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Inside

November/December 2023

INSIGHT LEADERS

FEATURES

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READ ONLINE! *This issue is available to read and download at* www.criticalcomms.com.au/magazine

Do you read me?

I'm writing this comment the day after the Optus network outage, which saw Optus mobile, internet and landline phone services around the country go down for several hours, directly impacting at least 10 million customers and 400,000 businesses. Described by South Australian Premier Peter Malinauskas as the single biggest telecommunications outage Australia has ever seen, it was a stark reminder of how dependent we are on telco providers for our everyday communication needs, and how significantly we are affected when things go wrong.

The outage was first noticed by Optus on 8 November at around 4 am AEDT, with the company swiftly beginning work testing a number of possible hypotheses to identify and resolve the issue — but without much success. It was only late in the morning that services began being sporadically restored — a mammoth task that would continue throughout the day and into the evening — with Optus CEO Kelly Bayer Rosmarin eventually putting the blame on "technical network issues"; at the time of writing, investigations into these issues are still ongoing.

While most Optus mobiles were still able to make calls to Triple Zero during the outage, thanks to the ability to 'camp' on other carriers' networks, there was discussion about whether consumers should be automatically moved onto other networks even outside of Triple Zero scenarios. In response to this, Minister for Communications Michelle Rowland acknowledged the ACCC's recent report examining the possibility of emergency roaming during natural disasters, which found that further work is needed to design and develop this capability but that it is technically feasible (see our news story on page 10). With a post-incident review into the outage having now been announced, we can but wonder if the event will spur the government to accelerate a roaming capability, or even to extend it to non-emergency scenarios.

Of course, the ideal situation would be to not be reliant on camping or roaming, and instead to have communications networks that are more resilient to outages in the first place. This certainly seemed to be the consensus at Comms Connect Melbourne, where presenters emphasised the importance of communications infrastructure that is robust enough to withstand natural disasters, challenging geography and more; Cheryl Giggetts, one of our speakers from the USA, is featured on this issue's cover. She is joined on the cover by several comms industry thought leaders, who have provided their perspective on some of the big issues facing the industry as we head into 2024.

Lauren Davis, Editor
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Calendar

December

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

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

January

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

February

MWC Barcelona 2024
26–26 February 2024
Fira Gran Via, Spain
https://www.mwcbarcelona.com/

March

BAPCO 2024
6–7 March 2024
Coventry Building Society Arena, UK
https://www.bapco-show.co.uk/

ARCIA One-Day Conference and WA State Networking Dinner
14 March 2024
Aloft Perth Hotel
https://arcia.org.au/events/one-day-conference-perth-14-march-2024/

SATELLITE 2024
18–21 March 2024
Walter E. Washington Convention Center, USA
https://www.satshow.com/

IWCE 2024
25–28 March 2024
Orange County Convention Center, Florida, USA
https://iwceexpo.com/

April

Disasters Expo Asia
3–4 April 2024
Singapore Expo, Singapore
https://www.disasterexpoasia.com/

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

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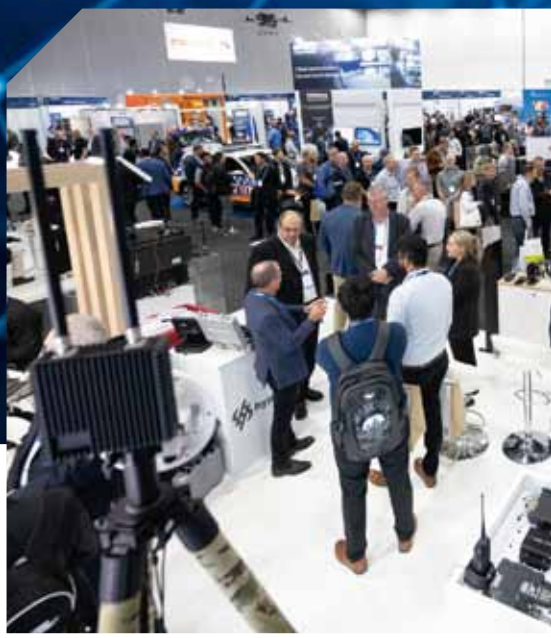
COMMS CONNECT MELBOURNE 2023: CONFERENCE HIGHLIGHTS

Lauren Davis

The Southern Hemisphere's premier critical communications event, Comms Connect, returned to Melbourne last month with a two-day conference and exhibition on 18–19 October, plus preconference workshops from ARCIA and the ACCF on 17 October. The event felt very timely given recent milestones, including the launch of the Australian Public Safety Mobile Broadband (PSMB) Taskforce, the Tasmanian Government Radio Network (TasGRN) and the first service delivered on New Zealand's Public Safety Network (PSN), all of which were discussed in depth at the show.



Attendance was also particularly strong this year, with more visitors on day one than any previous day in the history of the event and more expo-only attendees than at any previous event. This contributed to a buzzing expo floor throughout the two days, as well as good turnouts across all three of the conference streams.

Public Safety Mobile Broadband

Several presentations were based around the journey towards an Australian PSMB capability, with the conference taking place just weeks after the federal government established a PSMB Taskforce to help lay the groundwork for Australia's long-term public safety communications infrastructure. Kylie De Courteney, the Managing Director of the NSW Telco Authority, said she was thankful for the creation of the taskforce, but also that the Authority would be continuing its own work to narrow the digital divide — including by conducting technology tests in its 5G innovation lab; by making constant improvements to the NSW Public Safety Network (PSN), which it runs; and by rolling out broadband deployables including cell-on-wheels (COWs) and vehicle-as-a-node (VaaN) devices in situations where they are needed (see page 9). The Authority is also keen to share any data with other bodies around the country, to assist those without the resources to conduct their own tests.

So other states may be able to learn from the NSW Telco Authority, but what can Australia learn from other countries with PSMB? Perhaps the most well-known example of PSMB is the USA's FirstNet network, led by Executive Director Joe Wassel, which seeks to provide the best possible capability for first responders across the United States and its associated territories. According to Wassel, the "secret sauce" to the program's success is its use of dedicated spectrum, with the US Government setting aside Band 14 spectrum specifically for public safety, serving as a sort of VIP lane that is available only to first responders on FirstNet. FirstNet has also begun rolling out 5G connectivity, which it will use in tandem with LTE.

But is dedicated spectrum truly essential for PSMB? James Pickens, CTO of the NSW Telco Authority, argued that it is possible to have PSMB without dedicated spectrum, so long as there is support from the major carriers. Jason Johur, Broadband Industry Group Chair of TCCA, agreed that spectrum does not need to be dedicated so long as the commercial PSMB carrier has sufficient assets that can be allocated. Phil Crnko, Director of Engineering at PSBN Innovation Alliance Canada, noted that Canada uses a hybrid model — both dedicated and open access — and is also planning non-terrestrial networks (NTN) as a backup. Hypha CEO Neil Jamieson said he can't imagine Australian terrestrial networks being sufficient on their own in the face of natural disasters, with Pickens agreeing that future PSMB should include low Earth orbit (LEO) satellite connectivity.

Satellite and other infrastructure-free comms

As explained by Peter Scarlata, CEO of Simoco Australia, part of the reason that Australia will need infrastructure-free solutions such as LEO satellites, as well as mesh networks and radio over LTE, is the fact that it is simply not financially viable to install physical infrastructure in the country's most isolated areas — particularly when such

infrastructure could easily be destroyed by natural disasters. Ashley Hunter, an Intelligent Network Automation Executive at Telstra, remarked that Western Australia recently announced world-first plans to integrate LEO satellite technology into the police communications network — only a quarter of the state currently has mobile coverage, he noted — with WA Police's Brett Pearson confirming that Starlink has performed well in recent satellite technology trials, including during April's Total Solar Eclipse event in the coastal town of Exmouth (see page 12).

Cheryl Giggetts spoke on the future of P25.

Scarlata explained that LEO satellites offer coverage in non-existent signal areas, broadband capability and easy accessibility, with infrastructure-free solutions in general being cheaper to install with lower power costs, no site rental costs, no backhaul costs and no spectrum costs — though there are higher operational and maintenance costs. Hunter went so far as to claim that we can expect LEO direct-to-handset services around 2024–25 — a prediction that ended up being surprisingly accurate, with Starlink announcing just days after the conference its plan to roll out Direct to Cell text services in 2024, followed by voice, data and IoT connectivity in 2025.

Daniel Field, MD of startup company Skysite, meanwhile spoke of the emerging field of HAPS, or high-altitude platform stations, designed to provide observation or communication services from the stratosphere. He said the stratosphere provides new opportunities for aircraft without needing to send them into LEO or higher, although there are challenges to overcome: the air is very thin and very cold, so any aircraft would have to be lightweight and could not be made of conventional materials. The field is, however, currently ripe for R&D and entry-level testing, Field said, with recent developments in balloon-type, fixed-wing and airship HAPS — each of which has its advantages and disadvantages — from companies such as Skysite. Indeed, he said the Korea Aerospace Research Institute (KARI) developed its own fixed-wing HAPS as a research project 10 years ago and has recently resurrected it due to burgeoning commercial interest, indicating that a wider rollout of this technology could be closer than we think.

Where to with P25?

As critical comms technology continues to evolve, with the move into 5G and even 6G, there is the question of whether older standards such as P25 will continue to be relevant. Cheryl Giggetts, from the Project 25 Technology Interest Group, acknowledged that P25 equipment can be high in cost, but said it has the advantage of being proven to work — so you know what you're getting, regardless of which vendor or device you use — and that the standard is being continually adapted to meet the changing technology ecosystem, with new capabilities including security updates, GPS location and user IDs.

Indeed, P25 is key to the newly launched TasGRN — a partnership between eight organisations comprising over 7500 users — with Tim Rutherford from Tasmania's Department of Police, Fire & Emergency Management saying the LMR network, which doubled the state's radio coverage, was designed to be the "last network standing". But the network also contains several useful features, noted Inspector Nikala Parsons, such as status messaging, an emergency/duress button, location services and, most significantly, encryption — enabling the police to catch more criminals.

Dylan Earle, Business Solutions Manager at Tait Communications, said the resilience of LMR has very much been demonstrated in New Zealand, with the network staying up even in the face of cyclones and floods. He concluded that we should expect P25 to be around for a long time yet — as it is reliable, robust and mission critical — and that we should ultimately aim for an interoperable network that accommodates P25 as well as other tools and standards. No doubt the discussion will continue when Comms Connect returns in 2024 — with events currently planned for New Zealand in June and Melbourne in October — so keep an eye out for updates at https://www.comms-connect.com.au.

WHEN TRANS-TASMAN CRITICAL COMMS AGENCIES COLLABORATE

*Andrew Hooker**

As agencies on both sides of the Tasman lead the drive to deliver critical communications for public safety in our countries, collective learning is one of our greatest assets. That was a key takeaway for me attending October's Comms Connect in Melbourne, representing Next Generation Critical Communications (NGCC) Aotearoa New Zealand.

It was an inspiring and collegial event that highlighted how us agencies involved in building 'once in a generation' replacement critical communications networks are tackling many of the same challenges — and that networking is key to accelerating delivery of communications services that save lives.

We all have a strong willingness and drive to get these critical public safety networks solutions in place. Talking to my colleagues across Australia reinforced the fact that building these networks is hard, including because it is not a BAU practice for many of our network suppliers to build large — in New Zealand's case, national — networks across complex geographies. Finding out from others what's worked or not is key and immensely beneficial.

For example, Tasmania is getting good results thanks to bringing utility providers into their radio network project as founding partners. This assists with both site acquisition and the all-important access to power — which are the most challenging things to get in place. Indeed, getting a site acquisition team in as early as possible and front-footing the design is standard for mobile network operators, to help avoid delays down the track.

It was great for NGCC to be able to share our experience of getting our new national Public Safety Network cellular roaming service live in July this year on schedule and budget.

What was our approach and what can others learn? Well, we took a simple route but one that asked for — and received — great collaboration from our national commercial cellular providers. Rather than building a new cellular core network, our Public Safety Network uses the existing Spark and One NZ cellular RAN and CORE infrastructure, improving coverage reliability and resilience through a multi-network solution.

This required the creation of Hourua, a joint venture between our two major cellular carriers, and a single SIM, to provide access to both of their networks for the emergency services. Next year, NGCC will launch a quality, priority and pre-emption (QPP) cellular service which will mean emergency communications take priority over other mobile users on cellular networks when the networks are congested or degraded.

Comms Connect also provides an inspiring opportunity to see new communications capabilities becoming available to the sector, such as private LTE and drones, which have been used by other industries but are now coming onboard for our work. Capability such as the 3GPP MCX InterWorking Function (IWF) is now becoming mainstream to enable mission-critical push-to-talk services over LTE, providing seamless interconnectivity across land, mobile and cellular networks. It's great to see this new capability being offered by vendors as we think about evolving to meet the changing needs of emergency responder organisations.

I was excited to see the NSW Telco Authority has implemented a tool for what I would call 'unified network visibility'. By combining cellular coverage with LMR coverage, the Authority can show a unified view of available communication services. This provides a great capability for multiple agencies at major incidents, supporting planning ahead of dispatching emergency teams.

Ultimately, this is an exciting and transformational time harnessing technologies to save lives and help keep responders safe. Comms Connect highlighted that with the collective nature of our work and our challenges, keeping up communications will ensure we're not reinventing the wheel and are learning from each other for the good of our emergency services and, ultimately, our communities.

Andrew Hooker is Chief Technical Director at Next Generation Critical Communications Poutama Whai Tikanga Pāpāho, New Zealand.

NSW BUDGET INVESTS IN COMMS UPGRADES

The NSW Government has announced its intention to rebuild essential services and deliver a safer state, by investing $26 million into new emergency services communications upgrades in the 2023–24 Budget.

Disaster resilience and response and recovery programs will be boosted through an $11.3 million investment in four new broadband cell on wheels (COWs) units to be delivered by the NSW Telco Authority. Self-powered and mounted on trailers, the COWs can be deployed to disaster areas to provide internet and mobile phone (Wi-Fi and 4G) coverage during and after emergencies.

An additional $11.3 million investment will begin the rollout of fit-for-purpose vehicle-as-a-node (VaaN) technology to the Rural Fire Service fleet. The upgrades should provide seamless internet connectivity to firefighting vehicles, enhancing communication and operational efficiency.

The government will invest $3.2 million in a suite of products providing community members and emergency services access to timely, accurate and actionable hazard warnings. This includes the mobile Hazards Near Me app, the HazardWatch flood and evacuations website and the HazardPublisher public warning management tool for emergency services. In addition, $3.3 million will be spent on early-warning detection systems for fires and floods, such as smart sensors, to better protect communities.

The government has also announced an investment of $103 million in capital expenditure over four years will support the upgrade of police facilities and infrastructure across the state. This includes $27 million for critical police operational radio communicating capabilities across the south, southwest and far west of NSW, and $2 million to support the NSW Police Marine Area Command through the upgrade of its Nemesis vessel (including its telecommunications system) for extended offshore operations.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NOKIA OPENS 6G LAB IN BENGALURU, INDIA

Nokia has announced that it has established a 6G lab at its global R&D centre in Bengaluru (Bangalore), India, in a project which aims to accelerate the development of fundamental technologies and innovative use cases underpinned by 6G technology that will address the future needs of both industry and society. The lab was inaugurated virtually by the Indian Minister of Railways, Communications, Electronics & IT, Ashwini Vaishnaw.

Nokia is engaged in several global projects and regional initiatives with industry peers, customers, academia and research institutions, in order to form a common view and direction for 6G. The 6G lab will support the Government of India's 'Bharat 6G Vision', introduced by Prime Minister Narendra Modi, which envisions a key global role for India in the standardisation, development and implementation of 6G technology.

The lab will enable collaboration between industry stakeholders; provide an experimental platform for researching algorithms, privacy and sustainable system design; and facilitate the testing of innovative solutions while establishing their potential for commercialisation. Key research areas will include foundational 6G technologies like network as a sensor, network exposure and automation.

Network-as-a-sensor technology enables the network to sense objects, people and movement without the need for onboard sensors. In the 6G era, network as a sensor has been identified as a key enabling technology that supports the vision of bringing the digital and physical worlds together. Sensing will be fully integrated into the wireless network and operate simultaneously with communication services. This has the potential to enable people to see around corners, gather information about their surroundings and even interact with objects at a distance.

"The inauguration of the Nokia 6G research lab in Bengaluru today is another step towards PM Narendra Modi's vision of making India an innovation hub," Vaishnaw said. "Interesting use cases coming out of this lab will be related to transportation safety, health care and education, which will be another big contribution in the entire Digital India suite."

Experts at the Bengaluru R&D centre will support India's ambition to make notable contributions towards global 6G technology standards. Furthermore, Nokia is in the process of building research collaborations with premier research institutes, like the Indian Institute of Science and Indian Institutes of Technology, to further scale up the 6G research initiative in India.

SATELLITE TECH PROVIDES STATE-WIDE CONNECTIVITY FOR WA POLICE

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The Western Australian Police Force has announced that it will soon become the first law enforcement agency in the world to integrate low Earth orbit (LEO) satellite technology with its current communication network, giving officers high-speed internet anywhere in the state. The technology will be accessible from 550 WA Police vehicles and close to 130 regional stations, benefiting day-to-day patrols as well as specialist teams such as the Regional Operations Group, Tactical Response Group and Regional Enforcement Unit.

Making up one-third of the Australian continent, WA has one of the largest police jurisdictions in the world — yet just 26% of the state has mobile phone or radio coverage. The $8.5 million upgrade will enable police operating in remote locations to instantly send and receive mission-critical information, including automatic number plate recognition data and real-time emergency alerts. It also means officers will be able to livestream body-worn and vehicle dashboard camera footage to the Perth-based State Operations Command Centre, as well as aircraft and security camera vision.

In a recent 12-week trial, officers working from isolated police stations in Kintore, Balgo, Burringurrah, Kalumburu and Jigalong benefited from access to high-speed internet. LEO communication equipment was also tested by Water Police and during high-profile operations such as Exmouth's Total Solar Eclipse event in April.

"This high-tech upgrade will boost the ability of police to solve crimes and coordinate large-scale emergency responses like remote searches for missing people," said WA Police Minister Paul Papalia.

"For the first time, officers will have high-speed internet no matter where they are in the state, meaning regional WA police will have the same level of connectivity as their metropolitan colleagues.

"Being able to livestream vehicle dashcam and body-worn camera vision will … improve situational awareness for officers on the frontline, helping them to make informed decisions during emergency situations."

Police Commissioner Col Blanch added, "Going forwards, the Western Australia Police Force will have the best communications capability of any jurisdiction in Australia, if not the world.

"We can now … live stream body-worn cameras and dashcams from the State Operations Command Centre in Perth and provide specialist support to our frontline officers anywhere in the state, at any time.

"Real-time communications means a real-time capability to respond, 24/7."

GOVT TO SCOPE EMERGENCY ROAMING CAPABILITY


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The Australian Government has announced it will work with industry to scope an emergency mobile roaming capability to keep citizens connected during natural disasters, following the release of a new report by the Australian Competition and Consumer Commission (ACCC).

The ACCC's Regional Mobile Infrastructure Inquiry final report outlines key challenges when it comes to providing reliable, accessible and resilience communications in regional Australia. Importantly, the report examined the feasibility of temporary roaming services to enable Australians to connect to any available mobile network during natural disasters and other emergencies.

The ACCC found that temporary emergency roaming was technically feasible, but further work was needed to design and develop the capability. Ensuring coordination between government and mobile network operators would also help mitigate risks such as network congestion. Ministers have tasked the Department of Infrastructure, Transport, Regional Development, Communications and the Arts (DITRDCA) and the National Emergency Management Agency (NEMA) with progressing this next step in collaboration with mobile carriers and to report back to government by March next year.

The report makes the case for a review of existing regulation that governs access to mobile towers and associated infrastructure in regional areas to deliver better outcomes for consumers. It highlights that encouraging carriers to deploy mobile infrastructure in areas without a commercial incentive through current grant programs is a significant challenge, and industry collaboration through infrastructure sharing may be the key to coverage improvements in these areas. It also found that infrastructure sharing can reduce costs to deploy new mobile sites and that the public benefits flowing from these grant programs would outweigh possible competition concerns.

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The European Telecommunications Standards Institute (ETSI) has announced that at a recent meeting of its technical committee in charge of the TETRA standard (TCCE), a full consensus was reached to make the primitives of all TETRA Air Interface cryptographic algorithms available to the public domain. Brian Murgatroyd, Chair of ETSI TCCE, said the meeting was well attended by a wide spread of the TETRA community — including operators, users, manufacturers and governments.

"Following publication of the algorithms, we are open to academic research for independent reviews," he said.

Making the algorithms public was discussed following the discovery earlier this year of five vulnerabilities in the original TETRA Air Interface security design (including algorithms) by Dutch security researchers. Keeping cryptographic algorithms secret was common practice in the early 1990s when the original TETRA algorithms were designed, but public-domain algorithms are now widely used to protect government and critical infrastructure networks, for example AES (the Advanced Encryption Standard, standardised by the US Government). Effective scrutiny of public-domain algorithms allows for any flaws to be uncovered and mitigated before widespread deployment occurs.

TETRA has an original set of Air Interface cryptographic algorithms — TEA1, TEA2, TEA3 and TEA4 — some of which were disclosed by the researchers. In 2022 ETSI introduced TEA5, TEA6 and TEA7 in order to futureproof the technology against quantum attacks. The entire set of these original and additional algorithms will be made available in the public domain as well as TAA1 (the original authentication and key management specification) and TAA2 (the new authentication and key management specification). This work will be carried out with the support of TCCA, the global representative organisation responsible for the enhancement of the TETRA standard.

With more than 120 countries using dedicated TETRA networks for mission- and business-critical communications, ETSI said it is continually evaluating standards and procedures to ensure the TETRA standard remains robust in the face of evolving threats, with an ongoing program of maintenance to ensure standards remain fit for purpose in an evolving security landscape.

'RADIO QUIET' ELECTRONICS TO POWER THE SKA-LOW RADIO TELESCOPE

A team of researchers, engineers and technicians has developed so-called 'SMART boxes' to power the SKA-Low radio telescope, currently under construction at Inyarrimanha Ilgari Bundara, the CSIRO Murchison Radio-astronomy Observatory, in Western Australia. The SMART (Small Modular Aggregation RFoF Trunk) boxes provide electrical power to the SKA-Low telescope's 131,072 antennas and collect signals received from the sky to go off-site for processing.

The Engineering & Operations team at the Curtin University node of the International Centre for Radio Astronomy Research (ICRAR) designed and built the first set of 24 SMART boxes, which were 10 years in the making. Tom Booler, Program Lead for Engineering and Operations at ICRAR, said they are the only electrical devices that must be placed among the antennas, creating a challenge for the sensitive equipment.

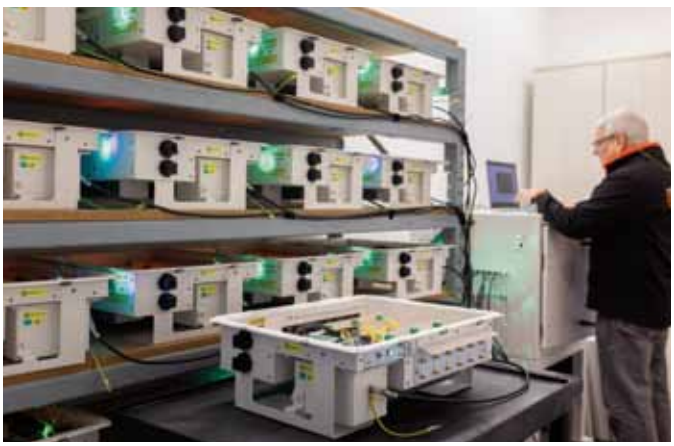
"The SKA-Low telescope will receive exquisitely faint signals that have travelled across the universe for billions of years," Booler said. "To detect them, the SKA-Low telescope is being built in a pristine radio quiet zone far from the interference created by modern technology.

"It's so radio quiet at the observatory site that the biggest potential source of interference is the electronics like ours, due to the proximity to the antennas. That meant our project had to meet the strictest radio emission requirements across the entire Australian SKA site."

The researchers had to source special 'radio quiet' parts that emit minimal interference, replacing the more 'noisy' ones. The parts were wrapped in a specially designed case to prevent any stray radio waves from escaping and the boxes were tested at an electromagnetic test facility in South Africa.

"The 'radio quiet' results that the ICRAR-designed SMART boxes achieved were to the highest standards in radio astronomy," Booler said. "A mobile phone on the surface of the moon would cause more interference to the antennas than the SMART boxes that sit among them."

A contract to build up to 12,000 SMART boxes for the entire fit-out of the SKA-Low telescope has been awarded to AVI, a company based in Perth.



Each SMART box houses 12 front-end modules that convert electrical signals from the antenna to fibre-optic signals for transmission. Image credit: ICRAR.

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CRITICAL NETWORKS: THE URGENT NEED FOR DIGITALISATION AND INNOVATION IN PUBLIC SAFETY

Thomas Rehberg, Head of Public Safety, Nokia*

Those employed in the fields of public safety and critical infrastructure are, by definition, familiar with emergencies. But our world is changing rapidly, and a torrent of modern threats is ratcheting up the definition of emergency, adding more urgency to the need for innovation in critical communications.

Public safety is a tough job, and climate change and disaster response are making it even tougher. Forest fires in Canada burned through more than 15 million hectares this summer, shattering the previous record of 7.6 million, and led to the deaths of four on-duty firefighters. With a five-time increase in climate-related disasters in the last 50 years, according to the World Economic Forum, wildfires, extreme storms, rising sea levels and droughts are causing deaths, damaging critical infrastructure and costing billions.

Add to climate disasters the enormity of our modern socio-economic challenges and the situation worsens. A lack of housing and transport for a growing urban population are driving homelessness and crime in cities. Soaring living costs are pushing many into poverty. And just when we need more first responders, the industry faces a sector-wide labour gap. Fewer and fewer people are choosing a career in critical industries and public safety, and there's a growing skills gap as digitalisation changes job descriptions.

Cybercrime adds another dimension as it diversifies and grows more frequent, from money scams and corporate hacking attempts to the misuse of artificial intelligence (AI) and social engineering cases that can lead to civil unrest. The pressure on the public safety community to operate effectively in a virtual world is enormous.

So, how do public safety operators tackle all of these threats?

The answer lies in developing digital capabilities at scale. Operators of critical infrastructures such as railways, power utilities and emergency response must do so to protect their own data, assets and operations against potential threats. Public safety operators must leverage digital and situational intelligence to prepare for escalating threats, and thus respond quickly and adequately.

New solutions for digital-age problems

There's some relief in knowing that a robust toolbox of digital technologies already exists. Think AI, augmented reality (AR) and deep data insights. These kinds of tools can help public safety agencies protect and serve efficiently, safely and confidently.

For example, improved situational analysis can lead to better decision-making, laser-sharp preparedness and faster response times. The data to support this can be sourced in dozens of ways. By combining IoT sensors, wearables and body cam footage with real-time analytics in the command-and-control centre, it's possible to follow the exact location, exposure and movement of first responder teams as well as monitor vital health statistics — helping to keep staff out of harm's way.

Drones are an especially powerful tool to elevate intelligence as well as aid disaster response: from real-time video monitoring of large public events or ongoing emergency situations to utilising drones equipped with sensors and thermal cameras to support response after disaster strikes.

This type of project is already underway in Belgium, where telecom operator Citymesh has deployed 70 drones in 35 emergency zones across the country. Designed to gather information in the critical 15-minute period immediately following a call, the 5G automated drone grid ensures first responders are fully apprised of and equipped to respond to each unique situation.

This new level of situational awareness can be extended further into the general public. By deploying rich-media early-warning sys-


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tems, public safety agents can enhance their communication with citizens and alert them in real time and based on their geolocation about an ongoing situation. Indeed, a report by the World Meteorological Organization found that early-warning systems and disaster management increased the lives saved almost threefold between 1970 and 2019.

The industrial metaverse

Though AR and the industrial metaverse may seem radical and far from where we are today, opportunities for applications within critical communications are taking shape.

With these new technologies, human capabilities can be augmented to naturally interact with the digital world, and real-world things can be dynamically represented in the digital world to also interact with them. This will bring a new level of control and monitoring of physical assets and operations.

Imagine a full 360-degree situational view for operators in the command-and-control centre that supports live data feeds and visual cues about surroundings to responders during an emergency. This might include the exact location of a person in distress, the exact pathway through a burning building or the extent and spread of a wildfire as well as relevant contextual data such as weather information.

Training for emergency what-if scenarios and dangerous incidents is another opportunity. Crisis planning for cyber attacks, natural disasters or a hazardous waste spill in a factory could never truly be simulated in the real world safely. With these new technologies, it is possible to prepare responders for worst-case scenarios without putting them at risk.

More tools are coming, such as robots that assess the danger level and conditions in a burning building before responders enter or are equipped with sensors that detect explosives, securing a building before police units enter. And digital twins of the public safety organisation, which can provide real-time end-to-end visibility into the productivity and efficiency of systems and processes, enable them to anticipate and unblock bottlenecks, detect capability gaps and identify areas that require additional resourcing.

The networks to drive safety

Making digitalisation and innovative applications happen means a change in the communications infrastructure. The public safety community selected 3GPP 4G and 5G technologies for the evolution of the public safety communications network. These open, standards-driven and secure high-performance networks provide the required bandwidth, speed and flexibility needed to enable digitalisation and innovative applications for reliable mission-critical communications in an all-digital era.

Still, much collaboration is required. Technology companies working with the public safety community and governments will ensure specific requirements are understood and incorporated.

Given the many challenges the world is facing, it is crucial that the transition from voice-centric mission-critical communications is accelerated, providing the layers of rich information and insights needed for improved situational awareness and emergency communications. These technologies — like robotics, automation, AI and others — will also help public safety address the worker shortage, even as a younger generation of digital-savvy candidates enters the workforce.

A modernised communications infrastructure that can sense, think and act, and enable the public safety community to build the resilience and digital capabilities they need to protect and respond safely and efficiently in the times ahead is a must. And it's here — available today to future-proof public safety operations and ensure success for citizens and those who serve and protect them.

**As the Head of Nokia's Public Safety, Airports & Airlines segments, Thomas Rehberg focuses on providing digitalisation strategies and solutions for the company's customers. Within his 30 years of experience in telecommunications, he has served in general management, sales and services roles at service providers, and continued at Alcatel-Lucent as a leading supplier. After the acquisition of Alcatel-Lucent by Nokia, he headed the Account team for Deutsche Telekom in Germany, and eventually joined the Nokia Enterprise Division at the beginning of 2018. As a young engineer, Thomas also worked for Lufthansa, introducing wireless networks at airports. He is based in Stuttgart, Germany.*

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TIM KARAMITOS

REGIONAL SALES MANAGER, CRADLEPOINT ASIA PACIFIC

What opportunities do you predict for the growth of your industry in 2024?

Demand for connectivity in emergency services vehicles has been building for a very long time and while the development of the PSMB capability will support better connectivity for critical communications, the rollout of this capability is still several years away. Cradlepoint has already seen increasing demand for in-vehicle cellular connectivity in various industries across Australia. With the advent of LEO satellite technology in Australia, this option is even more attractive for emergency services vehicles. Cradlepoint enables emergency services organisations to seamlessly combine the likes of Starlink with 5G and other WAN sources such as LTE and Wi-Fi as WAN. In moving vehicles, Cradlepoint enables critical applications to move from 4G/5G connectivity in urban areas to LEO satellite in remote areas where there is no cellular connectivity available. Likewise, where a LEO satellite service is degraded or unavailable due to challenges with getting a clear line of sight to the sky (due to buildings for example) or if there are adverse weather conditions, Cradlepoint will switch back to cellular connectivity. Emergency services will start to take advantage of this capability next year.

The benefits don't stop in vehicles. We've seen that on the outskirts of small rural towns in Australia, there is already limited cellular coverage. So in many cases, emergency services can quickly find themselves with no connectivity at all. Using cellular and LEO satellite connectivity together will enable emergency services to have reliable connectivity in rural areas, connecting to cellular towers where they're available and switching to LEO satellite connectivity where there is no cellular signal, and then back again, in order to keep satellite data costs to a minimum. Cradlepoint also provides a central network management platform (NetCloud Manager), which features true cellular intelligence. It provides a single pane of glass to manage sites, vehicles and IoT by orchestrating policies to ensure applications use the best available WAN source and have the appropriate security protection applied.

What is your company doing to make critical communication accessible and affordable in the current economy?

Whether an organisation's IT team is large or lean, managing configuration changes, installing security updates, or setting one-off policies on each router within a fleet or across dispersed sites can quickly become expensive and operationally unsustainable. Cradlepoint Wireless WAN solutions are simple to install and manage. NetCloud Manager enables single pane of glass management, with centralised monitoring, configuration, traffic management and troubleshooting for network administrators and IT teams — including a wide array of dashboards with abundant insights and analytics about connection links and security incidents. Because devices are managed through the cloud, it's far more accessible for organisations with distributed sites, large fleets or lean IT teams.

How can critical comms users protect themselves against data breaches and cyber attacks?

When human factors come into play, achieving absolute foolproof security is challenging. Even with meticulous attention to patching, configuration, implementation of multi-factor authentication and sophisticated threat detection systems, vulnerabilities such as zero-day exploits can pose a challenge. The most robust defence always lies in prevention as opposed to detection, particularly in the realm of the web. Cradlepoint's Ericom isolation-driven solutions create a barrier between endpoints and the web, where websites are activated and scanned for activated malware in isolated cloud containers, delivering only a safe rendering to the end user. This approach proves equally potent against unaddressed zero-day vulnerabilities and aligns with various E8MM (Essential Eight Maturity Model) mitigation criteria.

What are the biggest challenges or threats facing your industry in 2024?

The biggest threats and challenges arise when organisations don't embrace change. Everything in technology is changing. The connectivity infrastructure is changing and with that, organisations face new risks. For example, as the use of 5G for business increases, the cyber-attack surface is increasing. To succeed, organisations need to acknowledge that and then embrace it by acting accordingly. SASE and zero trust are especially critical for IoT devices, which are exploding in number and are rapidly becoming favourite targets of bad actors. In-vehicle use cases often transmit confidential information, requiring the data to be secured from end to end. Fixed sites and remote workers also need the broad protection provided by SASE and zero trust because of their frequent web activity and cloud application usage.

As 5G/cellular continues to gain momentum within the enterprise market for both 5G WAN and private cellular networks, Cradlepoint is uniquely positioned to deliver a complete end-to-end 5G/cellular SASE stack. Cradlepoint architecture offers connectivity with 5G; inherent security through zero trust; network slicing-based steering with 5G SD-WAN; and operational simplicity through NetCloud Manager.

Prior to joining Cradlepoint, Tim spent 15 years in several technical and sales roles at Citrix — most recently as a principal corporate account manager, responsible for transforming the way many large organisations work from anywhere. Prior to that, Tim held roles in pre-sales and senior technology consulting, responsible for major client project deployments ranging from small engagements to long-term, multimillion-dollar projects.

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REG CLUTTERBUCK

SALES DIRECTOR, DC POWER SOLUTIONS, EATON'S A/NZ POWER QUALITY BUSINESS

What opportunities do you predict for the growth of your industry in 2024?

The predicted growth in artificial intelligence in 2024 and beyond means that critical infrastructure such as those utilised in telecommunications, data and essential services will need ever-increasing amounts of data processing capabilities both at the core and edge, which in turn requires incremental amounts of reliable energy and secure power. Companies like Eaton are well placed to provide those essential energy sources with unprecedented levels of reliability.

As network transformation continues to evolve, customers are expecting higher levels of remote management and real-time control of their network's assets. They need to be able to manage their assets and plan for future demand on demand. Eaton's BrightLayer suite of power and asset management software meets this growing need in a secure and scalable way.

What is your company doing to make critical communication accessible and affordable in the current economy?

We are constantly evaluating our solutions with the support of our global technology and development teams and utilising our international supply chain for the most competitive options. In addition to tapping into Eaton's global network, we continue to invest in engineering hubs in Australia and New Zealand, building local expertise and resource. This has worked extremely well for our customers as we are able to design fit-for-purpose engineered solutions from the start to end of a project — whether it is for reliable and secured power for mains sites or alternative energy sources such as wind and solar.

Communications network operators are striving to cut energy costs and/or to meet aggressive carbon footprint reduction targets. Eaton's range of modular high-efficiency rectifiers, inverters and solar chargers can significantly reduce energy waste, as well as reduce overall required energy consumption for the site cooling system.

Additional to energy savings from high efficiency, the Eaton solar chargers' popularity in grid-connected sites continues to increase, due to the network operator's ability to offset communications sites' power consumption via the use of solar. Little additional hardware is required, and a solar module can be used in a mains-powered system.

How can critical comms users protect themselves against data breaches and cyber attacks?

Implementing robust cybersecurity is important for all businesses in today's digitised economy, but an area that may not be high on the radar when it comes to cybersecurity is the hardware itself.

Every device that has communication capability, whether it be a wired or wireless connection, creates a gateway for hackers to infiltrate into the entire network that it is connected to. Such vulnerabilities could exist in critical communications networks of mission-critical infrastructure if the equipment deployed has not met certain cybersecure benchmarks.

At Eaton, cybersecurity is part of our DNA and an integral consideration, with strict protocols placed on the people, processes and technologies within our Secure Development Lifecycle process — the program that integrates security protocols at every phase of product creation. Communication devices designed and manufactured by Eaton must be certified against UL cybersecurity standards before they are released to market. This practice ensures we offer the highest level of security to our customers and their networks.

Are there any new or growing sectors that will be particularly reliant on critical communications in 2024 and beyond?

We continue to see a demand for engineered-to-order off-grid solar solutions, which are a core component of the Eaton power quality business. The augmentation of alternative energy sources at mains power-supplied sites will continue to be required in the future to ensure uptime of networks.

As well as ensuring very high uptime of sites via the use of high-reliability modular power systems with built-in backup redundancy, private 5G networks used for critical infrastructure and large industrialised sites will continue to require 24/7 secure connectivity to their sites, not only for live and up-to-date monitoring, but also for historical data extraction and control over the equipment on their site.

What's on your wish list from governments, innovators and the wider industry in 2024?

Governments in the industry need to ensure that critical infrastructure like 5G and fibre networks are resilient to natural catastrophes. During times of natural disaster, utility power is often one of the first services lost. If the standards of uninterrupted DC power to mission-critical equipment such as telecommunications are inadequate, the relevant communications networks that support the emergency services in the field — and local residents' ability to reach those emergency services when in a time of need — will be lost.

Setting expectations for uninterrupted DC power is a step in the right direction that can further be improved upon by 5G network providers should they consider the addition of alternative energy sources at their mains power-only sites, such as solar and wind power. These renewable sources would augment the existing mains power and, during grid disturbances or outages, continue to support the reliability of the site to remain online, acting as an additional source of power beyond the battery backup that would also be present.

With over 30 years of experience across APAC, Reg is an industry veteran in the telecom and industrial segments. Based in Brisbane, he heads up Eaton's DC sales and business development teams in Australia and New Zealand.

Industry Talking

There was a lot of anticipation in the lead-up to Comms Connect Melbourne and our annual gala dinner and awards night this year, with the expectation that both would see solid numbers and growth on 2022 — and nobody, it would seem, was disappointed.

Our dinner and awards night attendance was up significantly, reaching almost 500, and having seen the queues at the exhibition and conference entrance myself, Comms Connect clearly had an outstanding turnout too, with the show floor buzzing (in particular on day one). It was great to see the show bounce back to its former glory after a few difficult years and it demonstrates that the vibrancy and collaboration that these events have fostered and generated, both locally and internationally, since we first formed our strategic partnership many years ago, continues in a very positive manner, thanks to the hard work of all involved.

Our MC Paul McDermott did an outstanding job looking after the awards proceedings whilst entertaining our guests for the evening, on occasion leaving the stage to speak with and poke good-natured fun at a few tables and their guests. This entertainment, along with the newly revamped award categories, plus the great food and service delivered by the MCEC team, seemed to hit the spot, with the very positive feedback suggesting it was one of the best nights ARCIA has put on over the years.

Award competition was strong on the night, with our very worthy winners being chased closely by solid nominees, making it extremely difficult for our awards judges to make final selections. But that's what makes entry so worthwhile, so please make sure you participate and nominate those that you see as worthy in 2024.

Congratulations to the 2023 ARCIA Excellence Awards winners:

- **Small Business Award:** Spectrum Engineering
- **Outstanding Individual of the Year Award:** Daniel Chivell
- **Local Manufacturing Award:** Omnitronics, with the **DRG**100 Digital Radio Gateway
- **Major Project Award:** NSW Telco Authority and the Queensland Government Wireless Network Contract Directorate, for their Interstate Roaming Service
- **Industry Innovation Award:** Simoco Wireless Solutions, with the VR-950
- **Peter Wallace Industry Advancement Award:** Wayne Turnbull
- **Jonathan Livingston Award:** Andrew Wyborn
- **Life Member Awards:** Steve Jaques and David Cox

At the time of writing, the year is set to wrap up for ARCIA with two final networking opportunities — first in Brisbane on 16 November at The Greek Club, where Nick Ashby, who was unable to be in Melbourne, will be presented the Major Project Award, on behalf of the Queensland Government Wireless Network Contract Directorate, for the Interstate Roaming Service; and finally at The Shoe Bar in Perth on 6 December, with all welcome to join us.

To keep up with our ever-developing calendar of events and training courses for 2024, including conferences in Perth, Sydney and Brisbane, visit https://arcia.org.au/events/.

Paul Davis, CEO
Australian Radio Communications Industry Association

The team from Spectrum Engineering (left and middle).

Daniel Chivell (left).

The team from Omnitronics.

The team from the NSW Telco Authority.

The team from Simoco Wireless Solutions.

Andrew Wyborn (centre).

David Cox (left) and Steve Jaques (right).

MINIATURISED FSO SYSTEM ENABLES HIGH-SPEED WIRELESS COMMS

In a world that relies on high-speed internet and seamless communication, the absence of a reliable fibre connection can be a significant hurdle. Fortunately, a cutting-edge technology known as free-space optical communication (FSO) offers a fast, secure and licence-free solution for field-deployable wireless communication in areas where fibre connections are unavailable. Researchers from Nanjing University (NJU) have now developed a miniaturised FSO system that could potentially revolutionise high-speed wireless communication.

FSO has received increasing attention as an alternative to fibre communication for high-bandwidth wireless data transmission, in part due to its versatility across various scales of operation. It plays a crucial role in establishing high-speed satellite internet projects like Starlink, enabling global network coverage. It can also be used at the ground level, particularly in low-altitude scenarios, where its high-data-rate, licence-free and high-security connection makes it suitable for applications such as last-mile connections, disaster recovery efforts and military communications.

"In these flexible communication scenarios," the NJU researchers wrote in the journal *Advanced Photonics Nexus*, "a portable and plug-and-play FSO system is essential."

The NJU researchers developed a miniaturised FSO system which has now achieved an impressive communication bandwidth of 9.16 GBps over a 1 km link. This was accomplished using readily available commercial fibre optical communication transceiver modules, with no need for optical amplification.

The core of the miniaturised FSO system comprises a pair of FSO devices. Each FSO device is compact, measuring just 45 x 40 x 35 cm, with a weight of 9.5 kg and a power consumption of approximately 10 W. Each houses an optical transceiver module, an acquisition, pointing and tracking (APT) device, and its control electronics, all safely sealed within a box for rugged outdoor operation. The APT device features a low-diffraction optical design and a highly efficient 4-stage, closed-loop feedback control system.

The FSO system has been found to exhibit remarkable tracking capabilities, through the integration of multiple sensors and sophisticated algorithms, which are said to enable automatic, fast and accurate acquisition and fine tracking in just 10 minutes. This precision keeps the tracking error within 3 microradians (μrad), resulting in a low average link loss of just 13.7 dB over the 1 km link. Such precision eliminates the need for optical amplification. The FSO system can also achieve bidirectional data rates averaging 9.27 Gbps over the 1 km link, using only commercial transceiver modules.

"This work highlights the potential for achieving FSO using commercially available fibre optical transceiver modules," said corresponding author Zhenda Xie, professor at the NJU School of Electronic Science and Engineering. Xie added that the effective distance of 1 km may be extended; his team also tested the optical links at up to 4 km, where the average loss increased to 18 dB — likely due to a foggy test environment.

"With better weather conditions and optical amplification, longer FSO can be expected," he said.

The miniaturised FSO system unlocks the potential for high-speed wireless communication virtually anywhere, making connectivity happen even in the most challenging environments. These devices can be expected to play a pivotal role in the future of FSO networks, offering plug-and-play configurations that can establish high-speed FSO channels in minutes. The team's innovation thus addresses the growing need for field-deployable, high-speed wireless communication solutions, bridging the connectivity gap in a world where staying connected is more critical than ever.

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MICHAEL CAPOCCHI

MANAGING DIRECTOR, BEAM COMMUNICATIONS

What opportunities do you predict for the growth of your industry in 2024?

The growth of remote workers and increased reliance on satellite products for businesses has been a noticeable trend, and it's likely to continue growing. The COVID-19 pandemic significantly accelerated this trend but even as the pandemic subsides, this shift has driven the demand for reliable and robust communication solutions. This includes mobile satellite communications to support remote workers in various locations, including areas with limited terrestrial infrastructure and especially in remote areas where traditional mobile networks have poor service or are unavailable.

Businesses are increasingly relying on satellite products and services due to their ability to provide reliable and global connectivity. Satellite communication is essential for various sectors, including agriculture, maritime, energy, emergency services, transportation and more. It enables businesses to stay connected, monitor operations, gather data and make informed decisions regardless of their geographical location.

What is your company doing to make critical communication accessible and affordable in the current economy?

The increasing demand for global, reliable connectivity in remote areas presents a significant opportunity for the mobile satellite industry. Remote workers require seamless communication and data transfer capabilities, making satellite solutions essential.

Beam Communications (ASX:BCC), a proud Australian listed company and a world leader in mobile satellite technology, plays a crucial role in providing innovative satellite products to meet the growing demands of businesses for reliable and global communication solutions for the mobile satellite industry. Beam have developed robust terminals and modems that connect to a satellite network that can facilitate the connectivity required to enable real-time monitoring, data collection and automation.

Satellite technology is crucial for disaster recovery and emergency communication, providing a resilient and immediate communication channel in the event of natural disasters, emergencies or crisis situations when cellular towers are down. The portability and ease of use of our portable satellite products such as the Iridium GO!, Iridium GO! exec and ZOLEO Global Satellite Communicator can provide that connection even when mobile signal is lost. Environmental factors do not affect connectivity via Iridium's satellite network; it is very resilient where other networks may suffer from heavy rain, fog or smoke.

Are there any new or growing sectors that will be particularly reliant on critical communications in 2024 and beyond?

Mobile satellite communications are pivotal for growing sectors such as the Internet of Things (IoT), encompassing agriculture, transportation and logistics, which demands reliable and widespread connectivity for real-time data exchange. In remote environments, mining, natural resources, and offshore energy and utilities industries depend on satellite technology for essential communication, safety and operational monitoring. Furthermore, emergency response, maritime and shipping, as well as remote health care, heavily rely on mobile satellite communications for effective coordination, safety and healthcare provision in underserved areas. These sectors continue to hinge on satellite technology for critical and reliable communication needs.

These sectors, among others, will likely continue to rely on mobile satellite communications for critical and reliable communication needs.

What are the biggest challenges or threats facing your industry in 2024?

The mobile satellite industry faces two primary challenges. First, traditional mobile networks are advancing, potentially encroaching on satellite territory by offering high-speed, low-latency communication through 5G technologies. Second, cost-efficiency remains a hurdle, limiting widespread adoption due to historically high expenses associated with satellite technology. Innovations in manufacturing and operational efficiency are imperative to address this barrier. Striking a balance and ensuring interference-free operations will be key for us to sustain relevance and effectiveness of developing new products and services in the ever-evolving mobile satellite communication technology landscape.

Michael Capocchi, with 25+ years in the ICT industry and key roles in senior management, is based in Chicago, strategically close to major satellite communication hubs in the USA and UK/Europe. As the Managing Director of Beam Communications Holdings Limited since 2008, he oversees operations and has been integral to the Group's growth. Before this, he held pivotal positions at Iridium Satellite LLC, Pacific Internet and Optus Communications. Additionally, Michael has been a Director at Zoleo Inc. since its inception in August 2018, contributing significantly to the joint venture's success.

ENSURING 5G NETWORK PERFORMANCE

*Senthil Vel Shanmugasundram**

Modern societies worldwide depend on the performance, reliability and security of critical infrastructures and networks. There is a plethora of 'new verticals' including manufacturing, warehouse, mining, ports or other critical infrastructure.

These 'new vertical' use cases all have one common requirement: the mobile network needs to provide a superior performance compared to a commercial mobile network. In such environments, 5G brings new capabilities to build fast and secure campus or private networks tuned to higher performance, which can increase productivity and efficiency.

To be successful in these business-critical use cases, the wireless networks need to be as reliable as the wired ones. To explain what 'superior network performance' means, we need to consider the various types of applications used in such a business-critical environment. We continue to see applications where people are involved, for example remote support or maintenance (AR/VR) where an expert from afar provides guidance to an onsite non-expert on how to maintain or repair a machine. Tablet connectivity is another important 'human' use case.

In addition, we see many machine applications with varying requirements. These include automated guided vehicles (AGVs) or autonomous mobile robots (AMRs).

Industry 4.0 process control is another machine application and many more are expected in the future. What is clear is that private networks will need to fulfil a huge variety of KPI-related requirements.

Network deployment phases and user groups

A private network for business-critical use cases follows different lifecycle phases depending on its maturity and importance for covering critical industrial processes. An important criterion is which user group is responsible for the actual lifecycle phase.

Engineering activities are typically aimed at verifying the RF performance of a novel network technology, as well as features and services in the early phases of introduction based on lab tests and field trials, where the interaction of the network and devices is in focus. The engineering phase often precedes network rollout, can happen in the field as well as in the lab and is typically done by experts.

Before deploying the private network, for example on a mine site, spectrum clearance is essential because interference will always limit network performance. If the private network is deployed, its network performance will need to be tuned to fulfil the required customer KPIs and therefore passive RF and active tests have to be executed and finally documented in an acceptance report. For both the spectrum clearance and network tuning phases, the

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user group responsible is the company who plans the private network, for instance an infrastructure supplier, a system integrator or a mobile network operator.

Once deployed and operational, it is critical that performance levels of the network (in terms of coverage and other KPIs such as data throughput and latency) are regularly checked because every modification in the network, for example moving a metal shelf or robot on the factory shop floor, will affect the signal propagation characteristics and can affect the coverage and network performance. Through continuous performance monitoring, the private network can be predictively maintained at an optimum performance level before an issue occurs. Here the responsible party is the company that uses the network for their business and since they are often not technical experts in mobile communication, the test tools at their disposal should be easy to use (or even be able to operate autonomously).

If a problem occurs in the private network, for instance KPIs are not being met over an operational period or there are negative trends in certain areas, then technically skilled experts should perform troubleshooting. This will take the form of detailed passive RF and active tests onsite and the user group responsible in this phase will be the operator of the network who is responsible for keeping the SLA (service level agreement). Think the IT department (which has developed a certain level of know-how regarding operation and troubleshooting of the network) but also either a system integrator or infrastructure supplier to which the task of operating the network was outsourced.

Test methods and their benefits

For passive tests with network scanners, SIM cards are not needed and it is possible to get an overview of all 'always on' downlink signals in the area by automatic channel detection (ACD), decoding of broadcast channel information and many RF parameters like signal strength or synchronisation.

With active tests where a connection with the network is needed, we can measure the network performance in terms of application quality of experience (QoE) or quality of service (QoS), for instance data throughput or latency. As RF frontend for active tests, smartphones and data modules can be used and the benefit here is their ease of use. The benefit of a data module is that the measurement is very close to the real-world use cases in private networks where data modules are integrated in robots, AGVs or other machines.

Only through a combination of passive and active testing is it possible to completely verify the reliability and performance of a network. Through continuous monitoring of network KPIs, it is possible to predict capacity bottlenecks or failures and conduct preventive network upgrades, reconfiguration or maintenance to solve the problem before it affects the end application resulting in high consequential costs. For an optimised process, smart tools that are easy to use (even for personnel who are not highly trained) are a must.

**Senthil Vel Shanmugasundram is Head of Telecommunication Solutions at Rohde & Schwarz Australia.*


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DR PAUL ELMES

MANAGING DIRECTOR, TAIT ASIA PACIFIC

What opportunities do you predict for the growth of your industry in 2024?

The land mobile radio (LMR) industry is set to continue to grow in 2024 — and at least for the next decade and potentially beyond. LMR technology remains unparalleled in delivering real-time, mission-critical voice communication. This assertion may challenge the convictions of some within the telecommunications community, but I firmly believe that both LMR and cellular technologies have their roles in ensuring the safety of emergency services and critical infrastructure workers.

Voice communication remains the primary means by which we communicate with mobile field workers. Despite the preferences amongst our younger generations, text messaging is not an effective or efficient form of communication. Voice offers a far richer medium. The human ear has evolved to detect auditory cues, such as variations in tone, pitch and volume, which can convey emotional nuances. The ability to discern emotions like fear through tone of voice is hardwired into our biology. Identifying distress in a colleague's voice triggers an instinctive response, with potentially life-saving immediacy.

LMR networks have undergone continuous refinement over five decades, tailored to the precise needs of the public safety community. One-to-many, all-informed group communication aligns with the standard operating procedures of the emergency services. Features developed by manufacturers often find their origins in real-world use cases, with the operating requirements specified by the radio users themselves. Quality of service and quality of experience are not just defined but vigorously demanded by end users.

In contrast, cellular networks were originally designed for consumer-grade one-to-one communication. While there have been strides in developing push-to-talk and off-network capabilities, these features are yet to be proven at the coalface, so to speak. Evaluating a feature in a controlled environment is one thing, but relying on its performance when lives are on the line is an entirely different matter. Cellular technology has its place, but LMR has been forged and refined in the heat of real-world experience. It stands as the only serious choice.

What are the biggest challenges facing your industry in 2024?

The foremost challenge facing the LMR industry in 2024, as it has been for the past five decades, is the lack of interoperability. Interoperability is the ability for different agencies, from different jurisdictions, to exchange voice communication on demand and in real time — usually to coordinate the response to an accident or natural disaster.

This challenge has been a known issue in Australia since the time of Cyclone Tracy's devastation of Darwin in 1974. Subsequently, it has been repeatedly cited in inquiries and Royal Commission reports following natural disasters, particularly during the 2019–2020 bushfire season, as a significant impediment to coordinated response efforts. So what limits interoperability?

The transition from analog to digital technology has brought the adoption of open standard protocols. In Australia, public safety organisations opted for the North American P25 standard, while non-public safety entities turned to the European Digital Mobile Radio (DMR) standard as a more cost-effective alternative to P25. This divergence has led to a diverse array of user groups, including utilities, local government authorities, transportation organisations and mining operations, embracing DMR technology for their critical communications. However, there is no inherent interoperability between the P25 and DMR standards.

Moreover, due to constraints in device technology, it was not feasible until relatively recently to manufacture a single device capable of spanning the frequencies most commonly used for radio communication. The industry has thus adopted internationally recognised frequency bands. Numerous factors, including licensing regulations and spectrum availability, dictate the choice of a particular frequency band for any given network. Even when two adjacent networks use the same technology (such as P25), if their frequency bands differ, they lack native interoperability. While workarounds exist, technology choices and frequency band selections have resulted in the creation of 'islands of operation'.

What is your company doing to make critical communication accessible and affordable in the current economy?

Tait has recently introduced the TP9800 multiband P25 and TP9700 multiband DMR radios. These devices encompass a transceiver spanning 136 to 941 MHz, thanks to advancements in semiconductor technology. These radios are expected to significantly enhance interagency and interstate radio communication, potentially rendering moot the recurrent recommendations for interoperability in the inquiry and commission reports.

Next year, Tait will release the TP9900, a multiband and multi-protocol P25 and DMR radio. With the TP9900, any first responder agency in need of interoperability between P25 and DMR can effortlessly achieve it through a mode change — simply switch from a P25 VHF channel to a DMR UHF channel, or vice versa, with the turn of a knob. The TP9900 represents a substantial stride towards eliminating the existing 'islands of operation' and bridging the interoperability requirements of both P25 and DMR users who need to exchange voice communication.

An engineer by training, Paul began his career as a research scientist at the UK's Defence Evaluation and Research Agency while also completing his doctorate. Paul has a broad background across both the public and private sectors, holding senior positions in government, education and commercial enterprises. Paul has held senior product management roles at Tait Communications; most recently, he was the VP of Product Management, responsible for Tait's global product portfolio.

FROM KITES TO AMPLIFIERS:
100 YEARS OF TACKLING MILITARY COMMUNICATION

Before the First World War, military forces attached radio antennas to kites to send them to the heights needed to get a signal and successfully transmit messages. However, adverse weather conditions, the inability to maintain a consistent height and the kite's detectability often rendered this ineffective. Luckily, technology has come a long way since then.

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Here David Reeves, International Director of Business Development at defence communications systems and battery specialist Ultralife, explains how these advances have helped to solve handheld, vehicular and military base communication challenges.

One of the main communication challenges that militaries across the globe have faced for over 100 years is loss of signal, which is often caused by being in an area with no radio coverage (known as dead spots). This can be extremely dangerous as it prevents soldiers from passing important messages to others in the field or those back at base. When this happens, soldiers can try to regain a signal by positioning the antenna in a higher location to improve line of sight. However, this is not always possible if one is close to an enemy position and needs to stay undetected. Therefore, another option is to try and increase the coverage range of the radio, so that it can communicate with devices outside of the dead spot.

Standard 5 W handheld military radios usually have an operating range of 8–10 km, depending on the ground and frequency they are operating on. Amplifiers, such as Ultralife's A-320V3A, attach to the radio and can boost this distance by up to three times by increasing the wattage to 20.

If this still fails to reach another radio, then changing the radio frequency that is being used might provide a solution. This can be achieved by connecting an LNA adapter (such as Ultralife's A-320DPA) to the amplifier, which allows a 30–108 MHz antenna and a 90–512 MHz antenna to be used without the need to keep removing and replacing them.

Both solutions have been widely proven to resolve coverage issues, making amplifiers an essential part of the modern soldier's arsenal. However, amplifiers rely on a power source (such as a battery) to function. This is often separate to the radio's internal battery but it must, nevertheless, meet the reliability and performance standards required for military use. Ultralife has its own well-established military battery manufacturing capabilities.

Choosing batteries for military communications equipment can be a challenge due to the demanding size, weight and power (SWaP) requirements. Military personnel need to minimise the amount of weight they carry and informed battery selection is a great way to achieve this. One of Ultralife's UBI-2590 batteries (UBBL13-01) weighs only 1.45 kg but has a high energy density of 208 Wh/kg, which means it offers high power with a low weight, for effective communication and operation.

In addition to solving handheld radio communication problems, the military must also think about improving communications from within a vehicle. Vehicular radios have had a troubled past when it comes to SWaP. In 2012, the US stopped developing a vehicle-mounted version of the Joint Tactical Radio System (JTRS), as it was being produced to the size of a dormitory-sized refrigerator. Small size is paramount for vehicle radios and amplifiers as they may need to be removed for handheld use in 'jerk and run' scenarios or to be concealed to avoid detection.

Therefore, rather than having a radio and amplifier built specifically for a vehicle, it is common for soldiers to mount compact handheld radios and amplifiers into the vehicle, which also reduces having to carry separate radios and amplifiers when on foot. Ultralife offers several mounts, including one that can house both a radio and amplifier (A-320HVA) and another for the amplifier only (A-320QM).

Solving vehicle and on-foot communications is not the only issue however, as problems can also occur at the base camp. If the base is breached or the power is cut by the enemy, it is essential that communications equipment has backup power and can be easily transported to a new location. Unlike soldiers or vehicles, many base stations have access to AC/DC mains power supply. Ultralife's LPAS-320U amplifier has been designed to utilise this, but also has a UBI-2590 battery fitted as a backup.

As you can see, amplifiers and batteries are paramount to solving today's military communications challenges, providing covert, easy-to-carry solutions. It is hard to imagine the early days where kites were used. However, in an environment where enemies try to block or hinder communications, innovations such as those developed by Ultralife will be continually required to help militaries stay at the forefront.

Switch-mode power supply

CRS Accessories is releasing the CRS-AC1230BB switch-mode power supply with battery backup, available in January 2024. The product features input voltage of 240 VAC, output voltage of 13.8 VDC and an output current rating of 30 A.

The device has a built-in battery backup circuit to automatically switch to battery-powered mode in a blackout and switch back to AC-powered mode once power is restored. The power supply will charge the battery simultaneously when in AC-powered mode.

The product has a compact size of 190 x 181 x 63 mm and weighs just 1.52 kg, making it suitable for desktop installation. It also has a built-in temperature-controlled cooling fan, enabling cool operation and long life.

CRS Accessories

www.crsaccessories.com.au

Rugged Windows tablet

Handheld Group's Algiz 10XR rugged Windows tablet is purpose-built to endure harsh environments, making it suitable for professionals in industries such as field service, transportation, utilities, public safety and more. It is engineered to meet stringent MIL-STD-810 military standards for ruggedness, meaning it can withstand drops, vibrations, extreme temperatures and exposure to dust and water. Its rugged design empowers field workers to stay connected, efficient and productive, even in most remote and challenging terrains.

The product features a 10.1″, Full HD capacitive touchscreen display that provides clear visibility even in bright outdoor conditions. It is equipped with a powerful Intel Pentium quad-core processor, providing smooth performance for data-intensive applications, and has a hot-swappable battery that allows users to extend their working hours without interruption. It also comes with a complete ecosystem of enterprise-focused accessories for maximum efficiency.

The tablet has been officially certified to operate on the Verizon 5G wireless networks in the United States, enabling seamless connectivity and enhanced communication capabilities. In addition to Verizon LTE support, the device includes Wi-Fi, BT and GNSS capabilities.

Handheld APAC Pty Ltd

www.handheldapac.com.au

IP65 power and backup system for outdoor applications

With extreme environmental and physical conditions requiring extreme solutions, Helios has introduced the HT1KWMP — a rugged and multidirectional power converter. The product is a DC power and backup solution for securing 48 VDC, 230 VAC loads and charging batteries.

The HT1KWMP is built for harsh environments, including earthquakes, vibrations, shocks, high temperatures, humidity, water projection, dust, corrosive atmospheres, and biologic and chemical contamination. The product is delivered in an IP65 enclosure and meets military specifications (MIL-STD 810 and 461).

The HT1KWMP has three fully bidirectional ports (AC/AC/DC) that can all function as input and output. This means it can be used to secure AC and DC loads and charge the batteries at the same time. The internal DC energy buffer dynamically distributes the power between AC and DC according to the needs of the system. No configuration is required.

Helios Power Solutions

www.heliosps.com.au

Empowering first responders through technology investment

First responders are under pressure to react faster to emergencies with better and more informed decisions. Multimedia mission-critical data services are essential to support crucial features for emergency response teams, such as situational awareness, position tracking, distribution of images or live video streams. Frequentis LifeX™ is a future-oriented public safety communication and collaboration platform designed to satisfy all the demands of a next generation control room and its multimedia handling.

MissionX is an integrated, end-to-end solution based on Mission Critical Services (MCS/MCX), which reliably ensures mission-critical multimedia communication over public, dedicated and hybrid standardised 4G/5G mobile networks provided by network operators. The Frequentis "OnSite" mobile client provides MissionX services for first responders. Innovative technology and investment in the Public Safety industry is essential for next generation control room solutions and mission-critical communication systems.

Radio Matters

iStock.com/undefined undefined

More often than not it is the invisible components of a machine that are the most valuable. Reliably humming away in the background — out of sight, out of mind. This is not to say that the telecommunications industry is out of sight per se, but when it comes to career opportunities it is most certainly out of mind. For a career that has been proven time and time again to be an essential part of contemporary life, why are so many people overlooking it?

The Radio Frequency Users Association of New Zealand (RFUANZ) has identified for some years that the telecommunications industry is rapidly moving towards a crisis in the availability of skilled radio technicians. A lack of any formal training pathway for new or current staff in the industry, and the high percentage of existing technicians and engineers approaching retirement age, is likely to cause a severe shortage in the next few years.

Focused on preserving the radio industry for generations, RFUANZ has been supporting industry training provider E-tec in the development of a Level 4 NZQA qualification suitable for training radio technicians. Our goal is a foundation course catered towards those entering the workforce or existing staff with no formal training who are wanting to gain a qualification. We understand that this one training solution won't solve all the issues affecting our industry, but it is certainly a step in the right direction. We are confident that this course will become the new default qualification requirement for companies looking for staff, so why not be a step ahead and sign up today?

With the course ready and enrolments open as of October 2023, our challenge now is visibility and viability. It is time to show what it means to be a part of the radio industry; the opportunities, skills and experience you gain plus the lifestyle you can create. It is time to utilise this training opportunity and develop a recognised career pathway that can take a school leaver and over time turn them into a highly skilled radio engineer.

New Zealand Certificate in Customer Premises Systems (Level 4) Wireless Systems Strand — course overview:

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

Justin Wonderlick
Chairman — ARE182
Radio Frequency Users Association of New Zealand

Wireless microcontrollers

The STM32WBA 32-bit wireless series from STMicroelectronics brings designers the performance, efficiency and security required for Bluetooth Low Energy 5.3-enabled applications.

The MCU offers the necessary features for wireless IoT devices, including a high data rate to provide fast data transfer; long range capability to enlarge the communication range; +10 dBm of output power to increase the communication range; and low-power messaging capability to extend battery lifetime.

Based on the Arm Cortex-M33 core running at 100 MHz with TrustZone technology, the device series provides a high level of security, protecting data, IPs and preventing hacks or device cloning.

Focusing on the Bluetooth Low Energy 5.3 protocol, the STM32WBA series allows non-expert developers to add wireless communication to their device. Leveraging the STM32U5 architecture, the device provides an ultralow-power platform and offers inherited digital and analog peripherals, suitable for many applications, from industrial, to smart home and consumer markets. The wireless MCU embeds large memory to sustain both applications and connectivity activities, coming with up to 1 MB of flash memory and 128 KB of RAM. A smart set of peripherals like ADC, touch sensing and times make this product a self-sufficient application wireless MCU.

The device facilitates efficient application processing based on a 407 CoreMark score and is designed to protect users' IPs and increase privacy protection based on SESIP3 device compatibility.

STMicroelectronics Pty Ltd
www.st.com

CASE STUDY

Hytera delivers nationwide TETRA network for Thailand

Hytera Communications has successfully delivered a nationwide TETRA network for Thailand's Department of Provincial Administration (DOPA) — a solution that aims to enhance governance and public safety across the country. TETRA DIB-R5 outdoor base stations, MT680 Plus mobile radios and PT580H Plus portable radios, along with network management systems, digital voice recording systems and a unified communication and dispatch platform, were deployed to ensure a complete overhaul of the legacy analog system and interoperability with the fixed telephony and mobile cellular networks.

DOPA's legacy analog trunked system was beginning to show signs of age, with regular breakdowns and limited coverage. Transitioning to a new TETRA radio system presented a significant challenge for DOPA as it required wide compatibility and interoperability across the existing infrastructure.

DOPA aimed to extend the network coverage by connecting the TETRA system with existing analog networks, enabling more efficient interagency operations and better coordination between central and regional departments. Hytera's innovative solution addressed this challenge by incorporating over 20 sets of analog gateways, which facilitated the interconnection between the TETRA system and the analog networks operating in different cities of Thailand.

Overall, the new system provided by Hytera was found to ensure wider signal coverage, better audio quality, and increased capacity for both voice and data transmission. It also allows for seamless communication and coordination between central and regional departments, enhancing interagency operations and promoting better collaboration.

The system optimises operational effectiveness for DOPA, allowing the Department to respond more quickly to incidents and emergencies as well as to address the day-to-day needs of citizens, including those in remote regions. The dispatching capabilities have been enhanced, allowing for more efficient resource allocation and cross-organisation coordination. Facilitating post-operation reviews and training also becomes streamlined with the ability to utilise voice and data recording.

"We are honoured to have supported DOPA in this crucial expansion," said Lynn Lin, Sales Director of Hytera Southeast Asia. "The new TETRA-based system will empower the government staff and enhance safety by providing reliable and efficient communication capabilities across the nation."

5G outdoor adapter

Cradlepoint has announced its redesigned outdoor W1855-5GC Wideband Adapter, which has been purpose-built to require fewer design materials and less operational energy than its predecessor while adhering to the latest 5G standards.

Ushering in the latest generation of Wireless WAN networking with a goal of supporting global sustainability objectives, the adapter enables enterprises to futureproof connectivity investments as they adopt Standalone (SA) 5G networks. It is designed for distributed sites that require secure cellular connectivity or failover in the event of a primary link disruption.

The refreshed modem features the latest 5G standards with 3GPP Release 16 specifications, providing users with expanded carrier aggregation and band combinations as service providers grow their 5G services. With Cradlepoint NetCloud Manager, lean IT teams can successfully manage the deployment, configuration and troubleshooting of each device from centralised locations, reducing unnecessary complexity and onsite visits. At less than half the size and weight of previous outdoor adapters, the stylised unit eases installation for field personnel.

Compared to its predecessor, the product is 78% smaller and 74% lighter, requiring 30% less energy when under load. In addition, it is securely packaged with 84% less packaging, which is 100% plastic free. The aluminium housing reinforces Cradlepoint's commitment to sustainably sourced and recycled materials.

Cradlepoint Australia Pty Ltd
www.cradlepoint.com/au

The transition from narrowband to broadband in critical communications

Information is important. Quality of Service is critical.

Change is never easy. This is particularly the case in environments where risk needs to be rigorously managed, such as critical communications. The evolution of technology has reached a threshold where traditional narrowband technologies such as TETRA (Terrestrial Trunked Radio) are beginning to coexist alongside ever-developing broadband technologies, including mission critical LTE. Use cases for broadband deployments are being explored, whilst the role of tried and proven TETRA solutions is under scrutiny.

Historically, critical communications systems have relied on narrowband technologies such as TETRA. Whilst these technologies are extremely effective in providing reliable voice communications, they have limitations when it comes to providing broadband data services such as video streaming, file sharing, and other data-intensive applications. Such use cases are increasingly relevant to public safety and other mission-critical users and the global critical communications market has been awaiting the shift from narrowband to broadband for some time.

With the arrival of the first true hybrid mission critical devices to the market, this is now becoming a reality.

Broadband technologies such as 4G LTE and 5G offer significantly higher data rates and greater capacity, making them well-suited for critical communications applications. The development of true hybrid mission-critical devices that can operate on both narrowband and broadband networks is a critical step in the evolution from narrowband to broadband communications for critical applications. For many, this is the best of both worlds, combining a proven, secure and standardised communication bearer (mitigating risk) with one that can future-proof the assimilation of data-intensive applications.

Benefits of transitioning to broadband

The transition from narrowband to broadband critical communications can provide a range of benefits for users.

- **Access to more services**
- **Improved situational awareness:** Broadband networks provide a range of data services, including video streaming, asset management, and other real-time data applications that can provide users with a more comprehensive understanding of the situation.
- **Rich Data:** Broadband networks offer significantly higher data rates, delivering more targeted responses and improved operational outcomes.
- **Cost benefits:** While the initial investment in a broadband solution may be higher than a narrowband solution, broadband networks can be more cost-effective over time due to their potential for device convergence and support for more data-intensive applications. .

Quality of Service demands

QoS is the overall performance of a communications network, as seen by the users of the network. To measure QoS quantitatively, several related aspects of the network service are considered, such as error rates, bandwidth, throughput, transmission delay and availability to communicate without delay and with complete reliability.

However, mission critical users need an assured Quality of Service (QoS) that guarantees communication is always available when it's needed. Land mobile radio (LMR) networks provide a high QoS for availability, reliability and security. Many of these networks worldwide are based upon the TETRA standard, providing narrowband voice and data services to its users. Mission-critical users will continue to rely on voice services but are evolving their operations to encompass more data services and applications, many of which can be carried over TETRA. But an increasing need for the use of data services such as video and high-speed data — which have higher bandwidth requirement than narrowband systems can deliver — will rely on broadband data services such as LTE.

Migration options

There are several choices available for users looking to transition from narrowband to broadband critical comms solutions.

Public Networks

Mission critical services can be run on public LTE networks, however without quality of service provisioning, hardening and coverage extensions to provide geographic coverage, these networks will not provide a mission critical service of the equivalent provided by LMR networks today. However, with provision of quality, priority and pre-emption services (QPP) as well as network hardening and coverage extensions, the use of MORAN or MOCN network architectures can provide a mission critical service utilising networks shared with the public.

When utilising public networks it is essential that Mission critical users receive an assured Quality of Service (QoS) that guarantees that communication is always available when it is needed. To provide quality of service quantitatively, several related aspects of the network service must be considered, such as error rates, bandwidth, throughput, transmission delay and availability to communicate without delay, with complete reliability. This is dependent upon the design and implementation of both the devices, applications and network to provide unfettered real-time access

Private LTE

Private LTE networks can be deployed to provide a dedicated, secure, high-speed network for critical communications within an organisation. Private LTE networks are typically used in industries such as transportation, utilities and mining and can be customised to meet the specific needs of the organisation.

Hybrid solutions

Hybrid solutions share the benefits of narrowband and broadband networks by combining the strengths of both technologies. For example, a hybrid solution may use narrowband voice communications for mission-critical voice communications, alongside a broadband network for data-intensive applications such as video streaming.

These solutions also offer access to proven ecosystems of accessories already used with TETRA devices, including those rated for extreme environmental and physical environments that would significantly shorten the life of consumer-grade products.

Key considerations in transitioning to mission-critical broadband

Transitioning from narrowband to broadband critical communications requires careful planning, evaluation and collaboration between stakeholders to ensure a successful transition. When planning the evolution of a system, there are several key considerations that users should keep in mind.

- **Expandability:** Android-based products can harness the power of a wide array of applications, which can evolve as use-cases advance.
- **Coverage and capacity:** Broadband networks need to provide equivalent geographic coverage and capacity to the narrowband networks they are replacing in order to ensure reliable communications for end users at all times.
- **Security:** Critical communications networks require a high level of security to protect against cyber threats and unauthorised access.
- **Device and accessory availability:** Not all users are the same. Installation options as well as power, audio and control accessory availability ensure deployments are user-centric, seamless and low risk.
- **Interoperability:** Formal interoperability processes are essential to ensure users have a wide choice of solutions, and to provide seamless communications to support coordinated responses during emergencies.
- **Training and support:** Users will need training and support to ensure that they can operate and maintain the new technology effectively.
- **Integration with existing systems:** Many organisations already have narrowband communications systems in place. It's important to consider how new broadband systems will integrate and interoperate with existing systems to avoid disruption and ensure continuity of operations.

Enabling broadband migration with a mobile hybrid solution

It is unlikely that any organisation relying on mission-critical communication systems would make a sudden switch to broadband services. Deployment of a hybrid solution delivers a transition phase, maintaining existing narrowband services and continuity of service as well as assisting the transition for end users. To that end, last year Sepura launched a dual-mode broadband vehicle device giving organisations the opportunity to continue to leverage existing mission-critical TETRA voice services, while taking advantage of broadband data connectivity via LTE as they plan and execute their migration to mission critical voice applications.

For organisations that aren't sure about a migration strategy to LTE, a dual-mode device offers the opportunity to continue using a proven solution with TETRA, while developing a strategy around broadband data services.

The Sepura SCU3 Broadband Vehicle Device is available in a dual-mode version combining broadband critical communications with a Class 3 TETRA module. The dual-mode option allows organisations to run hybrid fleets, with vehicles and control rooms using the dual mode device, and frontline staff using TETRA hand-held devices for critical voice communications. It offers support for 2G, 3G and 4G voice and supplemental data services (such as SMS and voicemail) and can also support high-definition video. The user experience has been a key consideration, with a single user interface for both MC-PTT and TETRA communications.

The use of a dual mode device also allows fallback to direct mode TETRA operation in the event of a loss of network availability — providing further advantages over an LTE-only solution.

Supporting Bluetooth, Wi-Fi, Ethernet and data routing capabilities, the SCU3 is already available with a range of accessories and ancillary systems, creating a mission critical communications hub suitable for use today and into the future.

sepura

www.sepura.com

Dispatch system

The Omnitronics **omni**core Enterprise Dispatch is a dispatch system for mining, public safety, resources, maritime, utilities, urban transport, government agencies, city councils and more. Suitable for medium to large organisations in mission- and business-critical operations needing to scale beyond 100 operators and/or 200 channels, **omni**core is compatible with existing Omnitronics gateways and features vendor-agnostic **omni**connect interoperability for those wanting to connect people, technologies, protocols and manufacturers.

The system has received the 2023 APCO International Technology Leadership Award at the national APCO Conference in Nashville, Tennessee for integrating Tait DMR T3 with the Illinois state-wide P25 network for interagency communications at Village of Melrose Park Department of Homeland Security and Public Safety.

The feature-rich system can be deployed in the cloud, a data centre or onsite with a plethora of functionalities included as standard, including many industry-specific features. Connection options include digital and legacy analog radio systems, phone, paging, SIP, IoT, SMS, etc.

The solution runs on COTS (commercial off-the-shelf) hardware and the floating licences model means organisations only pay for concurrent operators logging in simultaneously.

Customisable workflows combine complex operator actions into one-click actions; installing **omni**core on tablets and laptops means the dispatch console can flexibly be used from any location.

Call history and rapid recall provide the ability to instantly replay calls and store for later playback. SIP telephony provides operators with multiple phone lines, while CCTV, video, web and social media feeds can be displayed within the console. For smaller organisations, **omni**core Express Radio Dispatch Consoles provide a nearly identical breadth of functionalities with a lower operator and channel count.

Omnitronics Pty Ltd

www.omnitronicsworld.com

Semi-rugged laptop

Getac has announced its next generation S410 semi-rugged laptop, which delivers powerful processing and graphics performance in a sustainable design. The result is a versatile device designed to improve efficiency in the field while giving peace of mind to users in busy or challenging work environments — such as in the defence, manufacturing, public safety and utilities industries — where accidental knocks, bumps and drops can frequently occur.

The laptop features an Intel Core 13th generation i5/i7 processor as standard, which delivers high computing performance and rapid responsiveness to users. Integrated Intel Iris Xe graphics provide a rich visual experience, while an optional dedicated GPS chip offers improved location accuracy compared to previous generations. The laptop includes Wi-Fi 6E and Bluetooth 5.3, with optional 4G LTE and/or 5G Sub-6 with integrated GPS, to keep users connected in even remote locations.

The device can be fully configured to match different user scenarios. This includes up to three hot swappable batteries for those requiring ultralong battery life between charges, as well as numerous options in the media bay, from NVIDIA GeForce GTX 1650 discrete graphic controller, to a 1D/2D barcode reader, DVD or Blu-ray drive, to a second SSD storage device or additional battery. A wide range of compatible accessories and secure carrying/docking options enhance functionality even further, for more productivity in the field.

With over 24% of the chassis made from post-consumer recycled (PCR) materials, the laptop is the most eco-friendly device that Getac has manufactured to date, without compromising on its rugged nature. The product is both MIL-STD-810H certified and IP53 certified, as well as vibration and drop resistant up to 0.9 m, helping to protect against accidental damage in busy or challenging work environments.

The laptop's 14″ screen with sunlight-readable technology provides high visibility (1000 nits) in both internal and external environments, while multi-touch modes support various use cases, meaning tasks can be completed quickly and efficiently. Enhanced security features also help keep sensitive user data protected, including TPM2.0 and Intel vPro technology, user-replaceable peripheral component interconnect express (PCIe) non-volatile memory express (NVMe) SSD storage, and multi-factor authentication options such as Windows Hello Webcam, high-frequency RFID reader, smart card reader and fingerprint reader.

Getac Technology Corp

www.getac.com

VERIZON SURVEY REVEALS TOP PRIORITIES FOR FIRST RESPONDERS

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Verizon Frontline has released the results of its annual survey of nearly 2000 public safety professionals, revealing the value first responders place on network reliability, the evolution of mobility and the increasing impact of 5G.

Now in its third year, the Verizon Frontline Public Safety Communications Survey, conducted by Lexipol, was answered by first responders from fire and police departments, emergency medical services and emergency management agencies, as well as representatives from public safety answering points (PSAPs) and emergency call centres (ECCs). Respondents were asked about their current and future technology use, emergency preparedness and outlook on how 5G and advances in communications technology may impact their work in the field.

Reliability still reigns

Network reliability remains the chief priority for first responders. More than half of survey respondents (51%) cited a reliable and resilient network as the most important factor in their day-to-day professional communications. Additionally, almost half of all first responders (48%) said reliability and speed were the most important factors when choosing a public safety communications provider, in line with last year's results.

"The results of our third annual public safety communications survey once again underscore how important network reliability is to first responders," said Maggie Hallbach, Senior Vice President, Verizon Public Sector and President, Verizon Frontline.

Reliability as a priority is even more pronounced within the areas of emergency preparedness and response. Almost three-quarters of respondents (72%) stated that a reliable and resilient network was among the three most crucial communications considerations during emergencies, with 74% believing their agency is either somewhat or very prepared for an emergency.

Mobility is evolving

The devices most used on a daily basis by first responders in the field are smartphones (88%), land mobile radios (80%) and laptops (71%), though the survey revealed that fewer respondents expect to use these devices on a daily basis in five years, with only 84% saying they'd use smartphones daily, 69% saying they'd use land mobile radios daily and 67% saying they'd use laptops daily.

By comparison, the devices less likely to be used on a daily basis by first responders today are more likely to be used on a daily basis in five years. Less than half of respondents (49%) said they used tablets on a daily basis today, but almost two-thirds of them (65%) believed they would use tablets on a daily basis in five years. 43% use internet-connected vehicles on a daily basis, but 62% believed they would use them daily in five years. Other technologies more likely to be used daily in five years are wearables, drones/robots, and augmented and virtual reality (AR/VR).

5G is a must-have

As the prevalence of 5G continues to grow, so does awareness of 5G capabilities among first responders. In this year's survey, more than three-quarters of respondents (77%) considered 5G to be either an important or a top priority for the future of public safety. Overall, the number of first responders who viewed 5G as a top priority increased by five percentage points (from 18% last year to 23% this year). More and more, first responders see technology enabled by 5G connectivity as critical to public safety.

Other key findings from the survey include:

- 65% of first responders said they would like a stronger connection in the field, up from 60% last year. This desire for a stronger connection lines up with one of the main concerns of 67% of respondents — having an unreliable network.
- Smartphones are the devices most used by first responders today, with 88% of respondents saying they use smartphones on a daily basis, but that number is declining. Last year, 92% of respondents said they used smartphones daily. Also, only 84% of this year's respondents said they anticipate using smartphones daily in five years.
- 43% of first responders feel unprepared for cyber attacks.
- 43% of first responders expect to use robots on a daily basis in five years (compared to 13% now).

The full survey results can be viewed at https://www.verizon.com/about/news/frontline-public-safety-communications-2023.

Bluetooth hearing protectors

The Savox Noise-COM 500 products are Bluetooth hearing protectors designed for use in harsh, noisy operations. They are suitable for use in construction, mining or other heavy industries where using hearing protectors is vital, and the ability to communicate with clarity is of equally high importance. The robust hearing protectors combine ambient sound quality with a noise-cancelling microphone for clear speech.

As the hearing protectors can be connected to various Bluetooth two-way radios or mobile phones, users can listen to audio as well as make and receive phone calls. The ambient sound feature allows users to hear surrounding sounds such as speech or warning signals while blocking out high-level, harmful noises. There is also an easily accessible rotary button for push-to-talk and ambient sound volume adjustment. With the Savox Noise-COM 500XP model, there is an added possibility to define ambient sound audio profiles for different occasions.

The hearing protector features a voice-prompted menu, built-in rechargeable battery, noise-cancelling boom microphone, low battery warning and automatic switch off.

Savox Communications

www.savox.com

Bluetooth interface module with wireless PTT

GME's XRS-BT1 is an interface module providing full Bluetooth audio connectivity and wireless PTT (push-to-talk) functionality to the full range of XRS Connect UHF CB radios. Bluetooth audio connectivity allows the module to wirelessly connect to an extensive range of third-party audio accessories including headphones, hearing aids and vehicle stereo systems, providing users with plenty of ways to stay connected.

Included in the kit is an adjustable steering wheel clamp that provides a simple mounting solution for the IP67 wireless PTT button, and a wired hands-free microphone with a 1.8 metre cable for easy mounting options. The PTT clamp design provides access to the battery without the need to remove it from the steering wheel, and the PTT can also be removed from the clamp and mounted to an alternative location using the dash mount kit supplied.

GME Pty Ltd

www.gme.net.au/au-pro/

Low-profile MiMo 4G antenna range

The LPM2-7-27 antenna range has been designed to provide MiMo 4G/LTE coverage in an ultralow-profile package (30 mm high). The compact, robust housing is weatherproof and contains two antenna elements with effective isolation and low correlation coefficient covering 698–960/1427–2700 MHz.

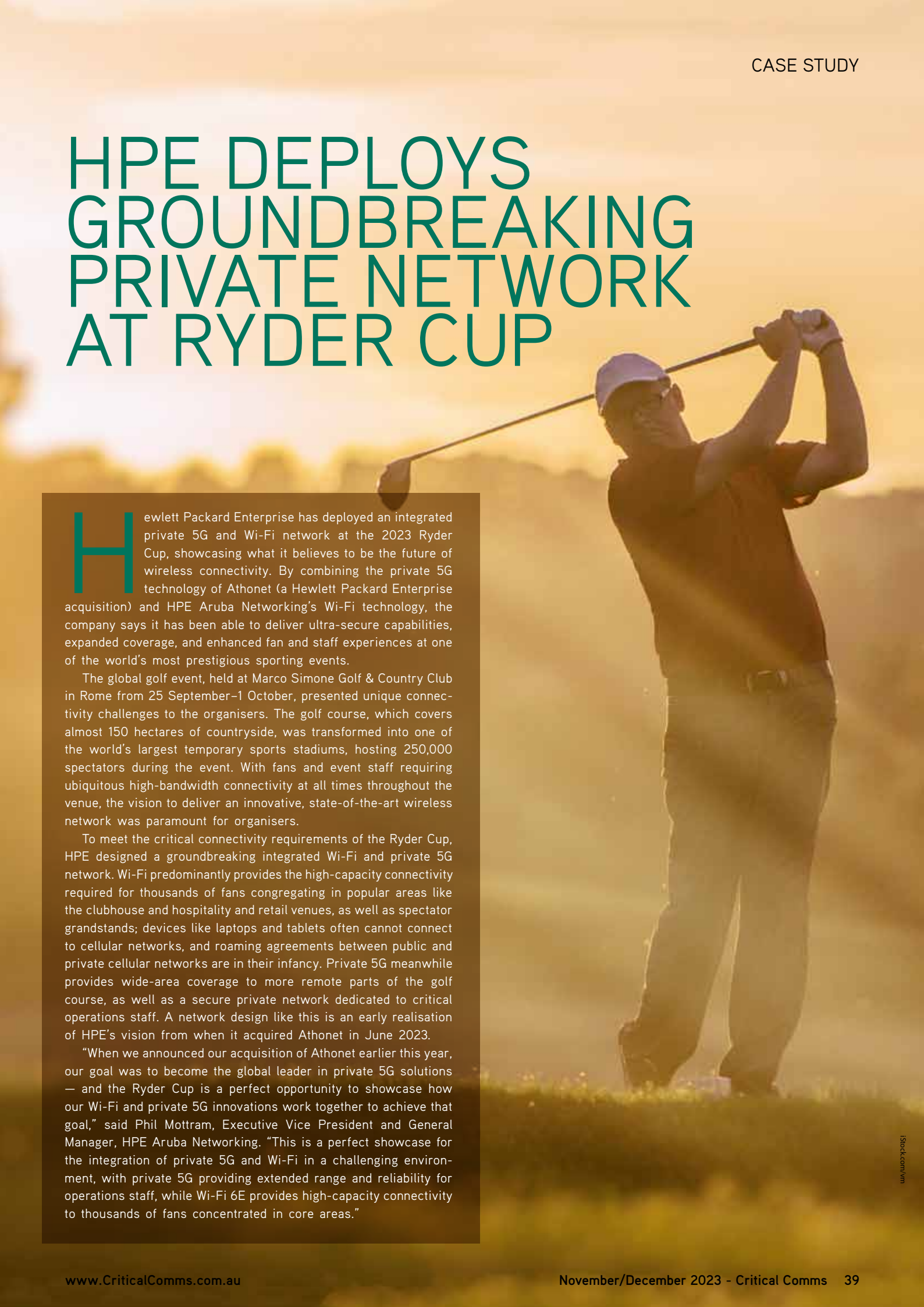
The antenna is designed to be panel mounted. Supplied with integrated flame retardant RG174 (compliant to UN ECE 118.03) cables and SMA plug connectors, the antenna will offer plug-and-play connectivity with many different routers and modems. It is supplied in black flame retardant LEXAN EXL9330 plastic as standard.

The product is engineered specifically for installation on a nonconductive ground plane and performance will be detrimentally affected by installation on a metallic or conductive panel. It is IP69K and IK10 rated.

Panorama Antennas Pty Ltd

www.panorama-antennas.com

HPE DEPLOYS GROUNDBREAKING PRIVATE NETWORK AT RYDER CUP



Hewlett Packard Enterprise has deployed an integrated private 5G and Wi-Fi network at the 2023 Ryder Cup, showcasing what it believes to be the future of wireless connectivity. By combining the private 5G technology of Athonet (a Hewlett Packard Enterprise acquisition) and HPE Aruba Networking's Wi-Fi technology, the company says it has been able to deliver ultra-secure capabilities, expanded coverage, and enhanced fan and staff experiences at one of the world's most prestigious sporting events.

The global golf event, held at Marco Simone Golf & Country Club in Rome from 25 September–1 October, presented unique connectivity challenges to the organisers. The golf course, which covers almost 150 hectares of countryside, was transformed into one of the world's largest temporary sports stadiums, hosting 250,000 spectators during the event. With fans and event staff requiring ubiquitous high-bandwidth connectivity at all times throughout the venue, the vision to deliver an innovative, state-of-the-art wireless network was paramount for organisers.

To meet the critical connectivity requirements of the Ryder Cup, HPE designed a groundbreaking integrated Wi-Fi and private 5G network. Wi-Fi predominantly provides the high-capacity connectivity required for thousands of fans congregating in popular areas like the clubhouse and hospitality and retail venues, as well as spectator grandstands; devices like laptops and tablets often cannot connect to cellular networks, and roaming agreements between public and private cellular networks are in their infancy. Private 5G meanwhile provides wide-area coverage to more remote parts of the golf course, as well as a secure private network dedicated to critical operations staff. A network design like this is an early realisation of HPE's vision from when it acquired Athonet in June 2023.

"When we announced our acquisition of Athonet earlier this year, our goal was to become the global leader in private 5G solutions — and the Ryder Cup is a perfect opportunity to showcase how our Wi-Fi and private 5G innovations work together to achieve that goal," said Phil Mottram, Executive Vice President and General Manager, HPE Aruba Networking. "This is a perfect showcase for the integration of private 5G and Wi-Fi in a challenging environment, with private 5G providing extended range and reliability for operations staff, while Wi-Fi 6E provides high-capacity connectivity to thousands of fans concentrated in core areas."

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> PRIVATE 5G PROVIDED BACKHAUL CONNECTIVITY TO SOLAR-POWERED WI-FI ACCESS POINTS IN MORE REMOTE PARTS OF THE GOLF COURSE.

"Each Ryder Cup gives us an opportunity to push the boundaries of technological innovation to maximise the fan experience, so it is really exciting to be breaking genuinely new ground with the combination of world-class Wi-Fi and private 5G technology," added Michael Cole, Chief Technology Officer of the European Tour group and Ryder Cup Europe.

"Private 5G brings huge operational benefits in particular, providing us with a fully private network that will be unaffected by the crowd's high demand for high-bandwidth applications. It gives us full course coverage for cellular devices providing critical services like security, stewarding, ticketing and scoring that might have otherwise relied on the under-pressure local telecoms networks."

The network leveraged the latest Wi-Fi 6 and Wi-Fi 6E technologies, delivering twice as much capacity as Paris 2018 via more than 800 Wi-Fi access points. The backbone of the network was built on 200 HPE Aruba Networking CX switches with AI-powered HPE Aruba Networking Central for network management providing a single point of visibility and control across the entire network. The dashboard within HPE Aruba Networking Central also provided AI-powered insights into what was happening across the entire environment from a network troubleshooting, optimisation and security perspective. HPE Aruba Networking ClearPass provided secure, efficient access control and onboarding for improved spectator experience across the Wi-Fi infrastructure.

Powered by insights from the network, spectators were able to virtually navigate the golf course, jump the queues for merchandise and food, and track player locations — no matter where they were on the course. Similarly, operations staff could monitor fan behaviour, assign more staff during peak periods, and provide fan activations on the fly. Running the network and compute environment from the HPE GreenLake edge-to-cloud platform meant less equipment was required onsite and it was more cost-effective and quicker to deploy and manage.

The private 5G network covered the golf course with one radio mast located in a central location powered by the Athonet Tactical Cube, a compact and mobile private cellular solution for mission-critical applications. Private 5G provided backhaul connectivity to solar-powered Wi-Fi access points in more remote parts of the golf course, extending the coverage of the Wi-Fi network without the need for cabling. This was important as, due to archaeological reasons, cables could not be buried in certain parts of the site. Private 5G also provided a secure, segmented network for delay and capacity sensitive critical operations that need guaranteed bandwidth, such as security, stewarding and transport.

Italy has allocated all 5G spectrum to mobile service providers, so spectrum is not normally available direct to enterprises, but the Italian Government made an exception for the Ryder Cup. The Ministry of Communications gave access to the 3.8 GHz band, which is ideal for 5G because it can carry plenty of data while travelling significant distances. HPE suggests that governments can help to realise the potential of private 5G around the world by making spectrum available to enterprises, telcos and technology vendors for innovative use cases such as at the Ryder Cup.

Ultralight business two-way radios

Hytera Communications has released its Ultralight Business Two-way Radios, the AP32X and BP36X, featuring a lightweight design and professional PTT (push-to-talk) features that empower business users to boost efficiency and productivity. The radios can be used to improve communication and streamlined operations whether the user is indoors or outdoors.

The two-way radios are suitable for users who need to maintain effective communication in bustling environments like shopping malls, supermarkets and construction sites. Featuring a powerful 3 W speaker with an advanced noise-cancellation algorithm, the radios provide crystal-clear audio even amid noisy surroundings. With sensitivity of 0.18 μV, the radios provide seamless communication throughout the workspace, regardless of location.

The radios are equipped with a long-lasting 2200 mAh Li-polymer battery, capable of enduring beyond a 10-hour shift, which takes just 2.5 h of charging to reach full capacity. The user can swiftly program and upgrade the radios using the convenient Type-C USB port, enabling charging on the go with a power bank.

The radios feature a sleek, slim design complemented by a 4.5 cm ultra-stubby antenna, offering users the flexibility to stand, sit or move around with ease while wearing the product around the waist. The radios also come packed with a range of features to streamline the work process.

Voice announcement functionality means that essential information like channel names, zones or battery level is audibly conveyed, eliminating the need to glance at the display for updates. This quick audio feedback keeps the user informed at all times. Meanwhile, the Voice Operated Transmit (VOX) feature allows for hands-free communication with the AP32X, as there is no need to press and hold the PTT key to initiate a call. These convenient and practical features empower users to carry out their tasks effortlessly and efficiently.

Hytera Communications Co. Ltd
www.hytera.com.au

CASE STUDY

Comms system improves safety in complex environments

RISE Pacific is an expert company in rigging, access and rescue in the broadcast, aerial and stunt worlds across live entertainment venues. While looking to source accessories and parts for its existing fleet of Motorola digital radios, the company ultimately engaged intercom specialist D2N – Technology Solutions to assist with utilising newer technologies for its onsite communication requirements.

"Operating in complex vertical and confined-space environments means communications are absolutely critical to our team's safety and ability to efficiently achieve a given scope of works," noted RISE Pacific's Design And Sales Manager, Dane Boulton. "What really interested us was the potential to deploy a solution that would allow constant duplex communication with all members of the work party.

"Not only does this allow our technicians to communicate even when both hands are busy ... it also removes the risk of a team member being blocked from passing an urgent message when a radio channel is busy. This is something that poses a major risk when comms systems are being relied upon as a primary means of communication in safety-critical rope-access and confined-space operations."

RISE Pacific required a comms system that was both durable and compatible with an AS-approved hearing protection/communications earmuff. It also had to be able to maintain interoperability with the company's existing fleet of digital Motorola radios. To meet these requirements, D2N proposed a comprehensive Riedel Bolero solution that is known for its flexibility and durability.

"The standalone Riedel Bolero system with audio interface and radio PTT input provided exactly what we were hoping to achieve, by allowing us constant duplex communication between our operators wearing wired or wireless Bluetooth 3M Peltor communications/hearing protection headsets and helmet-attached earmuffs," Boulton said.

"Not only did this provide our technicians hearing protection in noisy environments but also clear, articulate communications between them — regardless of whether they were one metre or hundreds of metres apart from each other. The beltpacks have proved incredibly durable in use, and the ability to interface with our existing fleet of Motorola MOTOTRBO radios allows us to easily scale the system up by providing radios to less critical members of the work party.

"With the Bolero system our technicians can quickly and easily connect their 3M Peltor headsets via Bluetooth and join the communications network onsite. We will often have a party-line just for users on Bolero that also includes our radio interface, a party-line that broadcasts to a speaker at our base station for communications with standby rescue operators and the client, and a party-line for external audio such as overload alarms from our Broadweigh load monitoring system or music for those really long days onsite. Another major plus is that we can easily get through a day or more's work with the battery life of the Bolero."

RISE Pacific's system is packaged in a rolling rack case that includes the Bolero system, NSA audio interface, radio interface and an IP camera system for monitoring of confined spaces and worksites. For less complex jobs the company can easily package antennas and beltpacks in a small case for easier transportation to the site. Deployment is quick, with the antennas being connected back to the rack with a single Ethernet cable handling both data and PoE power for the antenna.

For Boulton, the benefits of the D2N comms solution are plentiful. He said, "When we pass our clients a headset they get crystal-clear, low-latency communications made completely frictionless by the fully duplex, always-on nature of the system. This coupled with good hearing protection and ambient noise reduction is an incredibly powerful tool even on the most complex, loud and communication-hampering sites.

"So far, we've utilised the system in complex confined spaces where our technicians have been separated vertically including in a 160-metre-deep ventilation and maintenance shaft which was a very harsh RF environment and on a working airfield where, even with an extremely high levels of ambient noise, a ground team could clearly communicate with riggers working nearly 25 metres off from the ground in large boom lifts. Completing jobs of this nature smoothly and efficiently with clear communication between the team would not have been possible without such an effective means of communication."

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Critical communications — a period of considerable change

As a young electronics engineer from the Netherlands I arrived in Australia in the 1970s, joining Siemens Australia and then the Philips Telecommunications Manufacturing Centre in Victoria, which predominantly was involved in the design and manufacturing of land mobile radio as part of the global Philips company. This started my long career in the critical communications sector which took me to Europe, Singapore, South Asia and back to Australia.

My involvement in the Australasian Critical Communication Forum (ACCF) stemmed from my belief in the principle that Philips followed open standards that continually foster multivendor participation and sustain innovation across the entire ecosystem to address evolving user demands whether in consumer or critical industries — the company developed and followed open standards such as POCSAG, MPT1327 and TETRA in the 1990s.

The ACCF at its earliest stage some 20 years ago promoted TETRA as the pre-eminent solution for critical voice and short data LMR communications, supported by the TETRA MoU Association in Europe — now the global TCCA.

TETRA could not have become the global success story it is without its basis in standards, as well as the many manufacturers who saw it as an opportunity to grow a market through competition. The same scenario goes today for critical broadband standards being developed through 3GPP and its many global members, many of them TCCA and ACCF members.

The ACCF and TCCA provide an important global platform for collaboration, information exchange and cooperation. The ACCF and TCCA have more than 150 member organisations globally, comprising governments, public safety, manufacturers and vendors, integrators, operators and users in transportation, utilities and the resources industries. It is exciting to see just how much benefit can be achieved through collaboration and cooperation between like-minded individuals and organisations working towards the common good.

The critical communications landscape is undergoing a period of considerable change due to the ongoing adoption of broadband radio by mission-critical users across the world. TCCA, through ETSI and 3GPP, is helping to steer the global development of standardised critical communications broadband solutions and ACCF is supporting this in the Australasia/Oceania region.

The Australian critical communications landscape is undergoing a considerable change where government, industry and other verticals realise that mission- and business-critical features are becoming increasingly relevant to them as they continue to leverage broadband for their services. The government PSMB initiatives, the New Zealand NGCC initiatives and the strong interest in private LTE and private 5G in mining and transportation will provide important changes in the way we use critical communication tools.

The Australasian LMR landscape will change but I see critical PMR such as P25, TETRA and DMR featuring in our market for a long time to come, as least as long it takes for critical broadband to become a mature, well-proven and trusted critical communications technology. LTE is going to bring a lot of benefits to that landscape, but the more we look into this, the more I'm convinced that the PMR platform is going to remain for the foreseeable future, and LTE and/or 5G will build on that.

Standardisation — as well as interoperability testing, certification and stakeholder community collaboration — are processes in which TCCA has huge involvement. It remains the guardian of the TETRA standard and supports ETSI's interoperability testing for the various Releases of the 3GPP critical broadband standard — for example, with the ETSI MCX Plugtests. Supporting the industry in awareness, education and training with regards to critical broadband standards is critical. That makes ACCF's affiliation with TCCA so important as our link to the rest of the world, and I am proud to be able to continue to support the ACCF in its critical work.

Following 15 years as a director of the Australasian Critical Communications Forum (ACCF), Anton Abrahams is stepping down from the ACCF board, but will remain involved with the work of the Forum as a member.

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