group communications facilitated by push-to-talk (PTT) radios, which enable coordinated efforts among large teams. Widely recognised mission-critical LMR standards include TETRA and APCO P25. Other systems, such as Tetrapol and Digital Mobile Radio (DMR), follow more proprietary protocols, despite being based on published standards. Although these frameworks define the air interface, interoperability with external systems is typically implemented through vendor-specific gateways.

Mission Critical Services

MCX refers to mission-critical push-to-talk, data and video services delivered over 4G and 5G broadband mobile networks. It is defined by 3GPP, the standardisation body responsible for guiding the evolution and ensuring multi-vendor interoperability of cellular network standards, including 3G, 4G and 5G, and which is already working on 6G. MCX services leverage the broadband capabilities and open interfaces of 3GPP networks to enable public safety voice, data and video services. MCX integrates network and application layers to provide features such as priority access, group communications via multicast, and end-to-end interoperability across devices, servers and gateways.

MCX services can be deployed on public, private or hybrid 4G/5G infrastructures. Public deployments managed by mobile network operators (MNOs) support multiple organisations under defined service level agreements (SLAs), addressing both business- and mission-critical needs; for example, AT&T operates FirstNet in the United States. Private deployments can serve localised areas such as airports, underground railways and industrial sites, and several public safety agencies are targeting the deployment of a nationwide private network for their MCX services, which is complemented by public MNO networks to provide additional capacity and redundancy; one such notable deployment is SafeNet in South Korea. ›

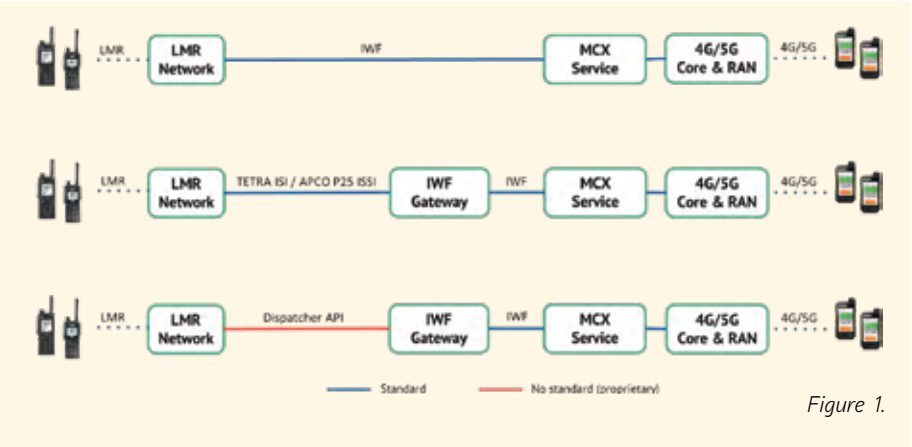

Figure 1.

The Interworking Function

The IWF is a key component of the 3GPP MCX architecture that enables interoperability between LMR systems and MCX services. It provides a standardised approach for facilitating seamless communication across both domains, ensuring compatibility in voice, data and signalling services. To achieve interoperability, an IWF is required, either as an embedded software component or as a standalone function/entity. This integration may be implemented by the LMR equipment manufacturer, a third-party developer or the network operator.

The objective of standardising interworking for MCX is to achieve seamless interoperability between broadband MCX platforms — defined by 3GPP for LTE and 5G — and existing narrowband LMR networks. This standardisation is essential for enabling a smooth and reliable transition from narrowband to broadband solutions. It allows public safety agencies, emergency responders and other mission-critical users to maintain secure, dependable and efficient communication across mixed technological environments.

By establishing a consistent and open framework — exemplified by the IWF as specified in 3GPP standards — the objective is to ensure continuity of key services such as voice and data, while optimising cost-efficiency and aligning with the evolving requirements of mission-critical communication.

Possible architectures

The integration of LMR and MCX networks can be realised through several architectural models (Figure 1). These configurations depict LMR user devices (eg, handheld radios, vehicle-mounted units) on the left and MCX user devices (eg, smartphones, tablets, ruggedised terminals) on the right.

- **Native IWF integration:** The first approach incorporates IWF support directly within the LMR network infrastructure. This method removes the need for an external IWF. However, native IWF integration is generally offered by the LMR manufacturer as a licensed capability and may require additional dedicated hardware.
- **ISI/ISSI interface-based architecture:** The second method leverages standardised interfaces on the LMR side to enable interworking. Interfaces such as the TETRA Inter-System Interface (ISI) and the APCO P25 Inter-RF Subsystem Interface (ISSI) are particularly suitable. These interfaces facilitate key communication services such as PTT group calls, private calls, and data messaging, and connect to the MCX domain via an IWF.
- **Proprietary dispatcher interface (API-based) architecture:** The third approach utilises a vendor-specific dispatcher interface or API. Many LMR vendors provide APIs that allow third-party developers to create customised dispatch solutions. These applications can emulate group calls, private communications and data messaging, thereby enabling interworking through an IWF.

The interworking capabilities supported in each architecture depend heavily on the underlying interface and the functionality of the IWF. Generally, native IWF integration provides the most comprehensive feature set, followed by standardised interfaces like ISI and, lastly, proprietary dispatcher interfaces.

Market segments and applications

MCX are primarily targeted at the public safety and emergency response sectors, but are also increasingly relevant across various industries that demand secure, reliable and prioritised communications. Developed on open 3GPP standards for LTE and 5G, MCX services are specifically designed to meet the rigorous demands of mission-critical operations.

The primary market includes agencies and organisations responsible for maintaining public safety, responding to emergencies and managing crisis situations. MCX solutions are deployed to replace or augment traditional LMR systems such as TETRA and P25 by offering enhanced capabilities including high-speed data, live video streaming and real-time situational awareness.

Augment or transition

The IWF plays a pivotal role in enabling hybrid communication environments that combine LMR systems with broadband solutions. By bridging these technologies, organisations can either augment existing LMR infrastructure or transition gradually towards fully broadband-based MCX. The various use cases outlined throughout this article clearly demonstrate the value of interworking during all phases of integration and migration. IWF is positioned to be a key enabler in the broader adoption of broadband communications across public safety, industrial sectors and critical infrastructure domains, where hybrid LMR–MCX solutions will serve as both a complement and a stepping stone to full migration.

Understanding the benefits and challenges of IWF-based interworking is essential when selecting the appropriate MCX and IWF architecture. While IWF introduces powerful capabilities, several key considerations must be addressed, including bandwidth constraints, latency and reliability, and cost and implementation complexity.

Organisations are encouraged to prioritise open, standards-based approaches — such as those defined by 3GPP — over proprietary solutions, as these enhance interoperability and support broader ecosystem collaboration. Open standards help ensure compatibility across devices and vendors, which is particularly valuable for critical communications. They also provide a foundation for robust security practices and can contribute to more predictable and potentially optimised total cost of ownership, depending on deployment context and scale.

The IWF and its implementations are explored in detail in the white paper from TCCA's IWF Working Group, available at https://tcca.info/about-tcca/tcca-resources/whitepapers.

**Harald Ludwig is Chair of the TCCA Technical Forum.*

^Sylvain Allard is Senior Director Connectivity at Capgemini.

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Industry Talking

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ARCIA continues to advance the cause of all wireless technologies and industries as part of a modern economy — and to that end, our new-look spectrum subcommittee, now led by Simon Lardner, has been busy responding to various ACMA consultation papers and questions from members.

ARCIA proposed updates to the citizens band radio service (CBRS) to bring it in line with the rest of the 12.5 KHz banding; as it stands, some channels are still operating at 25 KHz. In particular, the committee felt that there was likely to be community benefit when narrow-banding repeater channels to potentially allow more repeaters around the country.

The spectrum subcommittee also contributed to an ACMA technical paper regarding the allocation design for mobile satellite services (MSS) in the 2 GHz band. Given the growing importance of direct-to-satellite mobile services, the ARCIA committee felt that including public safety in allocation design could provide many future benefits across the country.

ARCIA also had a request from a member regarding the practical operation of the 4.9 GHz public safety spectrum. As ARCIA has commented on this important band for public safety previously, we were able to provide our advice on what the intended usage for this band is.

It's been pleasing to see a number of training courses that have run successfully so far in 2025, with good numbers in attendance, including for the Microwave Engineering Masterclass held in August. As part of the Brisbane conference in late July, Chris Stevens ran an LMR Antenna & Transmission Line Fundamentals & Testing practical course that saw 12 participants receiving an ARCIA Certificate of Competence on the day, with a further course held in conjunction with our South Australia conference. The association also continues to develop new content in line with market requirements and to this end is currently looking at sessions for the next generation of broadband communications for private 5G networks. Check arcia.org.au/training for upcoming training, both online and face to face.

With Comms Connect just around the corner, the association is again holding pre-conference workshops, this year on microwave engineering and P25 technology — so head to the Comms Connect site if there are some knowledge gaps in your team on these important topics. In addition, at the conference, there will be a segment on the future of our wireless workforce, so keep an eye out for that if you're attending. ARCIA will as always have a stand at Comms Connect, so please do come by and say hello at what is the largest gathering of professional wireless communications professionals and products in the Southern Hemisphere.

The association recently held its annual general meeting and it was great to see all committee positions filled without difficulty, with a number of these new to the committee and some from younger generations too! Reports demonstrated that the association is in a strong position currently, with growth in members and partners, setting us on a firm financial footing for the year ahead.

This is an amazing vote of confidence from the sector and recognition of a lot of hard work by the CEO and the committee. ARICA thanks its members and partners for their wonderful support.

Hamish Duff

President (Hon),
ARCIA – Australia's Radio & Critical Communications Association

Two-way radio

TOOOAir has launched its latest innovation in two-way radio communication: the TOOOAir PoCkit Radio, a push-to-talk over cellular (PoC) device for Australians seeking to connect in the field, on the road and across the country.

Unlike traditional radios, the product comes bundled with two years of included airtime, eliminating the need for complex fleet set-ups, ongoing billing and airtime management. Dealers can enjoy a hassle-free sales process with no follow-up invoicing, while end users benefit from a seamless activation process by simply scanning a supplied QR code.

Designed with flexibility in mind, the PoCkit can be configured in two powerful modes.

With Private Fleet Mode, users can create a secure, closed communication network with up to three dedicated channels (Groups). Suitable for businesses and teams needing privacy, this mode also supports Calling Name Display, Group Calls and Individual Calls, mirroring the performance of PMR/LMR systems.

Community Band Radio (CBR) Mode is a modern, supercharged take on CB radio, offering open access to 200 Australia-wide calling channels. This enables users to communicate with others across the nation.

The radio is purpose-built for the 4x4 community, caravan and camping enthusiasts, sports and school events, and bushwalking groups, offering a robust, lightweight and nationwide communication solution with no ongoing airtime worries. It is simple, flexible and built for how Australians communicate today.

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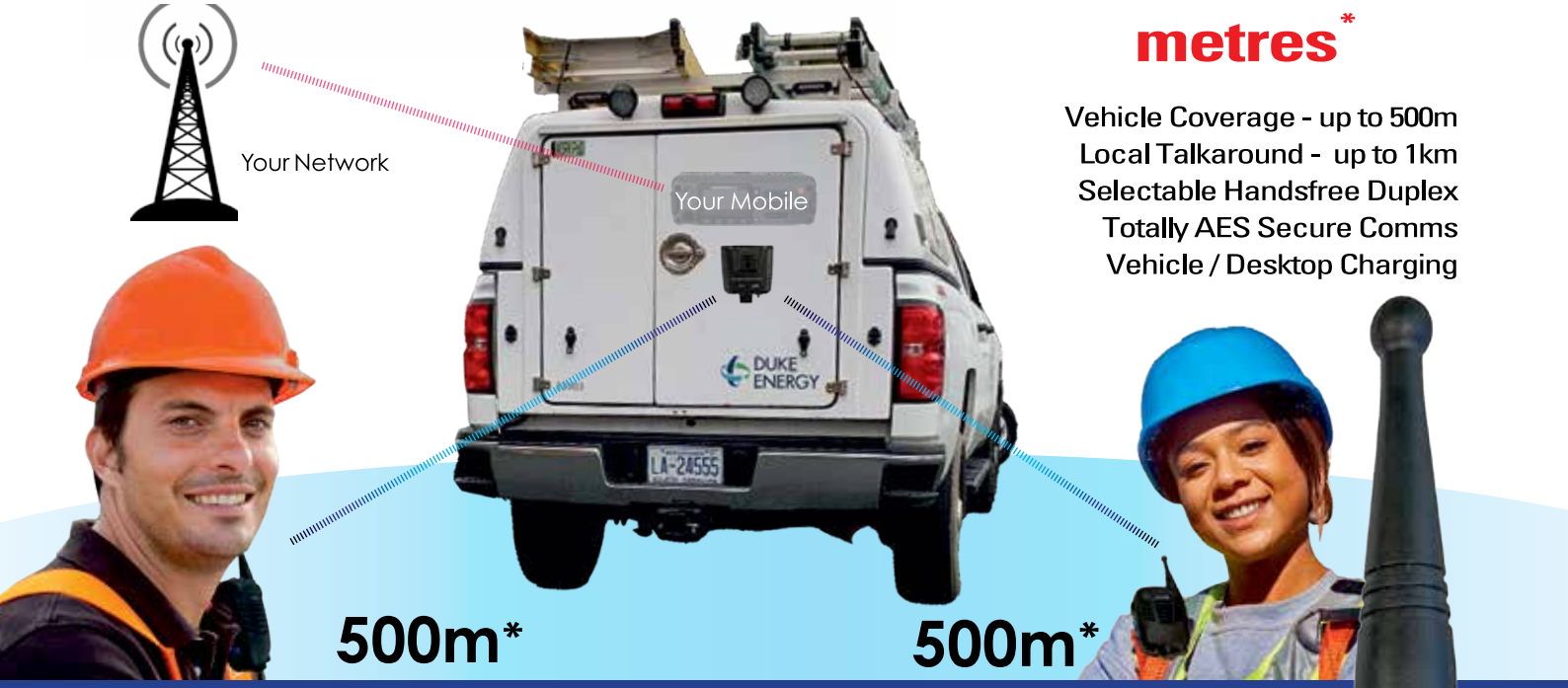

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QUANTUM NAVIGATION SOLUTION UNDERGOES DEFENCE TRIALS AT SEA

The maritime deployment of a quantum dual gravimeter, part of Q-CTRL's assured navigation solution for when GPS is unavailable or untrusted.

Quantum infrastructure software company Q-CTRL has revealed its latest advancements in quantum sensing for navigation through a major field trial on board the Royal Australian Navy's Multi-role Aviation Training Vessel (MATV), MV *Sycamore*, demonstrating the company's expansion into the maritime space.

GPS denial has become one of the most pressing strategic challenges in both defence and commercial settings, especially in contested maritime environments. Instances of 'spoofed' signals have resulted in significant disruptions to ships in the Middle East waterways as recently as 23 June 2025, not only causing critical logistical issues but also impacting collision avoidance efforts. Quantum navigation offers a robust and reliable GPS backup that cannot be jammed or spoofed; but while Q-CTRL has already validated the performance of its magnetic navigation solution in airborne field trials, this technique can be less effective in maritime vessels.

The new trial saw Q-CTRL make use of a quantum dual gravimeter, which measures tiny variations in Earth's gravity as part of a next-generation quantum-assured positioning, navigation and timing (PNT) system. The quantum gravimeter continuously 'sees' the otherwise invisible hills and valleys in Earth's gravity, allowing a navigation computer to compare its observations against known gravity maps. This is similar to orienteering, where one can position oneself on a map by identifying landmarks like valleys, mountains, rivers or roads. GPS is therefore not needed, making this a robust backup in contested regions.

Q-CTRL's demonstration with the Royal Australian Navy departed from most previous quantum sensing field trials in that these tests mandated peak performance with full autonomy and without the addition of any special infrastructure. The sensor had to operate just as a real navigation system would operate during a defence mission.

Quantum sensing leverages the physics of light and matter on the smallest scales to enable the detection of tiny signals. Because these devices work based on the fundamental laws of physics and are not affected by drift like other GPS alternatives, their outputs do not change over time, making them useful where long-term stability is essential. Generally, however, these devices are significantly degraded when taken from a research laboratory into the real world — an issue addressed by Q-CTRL's software-ruggedisation technology.

"Quantum sensors provide a near-term opportunity to achieve transformational defence capabilities, but previous deployments in the field have struggled to deliver defence-relevant performance," said Q-CTRL CEO and founder Michael J Biercuk. "Operating on a real moving vehicle is just not the same as conducting a science experiment; at Q-CTRL, we've taken a different approach to getting quantum sensors out of the lab, focusing on software as the critical enabler of performance in the real world."

The dual gravimeter was installed in a 'strapdown' configuration (bolted to the floor) in the space of a single server rack in a communications room onboard MV *Sycamore*. The ship's motion and engine vibrations were sufficient to cause total loss of signal using conventional operating techniques typically employed in research experiments — but Q-CTRL's software-ruggedisation strategies recovered operation at near-record levels even while MV *Sycamore* was underway.

The trial saw over 144 hours of continuous operation and successful data collection with no human intervention during real maritime operations. Furthermore, the sensor consumed only 180 W of power — about 10 times less than a household toaster.

"We expect the quantum sensing market to reach $3bn–5bn by 2030," said Jean-Francois Bobier, Partner & Vice President, Deep Tech, at Boston Consulting Group. "Especially amid heightened cases of GPS denial, field-validated quantum sensors are more important than ever for navigational safety. With clear use cases and early adopters in the defence industry, Q-CTRL's achievements pave the way for future economies of scale and broader adoption."

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Public Safety field teams and their control rooms rely on fast, secure communication to manage emergencies and their operations effectively. As the demand for real-time data and multimedia increases, legacy systems alone do not suffice.

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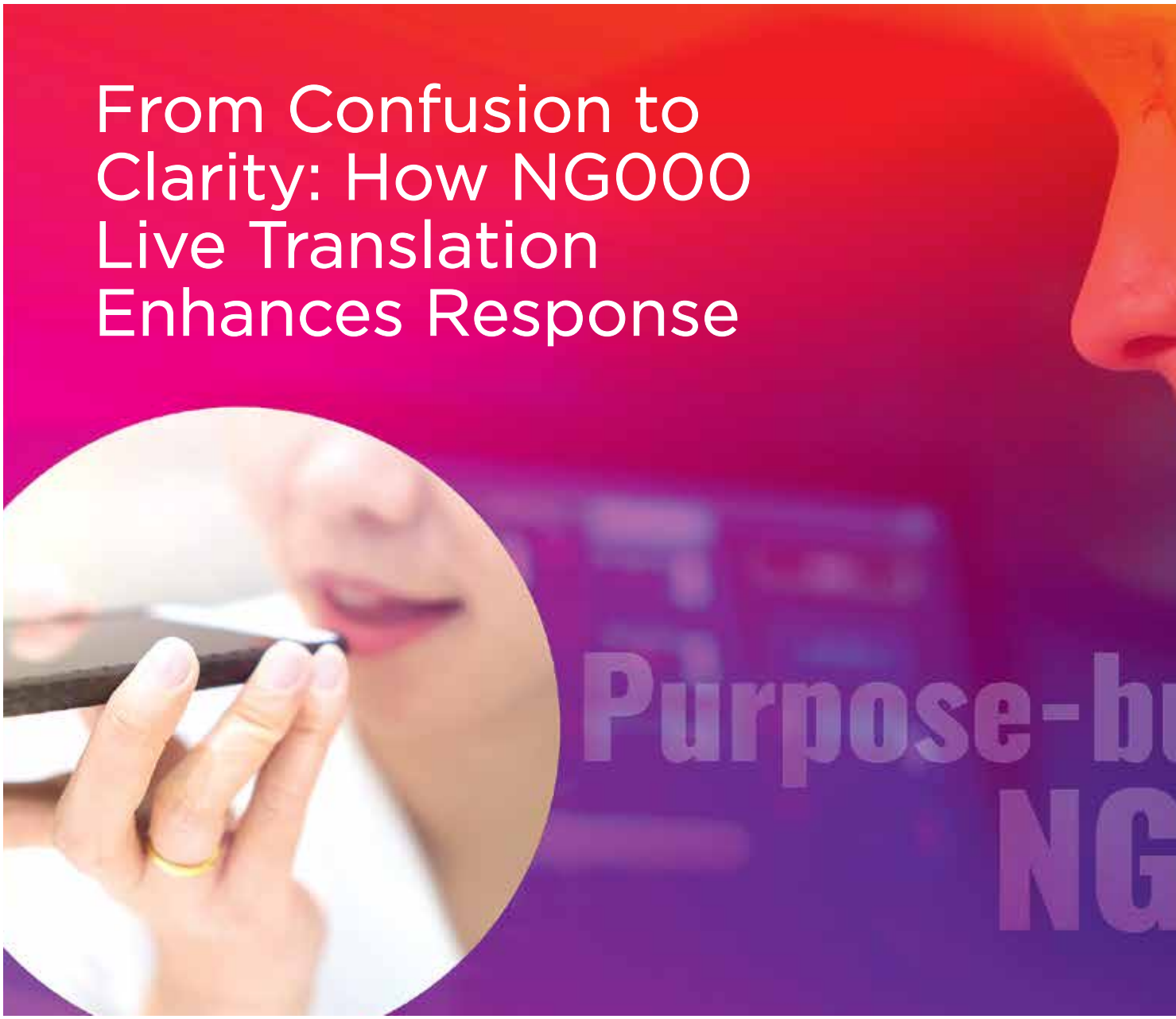

Clarity is one of the most important, and most difficult, things to achieve during a 000 call. People are often frightened, confused, or injured, but getting accurate information out of them as quickly as possible is crucial to saving lives.

This challenge is exacerbated by language barriers and misunderstandings. If a caller doesn't speak the same language as a telecommunicator, communication can go from being difficult to impossible. And in the messiness and confusion of a 000 call, telecommunicators may need to rewind and listen through a call recording to try and sort out the information that was being conveyed. Australia's diverse and growing population makes this challenge more difficult for Emergency Service Organisations (ESOs). The diverse population speaks hundreds of languages and even more dialects. And many ESOs themselves may have hundreds of staff responsible for thousands of people. At the same time, statistics bear out that the number of emergency calls is growing every year and pressure is increasing for ESOs to handle calls more efficiently. In this environment it's crucial for ESOs to have the tools they need to handle any call from any caller quickly and effectively.

Automatic translation and transcription is a powerful tool that ESOs can use to facilitate faster and more accurate emergency response. When language is an issue, live translations and written records of calls give telecommunicators the ready access to situational awareness information they need to effectively respond to emergencies. As Australia moves towards Next Generation 000 (NG000), integrating translation and transcription into emergency call handling will help accelerate emergency response efforts and save lives.

Outracing the Emergency Clock With Accurate Information

When a call is routed to an ESO, a timer starts. Telecommunicators have to capture the crucial information they need — the nature of the incident,

where it is, what type of emergency services have to be dispatched — as soon as possible. If a telecommunicator cannot understand a caller, this process becomes vastly less efficient and accurate. To overcome a language barrier, telecommunicators may need to transfer a call to another telecommunicator in the ESO, or to a translator in an external service. This takes time and may require a caller to repeat information. If the transfer is not made seamlessly, crucial time and information may be lost.

Language concerns also make staffing and operations less cost-efficient. To be prepared, ESOs must have staff on every shift to cover every language in their area, as there is no way to predict which language a caller may use. And keeping external translation agencies on call 24/7 adds significant additional costs.

Even without a language barrier, communication can become confused. Information relayed by voice can be unclear, and a telecommunicator may need to cycle through a call recording to double-check information they've been given. This can delay information sharing with first responders or even result in wrong information being passed along. A wrong address can delay a response; a wrong piece of situational awareness information, such as the nature of the incident or the services needed, can put both callers and first responders in danger.

Maximizing Clarity With More Seamless Communications

Automatic translation and transcription capabilities are not a replacement for trained translators or telecommunicators. But they are a powerful tool that can help fill critical gaps in information by providing telecommunicators with options where they otherwise did not exist. With real-time translation and transcription, telecommunicators can quickly and accurately gather as much information about a call as possible, even if they had trouble understanding the caller. When a transfer is necessary, the initial telecommunicator can gather more accurate information to pass to the new telecommunicator, making the transfer much more efficient and seamless. And by capturing critical situational awareness information, from the address of the incident to which services are needed, the emergency response is both faster and more accurate.

Improved clarity also reduces stress on both callers and telecommunicators, which is crucial in already stressful situations. Real-time translation makes it easier for telecommunicators to recognize and work with cultural sensitivity by accommodating how different languages and cultures express distress or urgency. For example, some may hesitate to speak openly due to fear or social norms. By capturing these nuances in a conversation, translation tools ensure vital information isn't lost.

The clarity translation and transcription capabilities provide goes beyond the original call. Automatically generated transcripts also provide a written record of emergency calls, supporting legal, medical, and operational needs while aiding police investigations, staff training, and performance evaluations.

Automatic and Flexible Capabilities Are Crucial

For these capabilities to be of maximum use to ESOs, it is crucial that translation and transcription happen automatically. Ideally, a call management solution will not only begin translating and transcribing a call as soon as it comes in but also inform the telecommunicator which language is being spoken. This makes the transfer of calls as efficient as possible.

Any translation software should also support the hundreds of languages and many dialects of English spoken throughout the country. Any of these may be used in an emergency call. Quickly identifying which one is being spoken, as well as translating for the telecommunicator, can eliminate seconds or even minutes of delay in an emergency response.

Ideally, call management systems should also be equipped to generate automatic transcriptions as a call goes on. This makes it easier for telecommunicators to leverage their knowledge and experience to identify information that is important during any call. Plus, pre-programing automatic transcription capabilities to highlight specific keywords enables telecommunicators to zero in on key points even more quickly.

Solacom Delivers Deployment-Ready Automatic Translation and Transcription

Telecommunicators need every tool available to do their jobs effectively. Even brief confusion can cost lives. The Solacom Guardian Automatic Translation and Transcription module ensures telecommunicators always have access to the best possible available situational awareness information at all times, letting them make the right decision for the situation as quickly as possible.

A Solacom Guardian Call Handling system equipped with the Guardian Automatic Translation and Transcription module supports more than 70 base languages and 140 dialects. Additionally, keywords can be set to appear in bold in both transcribed and translated audio and text calls whenever the caller mentions them. This purpose-built solution is ready to meet the needs of telecommunicators today, and tomorrow, as Australia continues moving towards NG000.

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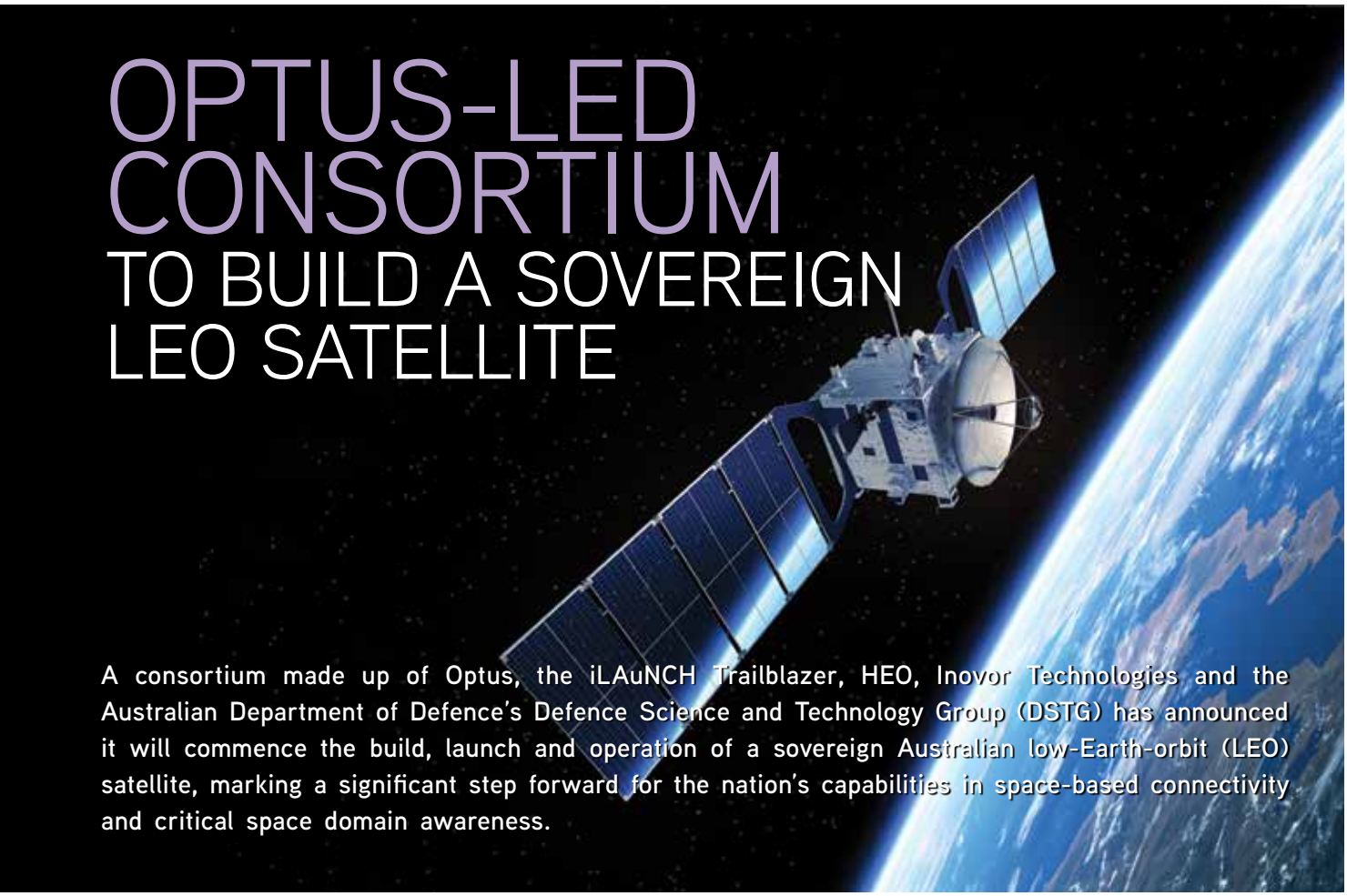

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A consortium made up of Optus, the iLAuNCH Trailblazer, HEO, Inovor Technologies and the Australian Department of Defence's Defence Science and Technology Group (DSTG) has announced it will commence the build, launch and operation of a sovereign Australian low-Earth-orbit (LEO) satellite, marking a significant step forward for the nation's capabilities in space-based connectivity and critical space domain awareness.

Optus is providing significant investment and in-kind resources for the project, and will act as leader of the consortium. Inovor Technologies will manufacture the main body of the spacecraft, as it did for the recently launched Buccaneer Main Mission (BMM) nanosatellite, while Defence is contributing $4 million to the project under a co-funded arrangement.

"By investing in innovative R&D projects, we strive to develop next-generation capabilities that are resilient and secure for potential future Defence applications," said Chief Defence Scientist Professor Tanya Monro.

The consortium will host two pieces of equipment developed under the Australian Government's iLAuNCH Trailblazer Universities Program, sponsored by the Department of Education. The first of these, led by Optus in partnership with HEO and the University of Southern Queensland, includes HEO's new 20 cm Adler Imager — a specialised space telescope designed to take high-resolution pictures of space objects, also known as non-Earth imaging. The space awareness information will assist with transparency in space and allow customers to manage and operate their space assets, protect essential space infrastructure, and optimise satellite life.

The second piece of hosted equipment, to be developed by the University of South Australia with support from the SmartSat CRC, will include a compact communication terminal that functions at fast speeds, using laser light (optical) to send and receive data between another satellite or a ground terminal. The hosted equipment will also include a more conventional radio frequency communications capability, supporting DSTG's ongoing research and development activities as well as its expertise in optical and LEO satellite communications.

The project builds on the innovative work already announced by iLAuNCH in partnership with The Australian National University (ANU), Optus and Leonardo UK to build smaller, lower-cost laser communications ground stations. Additionally, Optus is in discussion with other partners to explore additional opportunities that will help develop future space capabilities, including multi-orbit pathways.

"This project represents a huge step forward in transforming Australia's world-class research to sovereign space capabilities for our nation," said Darin Lovett, Executive Director of iLAuNCH Trailblazer. "iLAuNCH, an Australian Government Department of Education Trailblazer program, is proud to have brought together incredible researchers from our partner universities — University of Southern Queensland, Australian National University and the University of South Australia — to deliver the next generation of communications and advanced space-based observation. Together, we're strengthening our national space ecosystem and driving innovation for global impact."

The LEO satellite will be built by Inovor Technologies at Lot Fourteen in Adelaide, while Optus intends to operate the spacecraft from its Belrose Space Operations Centre in Sydney. The consortium is targeting a launch date of early 2028.

"Connectivity continues to play a critical role in the Australian economy; whether that be through supporting small businesses in regional and remote towns or large enterprises with employees spread across the country, we must continue to explore new ways of delivering services that businesses rely on," said Nick Leake, Head of Satellite and Space Systems at Optus.

"By collaborating with Australia's industry leaders across the public, private and academic sectors, we are able to further advance the use of technology to solve problems, fuel growth, and define what's next for the telco industry while supporting Australian businesses and Australian workers."

EMC: Designing for Compliance Courses

Melbourne 20th – 24th October 2025
Sydney 27th – 31st October 2025

EMC Technologies is a leader in EMC testing in Australia and New Zealand and has been hosting Keith Armstrong's training courses for the last 25 years. Keith is a practicing EMC & electronic design consultant, and well-known worldwide as an articulate and lively presenter. In 2000, EMC Technologies invited Keith Armstrong from the UK to teach the first courses on electronic design for compliance with EMC and Safety regulations. These courses have been held nearly every year since then for the benefit of manufacturers in Australia and New Zealand.

The courses are well received, with a few of the comments from past attendees as follows:

"By the way — just had XXXX in with their latest project. Their design chap was extolling your virtues. It passed first time — no remedial action required — virtually noise floor emissions — and it included Ethernet, PoE, USB and DSP! What more can I say!"

"You have the most comprehensive work in my opinion for a practical EMC engineer or tech, instead of academic based information with no relationship to practice."

"I would also like to thank you for the interesting and informative course that you presented. I have already begun to implement some design changes in an ongoing project."

"All participants were very experienced yet I'm sure that the others found it as valuable as I did."

This year Keith will share the teaching with his Associates, all experts and excellent speakers. The material has been updated; and — because of AUKUS — a full day on Military EMC Testing has been added.

There is also half a day of Live EMC demonstrations, showing how to use low-cost EMC test gear on unshielded testbenches or in the field, to troubleshoot causes of EMC test failure.

For more details, download the complete brochure and registration form from https://www.emctech.com.au/keith-armstrong-emc-2025.

EMC Technologies
EMC-EMF-Safety Approvals

EMC Technologies Pty Ltd
www.emctech.com.au

Broadcast audio system

The Williams AV Infinium System is designed to give venues a smart, accessible way to deliver high-quality, real-time audio. The system broadcasts real-time, low-latency audio over Bluetooth Auracast, letting users hear on their own compatible devices clearly without relying on complex wiring or traditional receivers.

The system is suitable for commercial and public environments where clear sound plays a critical role. This includes lecture halls, theatres, airports and fitness centres, as well as anywhere that needs to support large or diverse audiences with inclusive audio. The system lets guests connect using Auracast-enabled hearing aids, cochlear implants, headphones or the purpose-built Infinium handheld receiver, giving venues flexibility while reducing hardware and support overheads.

The system includes three key components: a low-profile transmitter; a network-ready controller; and an intuitive handheld receiver. The transmitter mounts discreetly to ceilings, walls, podiums or furniture, and uses a single CAT cable to carry both power and audio. The controller includes integrated Dante connectivity and supports secure audio channel creation and monitoring, which operators can manage locally or remotely through a web-based interface. The ergonomic receiver features a bright, high-contrast display and soft-touch buttons and runs all day on a rechargeable lithium-ion battery. It supports headphones, earphones, cochlear implants and neckloops for a comfortable, user-friendly listening experience.

The use of Bluetooth Auracast eliminates the need for venue-owned receivers, reduces maintenance and increases accessibility for users who prefer to connect through their own devices. The system thus lets venues create inclusive experiences and maintain streamlined AV infrastructure by integrating with existing networks seamlessly and simplifying set-up for installers and technicians.

Amber Technology Limited
www.ambertech.com.au

CASE STUDY

Private network enhances hazard management at oil reserve base

Caltta Technologies, a provider of mission-critical communication solutions, has delivered a customised private wireless communication system for the Lanzhou Petrochemical National Oil Reserve Base in China, significantly improving the facility's hazard management and emergency response capabilities.

As part of China's Phase II National Oil Reserve initiative, the Lanzhou Petrochemical QCGC project is a key component of the country's strategic energy infrastructure. The site comprises 30 floating-roof storage tanks with a total capacity of 3 million m^3, supported by auxiliary systems for instrumentation, communications, water supply, drainage and fire protection.

With the increasing operational lifespan of the facility and evolving regulatory standards for hazardous chemicals and major hazard sources, the demand for a safer and more reliable communication system has grown. Caltta's private network solutions have already supported major petrochemical players in China — delivering secure, efficient communications across both large-scale projects and daily operations — and so the company was confident in collaborating with partner Shandong Jiangke IT to provide a tailored solution designed to meet the facility's heightened safety and operational requirements.

Caltta deployed a new digital two-way radio system using the facility's existing communication tower infrastructure. This ensures uninterrupted private network signal coverage across the entire site — with no blind spots — enabling staff to communicate in real time from any location, improving situational awareness and emergency responsiveness.

The solution includes professional-grade explosion-proof radios (certified to Ex ib IIB T4 Gb/Ex ib IIIC T130°C Db standards), capable of operating safely and stably in high-risk petrochemical zones. These radios are designed to ensure secure communications for frontline personnel under challenging conditions.

By integrating the wireless communication system with a soft-switch platform, Caltta enabled seamless interoperability between radios, dispatch consoles and office PBX systems. This unified command and control structure facilitates efficient coordination between field operations and management teams.

With the deployment of a wide-coverage, fast-response and agile dispatch private network, the Lanzhou oil reserve base has significantly strengthened its communication infrastructure — providing a solid foundation for risk mitigation, hazard monitoring and emergency management.

Caltta Technologies
en.caltta.com

TETRA base station with optimised power consumption

Teltronic has introduced its GBS (Green Base Station) — a next-generation TETRA base station that integrates artificial intelligence algorithms to minimise energy consumption and reduce environmental impact.

Designed in compliance with IEC 62443 cybersecurity standards, the base station employs machine learning techniques to optimise power usage. Compared to other TETRA base station configurations, it is said to enable an average energy saving of up to 70%, positioning it as an efficient and sustainable option.

The product is designed to deliver the same output power as conventional base stations but in a more compact and lightweight form factor, reducing infrastructure costs, eliminating the need for additional hardware, and facilitating both installation and remote maintenance. With an IP65 protection rating, it can be deployed outdoors without the need for technical rooms or special conditioning. It adapts to any environment through different mounting and power supply options (AC or DC), and it can even be powered by solar panels.

Capable of supporting up to four TETRA carriers in a single unit and delivering up to 40 W of power, the device is designed to maintain the multi-carrier capabilities of its predecessors, while adding more intelligent and efficient network management. As a result, increasing radio resources in a given area is simplified: it only requires licence upgrades without the need for hardware installations or site visits. All this is made possible by software-defined radio (SDR) technology, which replaces hardware components with software-based equivalents.

Teltronic SA Unipersonal
www.teltronic.es

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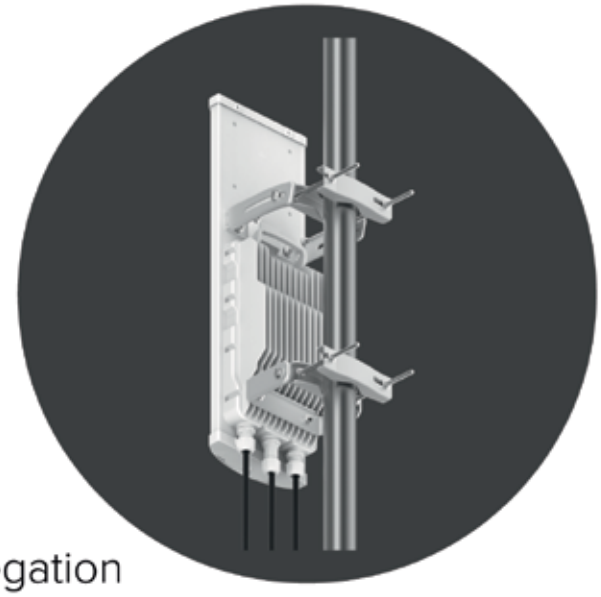

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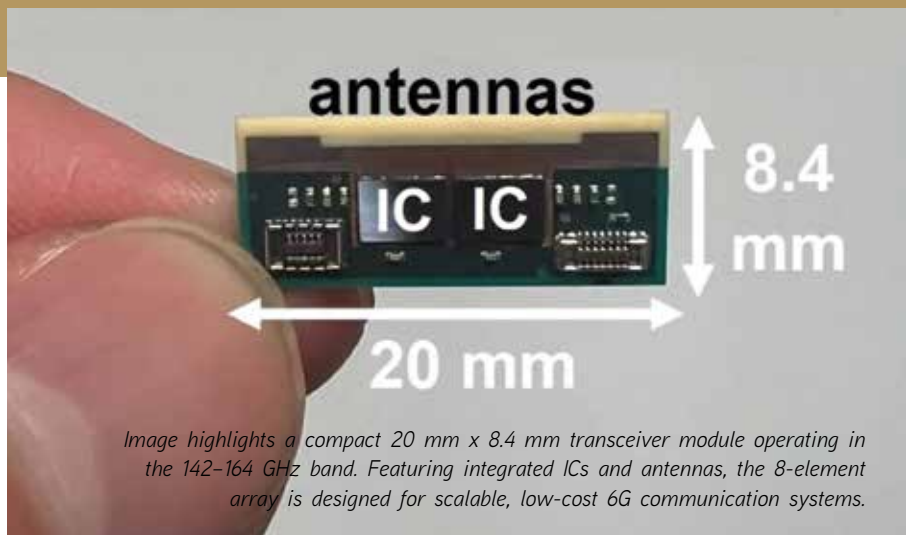

Image highlights a compact 20 mm x 8.4 mm transceiver module operating in the 142–164 GHz band. Featuring integrated ICs and antennas, the 8-element array is designed for scalable, low-cost 6G communication systems.

An ultra-compact, low-power, 150 GHz radio module enabling high data rates in mobile devices has been developed by researchers in Japan. Targeting 6G user equipment, the design integrates a phased-array transceiver with several key innovations to overcome the main challenges of operating at frequencies in the 150 GHz band, and could pave the way to unprecedented connectivity in terminal devices.

6G mobile communication technology aims to revolutionise wireless connectivity by achieving data rates exceeding 100 Gbps, far surpassing the current capabilities of 4G and 5G. To reach such an ambitious target, scientists and engineers are turning to the subterahertz D-band (110–170 GHz), which offers the wider bandwidth necessary for ultrahigh-speed, high-capacity communications.

However, harnessing these frequencies presents unprecedented technical challenges, such as significant propagation losses in free space and difficulties in implementing essential circuit components like amplifiers and switches. Because of this, existing D-band transceivers have been designed mostly for 6G base stations or backhaul applications, requiring large chip sizes and bulky antenna modules. This hinders their integration into user equipment such as smartphones and Internet of Things devices, which could truly capitalise on 6G's transformative potential.

To overcome these barriers, a research team led by Professor Kenichi Okada from the Institute of Science Tokyo, in collaboration with Japan's National Institute of Information and Communications Technology (NICT) and others, developed an ultra-compact, low-power, antenna-in-package radio module for 150 GHz operation. Their work was presented at the 2025 Symposium on VLSI Technology and Circuits, held in Kyoto in June.

The team's breakthrough lies in their innovative circuit design approaches that address the fundamental limitations of existing phased-array systems. At the heart of their solution is an injection-locked tripling phase shifter, which eliminates the need for local oscillator buffers that typically consume significant power and chip area. By directly connecting to the mixer, this design maximises voltage amplitude while maintaining precise frequency control.

Another innovation is the mixer itself, which is a bi-active sub-harmonic mixer. It operates at half the local oscillator frequency and effectively cancels problematic oscillator leakage. Moreover, its dual functionality enables both transmission and reception modes while maintaining high performance in an extremely compact footprint.

The researchers also integrated an antenna switch directly into the amplifier matching networks, thus eliminating parasitic capacitance issues that plague conventional designs. This integrated approach minimises signal losses and enables sharing of power amplifier components between transmission and reception modes, making the design even more area efficient.

"While conventional modules using millimetre-wave bands have had maximum data rates of a few Gbps, this new wideband 150 GHz module enables high-capacity wireless communication at several tens of Gbps in mobile devices," Okada said. "This advancement paves the way for novel application markets, such as highly realistic mobile VR and XR usage in medical operating rooms, offering experiences with unprecedented realism."

The completed eight-element module measures just 8.4 x 20 mm, which is considered remarkably compact for such high-frequency operation. Experimental tests also revealed impressive performance metrics for its size: 56 Gbps maximum data rates, 25.7 dBm effective radiated power (said to be a new record), and just 150 mW of power consumption per element in transmission mode.

"Compared to conventional phased-array radios designed for 6G, this module achieves very high power density, making it suitable not only for base stations but also for compact, low-power terminal applications," Okada said.

The design considerations adopted in this work are expected to accelerate the development of next-generation wireless applications, spanning immersive entertainment, precision medical procedures and advanced industrial automation. The work thus represents a crucial step towards realising 6G's full potential in everyday mobile devices and sophisticated industrial equipment alike.

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Radio Matters

Innovation, connection and collaboration were front and centre at the 2025 New Zealand Comms Connect conference held in Christchurch this past June. Industry leaders, suppliers and manufacturers from across New Zealand and Australia came together to share ideas, showcase cutting-edge products, and tackle the sector's most pressing challenges.

The event once again proved to be a valuable forum, not just for learning through thought-provoking presentations, but also for forging connections that drive the industry forward. Each year, we leave inspired by the range of smart and practical solutions on display, demonstrating the sector's ongoing commitment to innovation and delivering value to end users.

Held in conjunction with the event is the annual RFUANZ Gala Dinner and Awards evening — an exceptional celebration of dedication and excellence across the sector that saw every seat filled, every award well-earned and every detail carefully executed. This brilliant night of entertainment, networking and recognition was all MCed by the ever-charismatic and well-respected Mike McRoberts, whose engaging style and smooth flow kept the night lively and seamless.

A massive congratulations to all award winners, and in particular to Lifetime Service Award winner Ian Gardiner (Tait Communications), who was honoured for decades of leadership, mentorship and lasting contributions that have shaped the radio communications industry. Well done Ian!

A friendly reminder to keep an eye out for those making a real impact in our industry. If you know someone doing great things, be sure to nominate them for recognition in 2026. It's a valuable opportunity to celebrate their hard work and inspire others across the sector.

Looking ahead, the next few months are shaping up to be busy and exciting for RFUANZ. In October, several committee members will be heading across the ditch to attend Comms Connect Melbourne and the ARCIA Gala Dinner. We're eager to explore the latest industry trends and innovations in Australia. While the program is packed, there's always time for a good convo and we look forward to connecting with our Australian members and industry peers.

Closer to home, we're excited to launch the first of our RFUANZ Member Networking Evenings this November, with events scheduled in both Auckland and Christchurch. These relaxed bar gatherings are a great opportunity to share a pint, catch up with fellow members, and connect with local committee representatives. Stay tuned — we'll be sharing updates soon!

Whether it's in Melbourne, Auckland or Christchurch, we look forward to connecting.

Radio Frequency Users Association of New Zealand (RFUANZ)

STAND 64

Power supplies

Samlex Europe is a family-owned business which has been supplying high-quality (mobile) power supply products since 1991. The company has manufactured and distributed power supply products worldwide to more than 90 countries.

Samplex seeks to provide optimal service, with experienced employees who are able to offer tailored advice. Craftsmanship is also considered paramount and Samlex Europe has been ISO 9001-2015 certified since 2007 — a standard that demonstrates the company's commitment to quality management.

At Comms Connect 2025, Samlex will showcase its 19″ 1U rackmount DC-AC inverter for critical communication; its latest base station solution for the Kenwood NXR 17/1800E repeater/Hytera HR-655 repeater; and a 19″ 2U rack plate to convert the Samlex SECxxxxG power supply and Kenwood NXR 17/1800E repeater into a 19″ rackmount.

Samlex Europe

www.samlex.com

Smartphone app

TASSTA's T.Flex app turns any smartphone into a mobile command centre — delivering crystal-clear group calls, instant one-to-ones, real-time location tracking and secure data sharing. It is powered by the TASSTA Mission Critical Solution, the integrated ecosystem that connects teams, dispatch, management and infrastructure into one seamless network.

The app can be vital in facilitating responses to dangerous incidents where lives depend on timely communication. It connects people in a variety of ways, enabling instant voice and video calls over any network; GPS and indoor tracking for full visibility; lone worker protection and emergency alerts; and secure messaging, file sharing and task management.

The versatile and easy-to-use app is suitable for use by logistics specialists, security guards, firefighters and police officers, and more.

TASSTA GmbH

www.tassta.com

Smart Batteries and secure remote management of Communications Sites

In today's fast-paced digital world, critical communication sites such as emergency services, transport networks, utilities and regional/remote telecommunications require power systems that are not only highly reliable but also intelligent and secure. Lithium battery technology, particularly lithium iron phosphate ($LiFePO_4$), has rapidly become the preferred energy storage solution for these sites in recent years, offering unmatched reliability, and remote management capabilities.

Lithium Batteries: Reliable, Smart, and Maintenance-Free

Traditional lead-acid batteries have long served as the backbone of critical power systems, but they come with unfortunate drawbacks: ongoing hands-on maintenance, limited available information, reduced life in cyclic applications and vulnerability to environmental stress. Lithium batteries address these issues head-on:

- **High Reliability:** Lithium batteries maintain consistent performance across a wide temperature range, offer a significantly long service life and are not susceptible to many conditions that shorten the life of lead-acid batteries.
- **No Periodic Maintenance:** Unlike lead-acid systems, lithium batteries do not require site visits for maintenance such as thermal/equalization checks, reducing operational and technician costs.
- **Inbuilt Battery Management System (BMS):** Modern lithium batteries feature integrated BMS that continuously monitor voltage, temperature, and charge status. These systems operate 24/7, ensuring optimal performance and active battery management without human intervention.

Smart Monitoring and Remote Access

As infrastructure becomes increasingly connected, lithium batteries are now part of broader smart ecosystems. These batteries can transmit real-time data — such as health status, fault alerts, and predictive insights — directly to centralized platforms. This capability eliminates the need for costly technician dispatches to remote sites, improving operational efficiency and reducing downtime.

However, with increased connectivity comes the need for robust cybersecurity. Unsecured access to device data and site controls can expose critical infrastructure to malicious attacks or unauthorized manipulation.

Beyond Battery Control: The Eaton SC300

To address these challenges, operators are turning to comprehensive site controllers like the Eaton SC300. Far more than a traditional DC system controller, the SC300 is a full communications site controller capable of managing a wide array of infrastructure components:

- **Eaton Power Systems:** Controls and monitors Rectifiers, Solar chargers, Inverters, DCDC converters, lithium batteries, AC power meters and backup generators.
- **Environmental Systems:** Manages air conditioners, DC vent fans and temperature/humidity sensors to maintain optimal site conditions.
- **Security and Safety:** Monitors door access, smoke detectors, fire sensors, flood sensors and site monitoring devices.

This holistic approach allows operators to consolidate all site data into a single, secure platform — streamlining operations and enhancing situational awareness.

Cybersecurity: Certified, Not Claimed

In an era where cyber threats are increasingly sophisticated, it's not enough to simply label a device as "cybersecure." The SC300 is tested and verified by the Eaton Cybersecurity Centre of Excellence (COE) division. The testing process is independently verified to UL2900-1 and IEC 62443-4-1, two globally recognized cybersecurity standards. This testing validates the SC300's resilience against cyber threats and its ability to protect sensitive site data.

By using a single point of access through a trusted and verified device like the Eaton SC300, operators can ensure that only authorized personnel interact with site systems. This centralized model simplifies data management, enhances visibility, and fortifies the network against external threats.

Conclusion

Lithium iron phosphate batteries have transformed the way critical communications sites are powered and managed. Their reliability, safety, and smart monitoring capabilities make them ideal for modern infrastructure. When paired with a comprehensive and cybersecure site controller like the Eaton SC300, operators gain full visibility and control over their sites — from power and cooling to security and safety. In this new era of smart infrastructure, combining advanced battery technology with certified cybersecurity is not just beneficial — it's essential.

To learn more about Eaton's Industrial DC Power Systems, please visit Eaton.com/au/dc, or email us at EatonANZ@eaton.com

Written by Chris Barson, Product Manager Power Quality/DC Power Solutions

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Rethinking Radio:
How TooAir is Redefining Communication for a Mobile Australia

In an era where instant, reliable communication is essential for both business operations and everyday adventuring, an Australian tech firm is quietly transforming the two-way radio landscape.

TooAir, a Sydney-based specialist in Push-To-Talk over Cellular (PTToC) technology, is leading a shift away from traditional UHF and PMR systems. Leveraging the power of the mobile phone network, TooAir is making Australia-wide two-way voice communication more accessible, flexible, and powerful than ever before.

Founded by industry veterans with more than 60 years of combined experience, TooAir understands the persistent limitations of legacy radio systems — especially for mobile workforces, field operations, and vehicle fleets. Their approach addresses long-standing coverage, setup, and scalability challenges with a modern solution that's as practical as it is innovative.

At its core, PTToC technology enables real-time voice communication over the cellular network. The result? Exceptional in-building coverage, reliable communication in tunnels and basements, and national reach, all without the infrastructure or licensing requirements of conventional radio.

Now, TooAir is turning heads with the launch of its latest innovation: the **PoCkit Radio**. More than just a new device, the PoCkit represents a simplified, forward-thinking approach to how individuals and teams stay connected across vast distances.

One Device. Two Modes. Countless Possibilities.

What sets the PoCkit apart is its unique dual-mode configuration:

- **Private Fleet Mode** allows organisations to create secure, closed-group networks with up to three dedicated channels. Features such as Group Calling, Individual Calling, and Calling Name Display offer functionality familiar to users of PMR/LMR systems — without the technical complexity.
- **Community Band Radio (CBR) Mode** reimagines the classic CB radio for today's mobile world. With access to 200 open channels across the country, it empowers users to connect with others nationwide — ideal for 4x4 clubs, caravaners, bushwalkers, schools, and event organisers.

The PoCkit also simplifies deployment. Each unit includes **two years of prepaid airtime**, eliminating fleet setup, airtime management, and follow-up billing. Activation is as simple as scanning a QR code, making it equally attractive for resellers and end users.

"This is more than just a new product," says Peter Langbart, General Manager at TooAir. "The PoCkit represents a complete rethink of what two-way radio can be simple, flexible, and built for how Australians communicate today."

Compact Solutions for Modern Safety

Beyond the PoCkit, TooAir is also expanding into personal safety technology with the release of two new **Body Worn Cameras**.

One standout is the **TC-100 Badge Camera**, a discreet, lightweight device that doubles as a name badge, designed specifically for the retail and hospitality sectors. Weighing just 51 grams and offering up to 11 hours of continuous video and audio recording, the TC-100 provides both a deterrent against aggression and a reliable source of recorded evidence when needed.

Its minimalist design and magnetic or pin-on mounting options make it easy to wear without disrupting appearance or workflow, providing peace of mind for staff without compromising professionalism.

With solutions like the PoCkit Radio and TC-100 Badge Camera, TooAir is quietly leading the charge toward smarter, simpler, and more adaptable communication tools for the modern Australian landscape, whether on the job, on the road, or off the beaten track.

For more information, visit toooair.com.au or contact **info@toooair.com.au**.

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NETWORKS ON THE VERGE OF MAINSTREAM ADOPTION

SNS Telecom & IT

Private 5G networks are on the verge of mainstream adoption, with annual spending projected to reach US$5 billion by 2028, according to a new research report from SNS Telecom & IT.

Private LTE networks have been around for more than a decade, albeit as a niche segment of the wider cellular infrastructure segment. However, private cellular networks or NPNs (non-public networks) based on 3GPP-defined 5G specifications are just on the cusp of becoming a mainstream technology, with a market potential exceeding that of private LTE. Over the last 12 months, there has been a noticeable increase in production-grade deployments of private 5G networks by household names and industrial giants such as Airbus, Aker BP, Boliden, Coal India Limited (CIL), Equinor, Etihad, Ford, Hutchison Ports, Hyundai, Jaguar Land Rover, John Deere, LG Electronics, Lufthansa, Newmont, POSCO, Tesla, Toyota and Walmart, paving the way for Industry 4.0 and advanced application scenarios.

Compared to LTE technology, private 5G networks can address far more demanding performance requirements in terms of throughput, latency, reliability, availability and connection density. In particular, 5G's URLLC (ultra-reliable low-latency communications) and mMTC (massive machine-type communications) capabilities, along with a futureproof transition path to 6G networks in the 2030s, have positioned it as a viable alternative to physically wired connections for industrial-grade communications between machines, robots and control systems. Furthermore, 5G's wider coverage radius per radio node, scalability, determinism, security features and mobility support have stirred strong interest in its potential as a replacement for interference-prone unlicensed wireless technologies in Industrial IoT environments, where the number of connected sensors and other endpoints is expected to increase significantly over the coming years.

As end-user organisations in the United States, Canada, Germany, United Kingdom, France, China, Japan, South Korea, Taiwan, Australia, Brazil and other countries ramp up their digitisation and automation initiatives, private 5G installations have progressed to a stage where practical and tangible benefits — particularly efficiency gains, cost savings and worker safety — are becoming increasingly evident. For instance, Tesla, LG Electronics and Hyundai have eliminated connection-related stoppages since migrating AGV (automated guided vehicle) and AMR (autonomous mobile robot) communications from unlicensed Wi-Fi systems to private 5G networks at their production facilities in the United States and South Korea. The French city of Istres has reduced video surveillance camera installation costs from US$34,000 to less than US$6000 per unit by replacing fibre-based connections with a private 5G network. Among other examples, China Huaneng Group relies on a tri-band (700 MHz, 2.6 GHz and 4.9 GHz) 5G-Advanced network to safely coordinate a fleet of 100 unmanned electric mining trucks at its Yimin open pit coal mine in Inner Mongolia.

The report 'Private 5G Market: 2025 – 2030 – Opportunities, Challenges, Strategies & Forecasts' projects that annual investments in private 5G networks for vertical industries will grow at a CAGR of approximately 41% between 2025 and 2028, eventually surpassing US$5 billion by the end of 2028. Although much of this growth will initially be driven by highly localised 5G networks covering geographically limited areas for Industry 4.0 applications in manufacturing and process industries, sub-1 GHz wide area critical communications networks for public safety, utility and railway communications are anticipated to accelerate their transition from LTE, GSM-R and other legacy narrowband technologies to 5G towards the latter half of the forecast period. For more information, visit www.snstelecom.com/private5g.

Link Bonding:
Enhancing Connectivity and Resilience for Emergency Services

John Hopping, Director of Sales Engineering APAC, Enterprise Wireless Solutions at Ericsson

Link bonding, also known as link aggregation or WAN bonding, is a technology that combines multiple internet connections into a single, unified connection to increase bandwidth, improve application resiliency, and enhance overall network performance. This approach is especially beneficial for organisations requiring reliable and high-performance connectivity, such as emergency services.

Link bonding intelligently aggregates multiple wired or wireless links — such as LTE, 5G, broadband, Wi-Fi, and Satellite — into one logical connection. This aggregation allows data packets to be distributed across the combined links, effectively increasing throughput and providing redundancy. If one link experiences issues or goes down, the traffic automatically reroutes over the remaining active connections, ensuring continuous network availability.

Link bonding is especially useful for emergency services that may need to operate in areas with limited or unreliable connectivity options, making it particularly beneficial for emergency services field operations. Let's take a look at what Link bonding enables in more detail:

1. Enhanced Reliability and Resiliency: Emergency services require uninterrupted connectivity to coordinate responses and access critical information. Link bonding minimises downtime by providing seamless failover between multiple connections. If one link degrades or fails (e.g., a cellular tower goes down), traffic automatically shifts to other available links without dropping sessions or losing data. This seamless continuity is crucial during disasters when infrastructure may be compromised.

2. Increased Bandwidth: Combining multiple links boosts available bandwidth, enabling faster data transfer, improved video streaming, and better support for mission-critical applications like real-time video feeds and communication platforms.

3. Improved Application Performance: Intelligent bonding optimises traffic distribution based on application priority, ensuring that essential services receive the bandwidth they need without interruption. Load balancing in link bonding enables traffic to be distributed intelligently across all active links based on current performance and priority. Critical voice and alert messages get the highest priority, while less urgent data — like administrative uploads — uses remaining capacity.

4. Simplified Network Management: Modern link bonding solutions often include cloud-based management, providing centralised control and monitoring of all connections, which is crucial during emergency response scenarios. A single dashboard provides real-time visibility into link health, throughput and latency. Operations teams can set policies, adjust priorities and troubleshoot issues from a unified console.

5. Cost Efficiency: By leveraging a mix of connection types, including cost-effective wireless options, organisations can reduce reliance on expensive dedicated lines or singular satellite connections while maintaining high availability. By pooling available bandwidth from various networks, link bonding can achieve data rates far exceeding what any single link can provide. This is vital for transmitting high-definition video from incident scenes, real-time telemetry from drones or remote sensors, and large data files between command centres.

Ericsson Intelligent Link Bonding handles failover through intelligent traffic management that continuously monitors the health and status of each connection in the bonded link. If one connection fails or becomes unreliable, the bonding technology dynamically redirects all traffic away from the failed link to the remaining active links, ensuring uninterrupted connectivity. This failover process is seamless and automatic, providing organisations with high availability and resilience.

Ericsson offers Cradlepoint routers designed specifically for link bonding with multi-WAN capabilities and advanced software that manages link bonding in one of three ways:

1. Flow duplication for high resiliency

In this mode, identical packets are sent over two links at the same time. Even if a packet

iStock.com/Julia Gomina

is lost on one link due to a temporary signal drop, the packet on the other link gets through, ensuring the application remains connected. This is especially useful for critical and latency-sensitive applications like VoIP (Voice Over IP), where even momentary drops can degrade communication. While this may not seem bandwidth-efficient, it offers near-100% reliability for sensitive applications by eliminating the risk of packet loss due to network instability.

2. Flow balancing for cost savings

Flow balancing, on the other hand, is about distributing traffic flows across multiple links based on predefined weights or percentages. For instance, a branch office with both wired broadband and a cellular link might send 60% of traffic over the wired link and 40% over cellular. This optimises cost and performance, reserving the faster or cheaper link for the bulk of activity while ensuring redundancy. In mobile scenarios, the same principle applies — balancing between cellular providers or between cellular and satellite, based on defined policies.

3. Bandwidth aggregation for high bandwidth

Bandwidth aggregation is the mode most commonly associated with link bonding. It involves combining two or more WAN connections to increase the overall bandwidth available for large data transfers. In practice, this doesn't always result in a simple doubling of speed due to network overhead and router throughput limits, but it can significantly boost performance for large file uploads or real-time video uploads. For example, an emergency services vehicle can leverage bandwidth aggregation to upload large video files from a natural disaster site. With aggregated links, the vehicle can use multiple cellular connections to transmit footage back to the command centre faster and more reliably. Emergency services can equip vehicles and command centres with these multi-WAN bonding routers, combining LTE/5G cellular connections with satellite or wired broadband where available. This setup ensures continuous connectivity even if one or more links fail or become congested. Link bonding empowers emergency services organisations with robust, high-performance, and resilient networking capabilities that are critical during emergencies. By intelligently combining multiple connections, these organisations can ensure continuous communication, faster data access, and better overall operational efficiency.

ERICSSON

Ericsson Enterprise Wireless Solutions Australia Pty Ltd
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CASE STUDY

University hospital enhances security with integrated comms

Inrico, a global provider of push-to-talk over cellular (PoC) and converged communication technologies, has successfully deployed an advanced integrated communication solution at King Abdullah bin Abdulaziz University Hospital (KAAUH) in Saudi Arabia, significantly enhancing security coverage, emergency response and operational efficiency.

KAAUH, a 406-bed teaching hospital accredited by the Joint Commission International (JCI) and the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI), is known for its complex medical infrastructure. With eight interconnected buildings, underground laboratories and a rooftop helipad, the hospital's security demands are exceptionally high. However, its legacy communication system faced critical limitations — delayed emergency alerts, communication blind spots, lack of video capability and restrictions caused by spectrum licensing.

To address these challenges, Inrico deployed a fully integrated solution featuring the TM-9 mobile radio, T522A and T320 PoC terminals, along with a converged communication platform. The solution provides seamless coverage, real-time video communication and efficient patrol management across the entire hospital campus.

Seamless coverage with simplified deployment

Unlike traditional narrowband systems that require significant investment in repeaters, Inrico's PoC radios utilise public cellular networks and the hospital's existing Wi-Fi infrastructure. This plug-and-play architecture minimises deployment time and cost while achieving hospital-wide, blind-spot-free coverage.

The converged communication platform seamlessly integrates PoC radios with KAAUH's legacy narrowband system, ensuring compatibility and extending the life of existing assets. The solution also relieves pressure on spectrum licensing, enabling flexible and scalable system expansion.

At the core of the solution is the TM-9 mobile radio, installed in the hospital's security command centre and integrated with the existing video monitoring system. This central command hub enables real-time dispatch, resource coordination, and instant communication between units inside and outside the hospital.

With GPS-enabled T522A and T320 terminals, security personnel can be located and tracked in real time, allowing the nearest team to respond to incidents without delay. Historical route tracking also enables better scheduling and accountability.

Inrico's solution introduces real-time video calling capabilities, significantly improving situational awareness during emergencies. Security personnel can transmit live video, images and voice recordings directly from their terminals, equipping command staff with immediate visual context for critical decisions. This capability also supports post-event reviews, medical dispute resolution and criminal investigations, protecting the interests of hospital staff and patients alike.

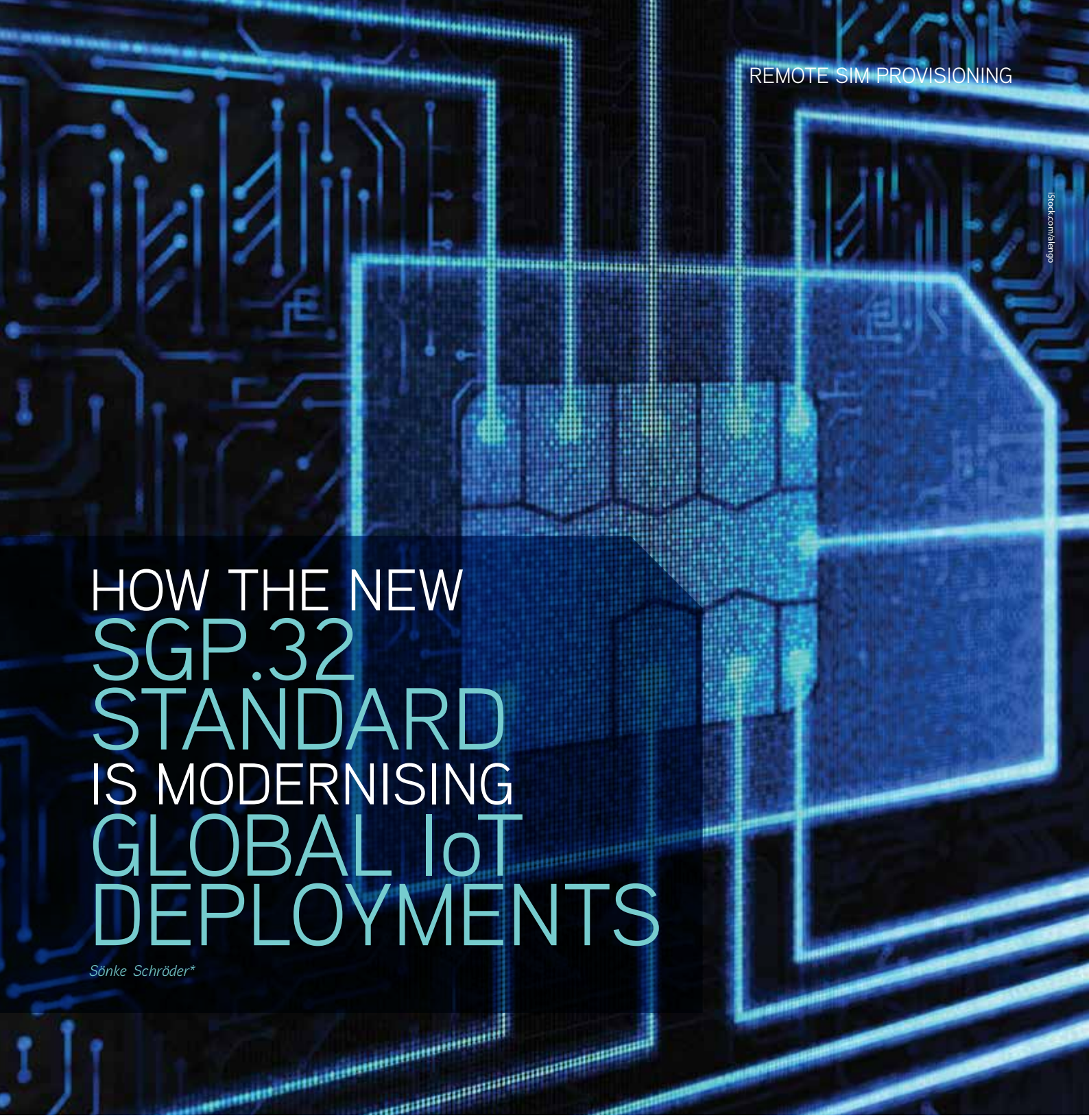
To support routine security operations, the T522A and T320 radios are equipped with NFC technology for digital patrol check-ins. Patrol data is automatically uploaded to the back-end system, enabling traceability and operational transparency.

The platform also streamlines work order management, enabling rapid assignment, progress tracking, and closed-loop handling of tasks such as equipment inspections, order maintenance and emergency interventions.

"Inrico's communication solution not only enabled us to achieve full coverage across the complex hospital but also elevated our emergency response speed to a whole new level," said a spokesperson from KAAUH's security team. "Whether during routine patrols or major incidents, the devices have consistently demonstrated stable and reliable performance — providing a solid guarantee for the hospital's safe operation."

Building on this successful deployment at KAAUH, Inrico continues to drive innovation across its product portfolio to support digital transformation in hospitals and other high-stakes environments around the world.

Inrico Technologies Co Ltd
www.inricosolutions.com



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HOW THE NEW SGP.32 STANDARD IS MODERNISING GLOBAL IoT DEPLOYMENTS

*Sönke Schröder**

With over 34 billion connected devices expected to be in operation worldwide by 2028[1], industries across the globe are facing mounting pressure to adopt streamlined, scalable connectivity strategies. The accelerating expansion of the Internet of Things (IoT) brings immense opportunity, but also significant logistical and technical complexity.

The Global System for Mobile Communications Association's (GSMA) new SGP.32 standard represents an exciting advancement in remote SIM provisioning (RSP), redefining how IoT devices are deployed and managed globally and paving the way for the next era of connected innovation.

Modernising remote SIM provisioning with SGP.32

SGP.32 marks a significant upgrade from its predecessor, SGP.02, shifting from SMS-based communication to IP-based protocols. This change not only brings faster and more secure provisioning but also delivers increased efficiency in device management across large-scale deployments. Furthermore, SGP.32 structurally aligns with the consumer-facing SGP.22 standard, offering a more unified and streamlined architecture across different device types. This alignment supports industry efforts to reduce fragmentation in connectivity solutions, enabling greater consistency across IoT ecosystems.

Industry readiness for this new standard is already evident, as the first embedded Universal Integrated Circuit Card (eUICC) products ›

compliant with SGP.32 have been certified under the GSMA's eUICC Security Assurance (eSA) scheme and eSIM Compliance program. This milestone follows the release of SGP.32 version 1.2 and its corresponding compliance and security specifications earlier this year.

These specifications were meticulously developed to ensure that eSIM IoT products are secure, interoperable and suitable for deployment across diverse mobile networks worldwide. The GSMA's enhanced compliance process has played a critical role in accelerating certification timelines, with some solutions achieving approval in under two months. This rapid certification capability is instrumental in helping organisations bring compliant IoT solutions to market more quickly.

Key value propositions of SGP.32 for global IoT

The benefits of adopting SGP.32 for global IoT deployments are numerous and far-reaching. One of the most immediate advantages lies in supply chain efficiency. Traditionally, deploying connected devices globally has required country-specific SIMs to be integrated during production — a process that introduces logistical challenges and inflates inventory complexity. With SGP.32, devices can automatically localise upon deployment, eliminating the need to pre-install region-specific SIMs. This capability reduces the number of stock-keeping units (SKUs) needed for different markets, simplifies inventory management, and can lower production costs by streamlining the bill of materials.

Additionally, SGP.32 helps organisations remain compliant with evolving regulatory requirements, particularly those involving permanent roaming restrictions. By enabling remote switching to local network profiles, businesses can maintain seamless device connectivity while adhering to regional regulations. This dynamic switching also enhances network resilience. As mobile network operators phase out legacy technologies like 2G and 3G, the ability to switch networks remotely ensures devices can maintain service continuity in the face of network sunsets or unexpected outages.

Cost control is another compelling advantage. Dynamic profile switching allows businesses to select network profiles that offer the best coverage and pricing, optimising connectivity costs based on regional market conditions. This flexibility contributes to a lower total cost of ownership and provides enterprises with greater control over their IoT budgets.

Moreover, SGP.32 introduces significant improvements in device management. Organisations can remotely provision and oversee millions of devices over the air, reducing the need for physical interaction and conserving operational resources. While switching profiles does consume energy — a consideration for battery-powered IoT devices — the SGP.32 standard was designed with power efficiency in mind. It incorporates protocols tailored to minimise the battery impact, enabling its use in energy-sensitive deployments without compromising device longevity.

> **THE BENEFITS OF ADOPTING SGP.32 FOR GLOBAL IoT DEPLOYMENTS ARE NUMEROUS AND FAR-REACHING.**

The standard's emphasis on interoperability and scalability positions it as a future-ready solution. SGP.32 promotes a high degree of compatibility across networks and vendors by using globally aligned protocols and components. This design enables enterprises to switch service providers or network operators without needing to replace existing hardware. The result is a flexible, vendor-agnostic connectivity model that empowers businesses to adapt to new requirements or market opportunities without incurring disruptive costs.

The industry impact

The relevance of SGP.32 is underscored when examined through the lens of specific industries. In the automotive sector, for instance, the ability to ensure seamless cross-border connectivity for telematics, emergency call systems and infotainment platforms is increasingly critical. SGP.32 supports continuous service as vehicles travel across regions, enhancing the driver experience and safety. In health care, where remote patient monitoring and connected medical devices play a vital role in delivering care beyond traditional clinical settings, the standard facilitates secure and reliable device connectivity, which is essential for the growth of telehealth services.

Utilities and smart metering applications also stand to benefit. SGP.32 allows companies to deploy millions of smart meters with the ability to receive updates and reconfiguration commands remotely. This over-the-air functionality reduces the need for technician visits and ensures devices remain current and operational. In transportation and logistics, the standard supports improved asset tracking and real-time shipment monitoring, which in turn enhances fleet management and reduces the risk of loss or delay. Industrial IoT use cases, such as automated production lines and real-time monitoring of equipment, also gain from the increased reliability and control enabled by SGP.32, helping to ensure optimal uptime and performance in mission-critical environments.

Preparing for SGP.32 implementation

To successfully implement SGP.32, organisations must understand and prepare the necessary technical components. These include the eUICC, which stores and switches connectivity profiles; the Subscription Manager Data Preparation Plus (SM-DP+), responsible for securely delivering profiles to the device; and the Subscription Manager Discovery Server (SM-DS), which helps devices locate the appropriate SM-DP+. Bridging these elements are the IP addressing components (IPAe and IPAd), which facilitate secure communications between the eUICC and external infrastructure. The IoT Remote Manager (eIM) oversees the full life cycle of device connectivity, from provisioning through to retirement.

Global interoperability remains a key consideration for any IoT deployment. SGP.32 supports integration with over 600 mobile networks in more than 185 countries, ensuring that connected devices can operate reliably in virtually any region. This global reach, combined with the technical robustness and flexibility of the standard, positions SGP.32 as a key enabler for the next phase of IoT evolution.

As the number of connected devices continues to rise, the ability to efficiently and securely manage these connections at scale becomes increasingly important. With its focus on flexibility, interoperability and cost efficiency, SGP.32 empowers enterprises to navigate complex connectivity environments with greater confidence.

**Sönke Schröder is the Director of Global Go-To-Market Connectivity & IoT Innovation at Giesecke+Devrient (G+D), a global SecurityTech company that recently became the first company to have IoT eUICC products certified as part of the GSMA's eUICC security assurance (eSA) scheme and achieve GSMA eSIM compliance.*

1. https://www.gsmaintelligence.com/research/iot-connections-forecast-to-2030

LiNET4835: Redefining Energy Storage for Telecommunications

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In today's fast-paced telecommunications industry, reliable and high-capacity energy storage is critical. Traditional lead-acid batteries, once the standard for backup power, are now being outperformed by advanced lithium technologies that offer superior efficiency and longevity.

PowerPlus Energy's LiNET4835, a cutting-edge lithium iron phosphate ($LiFePO_4$) battery, is a game-changer, providing an innovative alternative designed to meet the evolving demands of modern telecom infrastructure.

More Power in the Same Space

The LiNET4835 is engineered to replace front-terminal lead-acid batteries, offering a substantial increase in capacity. With a usable 200Ah, it delivers more than 250% additional power compared to a 120Ah lead-acid battery string, without increasing the physical footprint. This means telecom sites can achieve higher energy availability while optimising rack space.

Efficiency, Longevity, and Cost Savings

Unlike traditional lead-acid batteries, the LiNET4835 leverages $LiFePO_4$ chemistry, which offers high charge/discharge efficiency and minimal energy loss. Its significantly longer lifespan reduces the frequency of battery replacements, cutting down maintenance costs and operational disruptions. Over time, these efficiencies translate into substantial financial and logistical advantages.

Seamless Integration and Scalability

Designed for easy deployment, the LiNET4835 aligns with standard telecom racks, making installation straightforward with minimal infrastructure adjustments. Additionally, its modular design enables seamless scalability, allowing operators to expand their backup power capabilities as network demands grow.

Enhanced Safety and Sustainability

Safety is a major advantage of $LiFePO_4$ technology, known for its superior thermal and chemical stability. The LiNET4835 minimises the risk of overheating or thermal runaway, ensuring reliable operation in mission-critical environments. Moreover, its environmentally friendly composition — free from toxic heavy metals — supports sustainability efforts, making it a responsible choice for telecom operators looking to reduce their ecological footprint.

A Smart Investment for the Future

The LiNET4835 is more than just a battery; it represents a forward-thinking approach to energy resilience. With greater capacity, efficiency, and safety, it provides telecom networks with a dependable power solution that meets the demands of an increasingly connected world. By investing in this advanced energy storage technology, telecom operators can enhance reliability, optimise costs, and contribute to a more sustainable future. LiNET4835 is made in Australia, by Australians, and sold through Australia's most trusted RF supplier — RFI Technology Solutions.

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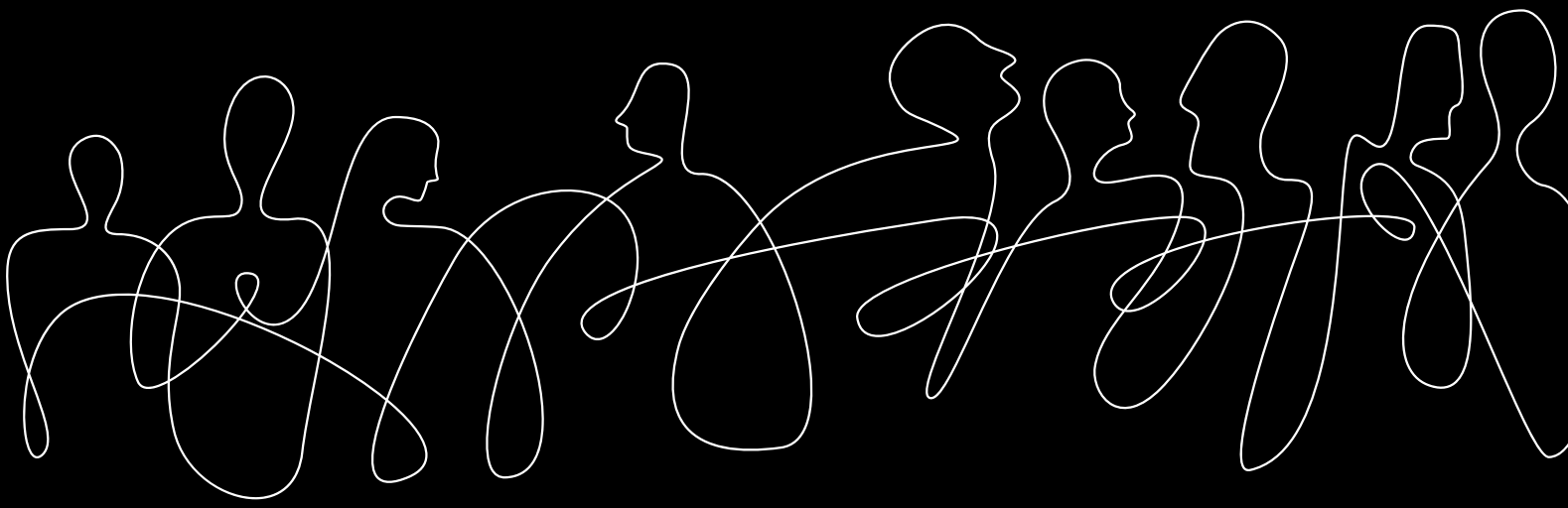

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CASE STUDY

Remote monitoring in remote environments: overcoming challenges

Image: Supplied

For power grids, water supply networks and many industrial facilities, managing infrastructure in remote locations is a significant challenge as it is virtually impossible to maintain regular in-person oversight. The answer lies in remote monitoring — but it is important that any instrumentation used for this is right for the environment it is deployed in, or efforts will be wasted.

Remote locations pose unique challenges for monitoring equipment for several key reasons. First, they are often exposed to harsh environments, such as heat, moisture, dust and electrical storms, all of which can damage electrical equipment. This is made worse as maintenance capabilities are often limited, and getting a technician out to look at the equipment is logistically challenging because of the locations, time and costs involved.

Furthermore, there is generally no access to mains electricity in these environments, so systems typically run on batteries or, where possible, solar. This means that energy management must be considered to maintain system availability, including replacement batteries so they can be replaced before outages cause downtime.

Finally, maintaining reliable data links and system connectivity is particularly challenging. Cell signals are often unavailable in remote locations and accessing them using traditional wired infrastructure is impractical due to the prohibitive installation costs. The only real options in these scenarios are radio and satellite.

Underlying all these obstacles is a broader challenge of system longevity. Many industrial monitoring products come with a baked-in obsolescence cycle that forces system replacements every decade, sometimes sooner.

For installations in remote and dangerous locations, this is not practical, as sending engineers out to regularly replace equipment presents all the same challenges as in-person monitoring and equipment maintenance in terms of cost and risk. For these systems, remote monitoring equipment should ideally maintain full serviceability and compatibility for decades to minimise the need to dispatch engineers and technicians.

In the early 1990s, South African electricity supply authority Eskom was struggling to cope with the challenges of managing remote installations, such as 11 and 22 kV distribution lines running through some of the country's most remote terrain. During storms, lightning strikes and falling tree branches regularly tripped the lines' auto-reclosers and sectionalisers, causing service outages.

Restoring service required engineers to travel long distances, often in the middle of the night and in treacherous conditions, to investigate faults and manually reset devices. Fault reporting was often delayed too as many of the regions had poor telecommunications infrastructure.

To overcome these challenges, Eskom engaged Omniflex to provide it with remote monitoring instrumentation that could be used to monitor installations from a centralised control room 24/7, with Omniflex providing a solution in the form of pole-mounted Maxiflex remote terminal units (RTUs). Maxiflex is a modular product that can be configured to suit a wide range of applications and its hot-swappable I/O modules enable maintenance without powering down the system, minimising any associated downtime.

The pole-mounted RTUs were mounted directly on powerline poles alongside switching devices and interfaced to a central control centre over unlicensed radio bands for secure 24/7 monitoring. This solution allowed operators to receive real-time fault alerts and enabled them to remotely isolate line sections or reset devices without dispatching engineers.

The Eskom project was one of the first projects where the Maxiflex product was deployed and, since then, it has gone on to be used across a wide variety of critical infrastructure applications worldwide. These include radiation monitoring at most UK nuclear sites, utility metering, real-time sequence of events monitoring, and alarm annunciation projects in industries including nuclear, petrochemical, and oil and gas.

Omniflex (Australia) Pty Ltd

www.omniflex.com.au

Satellite PTT radios

The IC-SAT100 and IC-SAT100M provide wide-area global coverage over the Iridium satellite network, enabling real-time, low-latency communication.

Unlike traditional satellite phones that support only one-to-one calls, Icom's satellite PTT radios enable users to instantly communicate with all members in the same talkgroup — at the push of a button.

Built for tough conditions, the IC-SAT100 series features IP67-rated waterproof and dust-tight protection, built-in Bluetooth, AES 256-bit encryption for secure communication, and loud 1500 mW audio output. No licence or special qualifications are required to operate.

With the VE-PG4 RoIP interoperability gateway, the series integrates seamlessly into existing systems — including IP networks, LTE radios, IDAS digital and analog radios.

Designed for mission-critical communication, emergency response, business continuity planning (BCP), disaster recovery, and remote fieldwork where cellular or landline networks are unavailable, Icom's satellite PTT radios provide a stable, independent backup solution when terrestrial infrastructure is compromised by natural disasters.

Icom Australia Pty Ltd

www.icom.net.au

STRENGTHENING DISASTER PREPAREDNESS THROUGH THE CONNECTIVITY INNOVATION NETWORK

Lauren Davis

Several new research projects, developed through the Connectivity Innovation Network (CIN), are paving the way for first-of-their-kind technologies that aim to strengthen disaster preparedness, improve power resilience and secure critical communications across NSW.

CIN was co-established by NSW Telco Authority and the Office of the NSW Chief Scientist & Engineer in 2021 to accelerate technology development for emergency services, government and communities. At a Stage 1 Showcase event held at the University of Technology Sydney (UTS) in August, attendees heard about some of CIN's proof-of-concept projects, which are a collaborative effort between researchers, industry experts and government agencies to tackle some of the state's most complex connectivity challenges.

"These technologies are not just research concepts — they are practical, first-of-their-kind solutions designed to help emergency services respond faster and keep communities safe," said CIN Director Dr Ian Oppermann.

"From real-time disaster sensing to platforms that improve power and network resilience, these projects show how research and collaboration can deliver tangible benefits for NSW."

Sensing for disasters

CIN's Sensing for Disasters Solutions initiative, delivered in collaboration with the NSW Smart Sensing Network (NSSN), emerged from the discussions and outcomes of the inaugural Regional Connectivity Symposium held in Lismore in September 2023. Following a call for proposals, CIN awarded three sensing projects designed to enhance early detection of floods and bushfires, addressing the drawbacks of current sensing technologies — such as weather radar, water gauges and satellite imaging — which require substantial investment and regular maintenance, and prove insufficient when rapid response and precision are required (as demonstrated during the Lismore floods and similar crises).

The first of these projects, helmed by Professor Jinhong Yuan from UNSW Sydney, applies a new integrated sensing and communication (ISAC) technique for environment and disaster monitoring. The project seeks to make use of existing wireless communication infrastructure by deploying a UNSW-developed waveform, dubbed orthogonal delay-Doppler division multiplexing (ODDM) modulation, which has been demonstrated to enable simultaneous communications and sensing in real time. What's more, it can achieve both using the same infrastructure — using shared radio frequency hardware, spectrum and signal processing — and it may reduce interference compared to standard techniques.

The second project covers geospatial sensing, and is being led by Dr Wanchun Liu from The University of Sydney. Liu explained that, with NSW under seemingly constant threat of floods and bushfires, we need to be able to estimate when disasters are coming — through nowcasting, or short-term forecasting for early warnings and evacuations. The problem is that existing sensor coverage is uneven, plus sensors can be faulty, prone to malfunction, and damaged in the very disasters that they are designed to predict.


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The solution, according to Liu, is to combine meteorological data, remote sensing data and terrain data, and to feed this data into AI in order for it to predict an impending disaster. The AI could even be trained with data sourced from disasters in different regions, Liu noted, bearing in mind that these may share common physics but differ in drivers. For example, if AI compares fires in California and NSW, it can be taught to pick up on those drivers that may be comparable and to combine these with its knowledge of general physics. The result, theoretically, is a comprehensive data fabric for bushfire and flood protection.

The third project is the development of a real-time, wireless rain gauge, led by Dr Kai Wu from UTS. Wu noted that accurate, real-time rainfall sensing is essential for early warning and management of flash flooding, but current rainfall sensors have certain drawbacks — including maintenance requirements, subjectivity to wear and tear, environmental degradation, and reduced responsiveness during flash floods. Wu's team has thus proposed a standalone sensor that uses wireless downlink signals from mobile networks, in combination with machine learning algorithms, to estimate rainfall intensity in real time.

The proposed sensor will be plug and play, Wu said, meaning it could be rapidly deployed across existing mobile coverage areas with no installation or alignment needed. Its use of ambient wireless signals means there will be no moving or exposed parts, making it inherently robust to environmental wear. Importantly, the sensor's use of continuous signal analysis will enable real-time rainfall estimation with a high level of accuracy, rather than being accumulation-based. Wu's team is currently working on a prototype based around the Raspberry Pi single-board computer, with software and firmware development well underway.

Power resilience

CIN's Power Resilience Platform is designed to enhance the resilience of the NSW Telco Authority's Public Safety Network (PSN) — a critical communications system used by frontline emergency services, government agencies and essential services across NSW. The initiative aims to improve the resilience of network infrastructure during disasters, by providing real-time monitoring of the power supply at individual sites, predictive analytics for potential disruptions and proactive measures to maintain network functionality. It is being developed in direct response to priorities raised by participants across the energy, telco and emergency services sectors at CIN's Power Resilience Symposium in early 2023.

So how can we improve the resilience of telecommunication systems during emergencies? While disasters can obviously lead to power or telecom outages, UTS's Associate Professor Wenjing Jia explained that drones can be deployed in advance to map every part of a network, as well as the surrounding terrain, to feed into a digital twin. This digital twin can be shared with all relevant agencies, who can use its clear visuals to track and even predict any outages, allowing for battery back-up planning if needed.

For his part of the project, Dr Vinh Bui from Southern Cross University is developing an integrated platform for sharing multimodal data of NSW power infrastructure, by leveraging drone imagery, AI-based analysis, mixed reality and secure data sharing. The platform is expected to support proactive maintenance through situational awareness and historical trends, and will also be trained in anomaly detection when it comes to towers and hazards; by teaching the system what 'normal' looks like, it will be able to identify what is abnormal. A pilot study has already been conducted in South Gundurimba, NSW, with the research team now seeking to expand testing across diverse geographic and weather conditions.

But what happens if a base station is disabled during a disaster? This is particularly a problem in remote areas, said Dr Fenghui Ren from the University of Wollongong, as it makes it difficult for rescue and repair workers in these areas to gain real-time disaster information — including information on the state of the base stations themselves. Ren noted that traditional manual dispatch struggles with rapidly changing conditions, variable resource availability and shifting task priorities; there is therefore a need for an automated dispatch system to serve as an alternative. Ren proposed the use of software agents, claiming they are capable of reasoning, decision-making and learning individually or collaboratively in order to achieve their goals — all without human intervention. Such agents would theoretically be able to adapt dynamically to evolving conditions, changing their plans based on real-time updates and thus accelerating emergency response efforts, according to Ren.

Conclusion

The Stage 1 Showcase served as something of a halfway milestone for these projects, with final outcomes expected by the end of 2025. The event marked the second wave of innovations funded through CIN, with NSW Telco Authority Managing Director Kylie De Courteney saying the projects are demonstrative of ongoing connectivity innovation.

"Connectivity is a basic need, and reliable and secure networks help save lives," De Courteney said.

"By investing in pioneering proof-of-concept research, we're ensuring NSW remains at the forefront of innovation that strengthens our state's communications infrastructure and disaster preparedness."

Connectivity Innovation Network COO Genie Tan will be speaking about CIN's work at Comms Connect Melbourne on 15 October in her presentation 'Developing technically innovative solutions for public safety and disaster resilience'.

The true cost of connectivity: why lifetime value trumps initial acquisition

In the professional communications sector, the conversation around hardware often defaults to one metric: price. The initial acquisition cost is easy to quantify and compare, understandably making it a primary factor in purchasing decisions. However, this narrow focus can be a costly error. For mission-critical applications, from public safety to smart infrastructure, the true measure of a component's worth is not what it costs upfront, but the value it delivers over its intended operational life.

This is the central tenet of a customer-centric design philosophy. It recognises that a component is not just a one-time purchase, but a long-term investment that must perform reliably under real-world conditions. This extends beyond the technical specifications on a data sheet to consider the complete, real-world ecosystem in which the product will operate.

Beyond the spec sheet: the power of holistic design

Effective professional-grade components, particularly antennas, are about more than form and function; they represent a delicate balance of engineering constraints and operational realities. While physics dictates that a larger form factor will typically perform better, the practical reality of installation — whether on a police vehicle, a utility meter or an EV charger — demands a careful balance of factors. This is where holistic design comes into play. It is about meeting explicit performance requirements (eg, specific frequencies, gain) while also addressing implicit needs.

These implicit needs are the unspoken demands of the customer and the environment. They include sympathetic aesthetic integration, ease of installation, and long-term durability. A well-designed product will reduce the need for multiple components, simplify installation and eliminate the risk of damage to a vehicle or enclosure. This nuanced attention to detail significantly reduces antenna installation costs, safeguards the value of the vehicle or system it's mounted to and enhances overall system integrity.

The compounding costs of 'cheap'

The allure of a lower-priced product is undeniable, but it often conceals a series of hidden costs that accumulate over time. A cheaper component may save a few dollars initially, but premature failure or performance shortcomings leads to catastrophic downtime, a loss of service, compromised safety or missed revenue. The cost of a technician's visit, the price of a replacement unit, and the potential for a complete system failure far outweigh these initial savings.

A value-focused design, in contrast, prioritises longevity and reliability. This approach considers thoughtful material selection and robust construction methods. For example, using custom seals to prevent water ingress and secure, screw-mounted housings instead of flimsy plastic clips can mean the difference between an antenna that lasts for months and one that lasts for the lifetime of the vehicle it is installed on. These design choices will marginally increase the initial cost, but prevent future problems like UV degradation, damage from high-pressure washing, or failure in extreme weather, ultimately protecting the customer's investment and providing a more cost-effective solution.

A partnership for innovation

A truly value-driven philosophy is built on a foundation of customer partnership. This is not a one-way street where a company simply sells a product. Instead, it is a collaborative process where feedback from the field is actively sought and incorporated into the design cycle. Engineers and designers must listen to the field technicians and system operators who work with the products every day. Their real-world insights into performance, durability and ease of use are invaluable. This continuous feedback loop ensures that products are always evolving to meet the unarticulated needs of the market, addressing challenges before they become critical failures.

In a world where connectivity is no longer a luxury but a fundamental necessity, the components that power these systems must be held to a higher standard. Shifting the focus from the price tag to the total lifetime value ensures that our investments in professional communication equipment are not just transactions, but foundations for long-term operational success and reliability.

Jan Jesman is Technical Director of Panorama Antennas, responsible for the technical, strategic marketing and commercial legal services within the Panorama Antennas Group. Jan holds Bachelor's degrees in Philosophy and Theology from Bristol University and Law from The University of Law, and co-founded a new-media and e-commerce company before joining Panorama Antennas.

Panorama Antennas will be exhibiting at Comms Connect Melbourne from 15–16 October on Stand 3.

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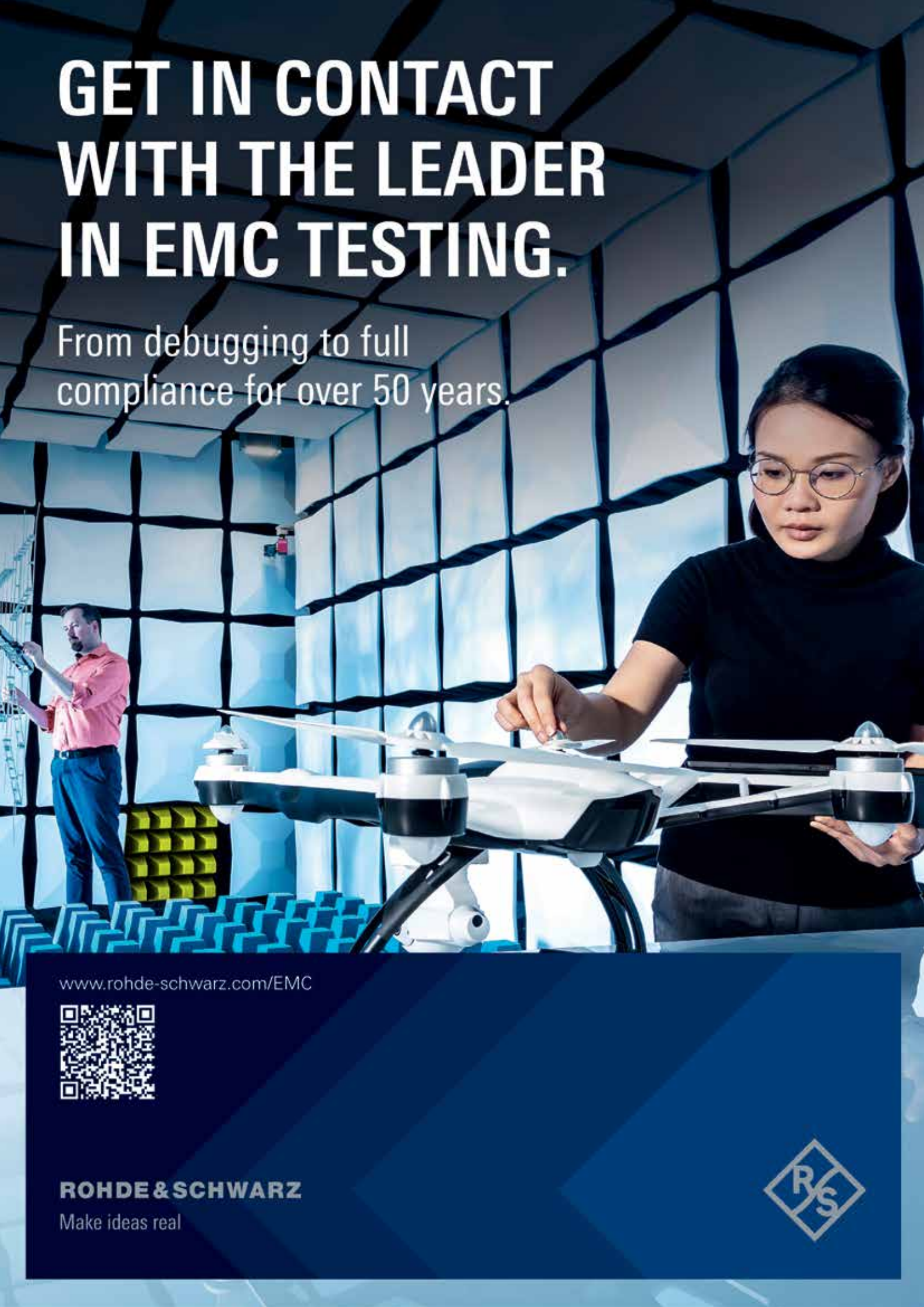
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