JAN/FEB 2023 Vol.10 No.2

comms critical

PUBLIC SAFETY | UTILITIES | MINING | TRANSPORT | DEFENCE

PR1000007393

RADLINK'S SOLAR ARRAY AND TOWER
in the pilbara with communications shelters done to client specifications

radlink COMMUNICATIONS

CAELUS

ALL-NEW, ALL-IMPROVED

Hytera's Latest Products Out Now in ANZ

NEXT GENERATION

Hytera Authorized Distributor

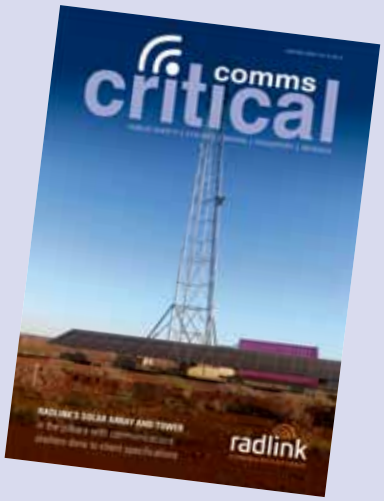
Caelus Wireless Pty Ltd sales@caeluswireless.com.au caeluswireless.com.au

comms critical

Inside

January/February 2023

ON THE COVER



Providing a high-quality client experience is as important as the delivery of any technical solution. When delivering a project, the managing of customer expectations in terms of time, cost and quality are critical in the overall delivery equation. Once the project is delivered, the business benefits of productivity, safety and efficiency need to be realised along with the improved overall user experience.

As a leading Australian technology integrator, Radlink Communications has a track record of delivering successful projects across a wide range of industry sectors. Through all the project phases — from initial scoping and design to supply and construct, installation and commissioning — Radlink staff listen and adapt to client needs. Importantly, measuring not just the technical deliverables, Radlink takes pride in upholding and measuring itself against its core values of Quality, Can Do and Integrity.

The technical world can often become fixated on the delivery of a pure technical solution, often to the detriment of the end-user experience and sometimes losing sight of the key business drivers. Radlink prides itself on a pragmatic approach that encourages staff to utilise active listening skills. Whether it is solution architects, engineers, drafts people, technicians or apprentices engaged with the client, it is expected that emotional intelligence is utilised to respectfully work to attain the best possible outcome for the client.

Radlink Communications
www.radlink.com.au

Cover image shows a Radlink project — solar array and tower in the Pilbara with communications shelters done to specific client specifications.

Do you read me?

Welcome back to *Critical Comms* for our first issue of 2023; I hope you all enjoyed the festive period and had a chance to relax and unwind for at least a few days. For me the Australian summer will always be associated with cricket season (the sport, not the insect), and I have fond memories of listening to the ABC commentary on the car radio during long holiday road trips. For others, of course, the summer may carry less fond memories of life-threatening bushfires and emergency radio broadcasts carrying vital information on when and how to evacuate. We can indeed be thankful that such technology is readily available in both critical and non-critical situations.

While many of us find our workloads winding down in December/January, things have recently started ramping up at the site of the SKA-Low radio astronomy observatory in Western Australia. Over the course of an eight-year construction period, which got underway in December, the observatory will become home to over 131,000 antennas, to be complemented by 197 dishes in South Africa. These instruments are set to provide an unparalleled view of the universe, helping scientists tackle fundamental scientific questions ranging from the birth of the universe to the origins of life. For more information on the observatory and the accompanying Radio Quiet Zone in Western Australia, see our lead article on page 6.

The astronomy theme continues as we cover the development of search and rescue technology for astronauts (page 31) and a new milestone in the mission to build the first global cellular broadband network in space to operate directly with standard mobile phones (page 22). But there's also plenty going on down here on Earth, with other highlights this issue including connectivity solutions for smart mines (page 14) and smart buses (page 26). So read on!

Lauren Davis, Editor
cc@wfmedia.com.au

Calendar

February

ETSI Research Conference
6–8 February 2013
Sophia Antipolis, France
https://www.etsi.org/events/2130-etsi-research-conference

Radio Communications 101 Workshop
6–10 February 2013
Online
https://www.comms-connect.com.au/event/radio-comms-101/

Mobile World Congress 2023
27 February–2 March 2023
Fira Barcelona Gran Via, Spain
https://www.mwcbarcelona.com/

March

BAPCO 2023
7–8 March 2023
Coventry Building Society Arena, UK
https://www.bapco-show.co.uk/

SATELLITE 2023
13–16 March 2023
Walter E. Washington Convention Center, USA
https://www.satshow.com/

ARCIA One-Day Conference
22 March 2023
Aloft Perth, WA
https://arcia.org.au/events/one-day-conference-perth-march-2023/

April

EENA Conference & Exhibition 2023
19–21 April 2023
Ljubljana, Slovenia
https://eenaconference.org/

May

Critical Communications World
23–25 May 2023
Messukeskus Helsinki Expo and Convention Centre, Finland
https://www.critical-communications-world.com/

June

Comms Connect New Zealand
13–14 June 2023
Te Pae Christchurch Convention Centre, NZ
https://www.comms-connect.co.nz/

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

wfmedia connecting industry

40 CELEBRATING YEARS

Editor: Lauren Davis
cc@wfmedia.com.au

Publishing Director/MD: Geoff Hird

Art Director/Production Manager: Julie Wright

Art/Production: Linda Klobusiak, Marija Tutkovska

Circulation: Dianna Alberry
circulation@wfmedia.com.au

Copy Control: Mitchie Mullins
copy@wfmedia.com.au

Westwick-Farrow Media
A.B.N. 22 152 305 336
www.wfmedia.com.au

Advertising Sales

Tim Thompson Ph 0421 623 958
tthompson@wfmedia.com.au

Liz Wilson Ph 0403 528 558
lwilson@wfmedia.com.au

Head Office
Unit 7, 6-8 Byfield Street, North Ryde
Locked Bag 2226, North Ryde BC NSW 1670
Ph: +61 2 9168 2500

Print Post Approved PP100007393
ISSN No. 2202-882X
Printed and bound by Blue Star Print

powerbox
Powering Progress

Reliable backup power

For hybrid, off-grid and grid-connected telecommunications networks.

POLARIUM SMART LITHIUM-ION BATTERIES

Key Features

- Smart batteries specifically designed for the telecom environment
- Available in both NMC and LFP chemistries.
- Up to 300AH in 4RU footprint
- Variety of form factors to fit most standard enclosures
- Intelligent features to allow easy replacement of VRLA batteries without complicated settings or adaptions
- Ease of use – plug 'n' play
- Each battery has a battery manager which can interface with remote site management system or rectifier platforms (Enatel, Eltek, CET, etc.)
- Polarium Charge Control makes batteries independent of current control from power system

OFFICIAL SUPPLIERS OF
Polarium

Sustainable
The lifetime is extremely long. It's small, light, maintenance free and can be remotely controlled

Safe
All our products are designed with your safety in mind - throughly verified and certified for safe operation

Simple
Advanced technology made super easy to use, easy to install, maintenance free, charge control

Secure
Our unique, patented Anti-Theft Device disables function of batteries if removed from site (GPS tracker optional)

Smart
Automatic balancing, automatic reconnect, remote monitoring options and much more

Strong
Works in all conditions and environments with extra protection against dust and moisture for prolonged life

Powerbox Australia Pty Ltd

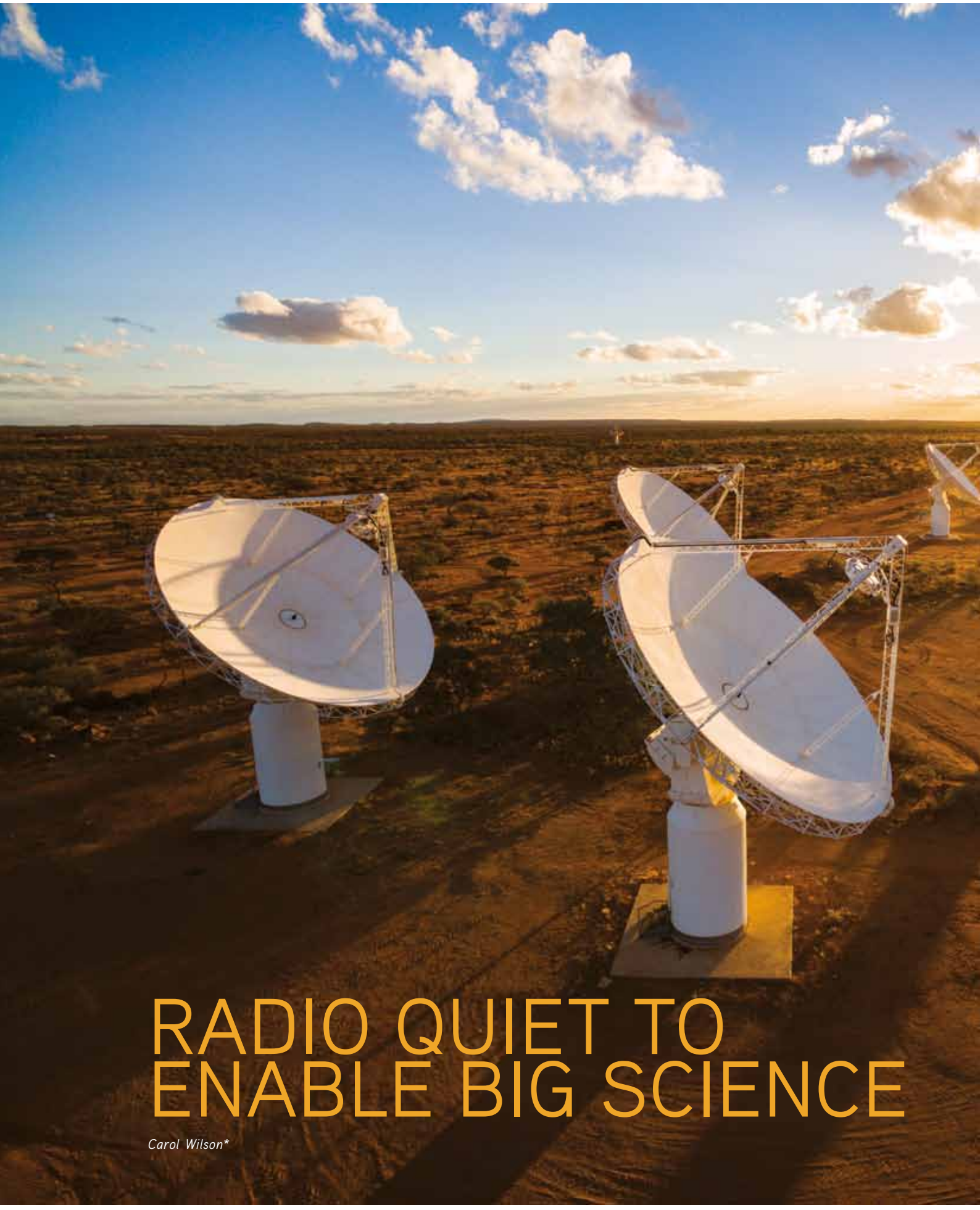
Sydney Head Office
4 Beaumont Road,
Mt Kuring-Gai, NSW 2080
Australia

p: +61 (0)2 9457 2200
f: +61 (0)2 9457 2255
e: sales@powerbox.com.au
powerbox.com.au

Powerbox Pacific Ltd

New Zealand Sales Office
1a Henry Rose Place,
Albany, Auckland
New Zealand 0632

p: +64 (0)9 4158 320
f: +62 (0)9 4159 780
e: sales@powerbox.co.nz
powerbox.co.nz



RADIO QUIET TO ENABLE BIG SCIENCE

*Carol Wilson**


Image credit: CSIRO.

For years, a huge adventure in science has been quietly taking place in Western Australia. Now a new stage is starting with the construction of an international telescope. This is the story of the site, the telescopes, and the radio quiet measures to protect them.

What is radio astronomy?

Everyone knows stars emit light. Starlight is produced by physical processes, and even at the speed of light, it can take millions or billions of years to reach Earth. Looking at the stars is literally looking back in time.

It's less well-known that stars give off radio energy, as do other objects in space, such as dust or gas clouds. These radio signals aren't coded with information like mobile phones or FM radio, so they appear as noise or static. Measuring the frequency and power of this radio noise provides information about the chemistry of celestial objects and their location, size and speed relative to Earth. This measurement is radio astronomy. It complements optical astronomy (and at other wavelengths) to study the structure of the universe, just as X-rays, CT scans and MRI complement each other in a medical assessment.

Radio energy from stars is very faint — it's produced by atomic and molecular transitions which are individually extraordinarily small, multiplied by the large number of atoms in a star or dust cloud. These signals travel for billions of billions of kilometres, so the energy measured on Earth is many orders of magnitude less than human-made radio signals. Radio astronomy observations therefore require large receiving antennas (or a distributed array), specialised sensitive receivers and long integration times.

The radio frequencies emitted by cosmic objects are fixed by their chemical and/or physical components. For example, neutral hydrogen has a rest frequency of 1420.406 MHz. Due to the expansion of the universe, cosmic objects are not only moving away from Earth, but are moving faster the further away they are. The Doppler shift means the observed frequency is much lower than the rest frequency. Consequently, radio telescopes need to observe over frequency bands allocated to radiocommunication services.

The next generation

Ideally, radio telescopes are built in areas with minimal interference from other radio sources. Those designed in the mid-20th century, such as CSIRO's Parkes radio telescope Murriyang (The Dish) in NSW or Jodrell Bank in Manchester, UK, were built when radio communication was far less ubiquitous. Over time the growth of radio communications, particularly mobile radio devices, has created significant radio frequency interference (RFI) at such sites.

In 1993, the International Union of Radio Science (URSI) established a working group to plan a next-generation radio telescope with 100 times the spatial resolution and 100 times the sensitivity of existing instruments. It was estimated that this would allow observations to the edge of the observable universe and therefore to the first few moments after the Big Bang. The original concept was to have an effective collecting area of about 1 km^2 and observe from 100 MHz to 25.25 GHz, with different technologies to cover the low, middle and higher frequency ranges.

Among the many considerations about where to build this telescope, a site with significant protection from radio frequency interference was a key requirement. Five countries — Argentina, Australia, China, South Africa and the USA — bid in 2003–04 to host the project. Following evaluation and preliminary RFI measurements, Australia and South Africa were shortlisted. After further studies and measurements, it was decided in 2012 to split the telescope between the two countries. The low-frequency component, SKA-Low, observing at 50–350 MHz with dipole antennas, will be built in Australia. The mid-frequency component, SKA-Mid, covering 350 MHz to 15.4 GHz with parabolic dishes, will be constructed in South Africa. This is now the SKA project, managed by the SKA Observatory.

The Australian site

Australia proposed a site on Wajarri Country in Murchison Shire, Western Australia, which has no gazetted towns, is approximately the size of the Netherlands and has a population of around 100 people. The region includes the Pia Wadjarri Aboriginal community, large pastoral stations and mining. As a result of the low population density, there is little radio frequency interference from terrestrial systems. The nearest cell tower and broadcasting site are at Cue, about 150 km away.

CSIRO, Australia's national science agency, acquired the lease for Boolardy Station, which has an area of 3467 km^2, to establish an observatory. Precursor telescopes were constructed to test technology solutions, to demonstrate the benefit of the radio quiet

protection, and as world-class instruments in their own right. The observatory currently hosts the Murchison Widefield Array (MWA), constructed by Curtin University and international partners and completed in 2013; CSIRO's ASKAP radio telescope, completed in 2014; and the 'Experiment to Detect the Global EoR Signature' (EDGES), which started observations in 2015 and is operated by Arizona State University and MIT.

In November 2022, the Murchison observatory was given a dual Wajarri name — Inyarrimanha Ilgari Bundara, the CSIRO Murchison Radio-astronomy Observatory — incorporating a Wajarri phrase meaning 'sharing the sky and stars'.

After years of planning and design work, the commencement of construction for SKA-Low was announced on 5 December 2022; construction is expected to take eight years. SKA-Low will consist of more than 131,000 dipoles deployed in 512 stations, with a dense central core and three spiral arms, with a diameter of about 80 km.

The Australian Radio Quiet Zone Western Australia

Early in the planning stages, CSIRO approached the Australian Communications and Media Authority (ACMA) to seek RFI protection. The ACMA implemented an embargo in 2005 and a policy document, RALI MS 32, in 2007 which defined the Australia Radio Quiet Zone Western Australia (ARQZWA), updated in 2014 with minor technical changes. Key points of this policy were formalised in legislation through a Radio Frequency Band Plan in 2011.

RALI MS 32 stipulates that within 70 km of the centre of the ARQZWA, the ACMA is unlikely to issue any new apparatus licences in the frequency range 70 MHz to 25.25 GHz. Concentric coordination zones start at 70 km and vary in size depending on frequency, with the largest zone having an outer radius of 260 km for the frequency range 70 to 230 MHz, and smaller radii as the frequency increases. Within these zones, applicants for new apparatus licences must consult with CSIRO to show that the RFI from the proposed equipment will meet defined thresholds. Similar requirements apply to transmitters deployed under spectrum licences. Various class licences state that the user must not operate transmitters within the 70 km zone if they interfere with radio astronomy observations.

To minimise interference from incidental emissions, the Western Australian Minister for Mines and Petroleum created 'Section 19' zones under the Mining Act (WA) where new mining tenements would not be granted. The WA Department of Mines and Petroleum

Image credit: Department of Industry, Science and Resources.

Image credit: Chris Brayton, CSIRO.

(now DMIRS) implemented a Radio Telescope Mineral Resource Management Area where mining companies must work with the observatory to ensure that their activities are compatible with radio astronomy.

The Murchison Shire Planning Scheme includes requirements that new developments are evaluated for radio interference potential. And the telescope equipment itself is subject to strict requirements and shielding to avoid causing local interference from incidental emissions.

This unprecedented level of RFI control was a significant factor in Australia's successful bid to host SKA-Low. It has already led to world-class astronomy results in frequency bands that cannot be used elsewhere in the world, particularly in 700–1000 MHz.

Nerida O'Loughlin, Chair and Agency Head of the ACMA, has said, "As Australia's spectrum planner, we are proud that our partnership with CSIRO and industry has created the conditions to support the radio astronomy successes at the Murchison observatory."

Implications of the Radio Quiet Zone

CSIRO seeks to minimise the impact of the ARQZWA on residents and industry while still providing protection for radio astronomy. It must be emphasised that the telescopes are passive receivers and cannot cause interference to other radiocommunication systems.

It is understood that radio communications are essential to safety in such a remote area, and none of the radio quiet measures restrict use in a genuine emergency. While the use of satellite phones is discouraged under class licence conditions, none of the measures affect the coverage of the region by systems like Iridium, Globalstar, Thuraya or Inmarsat. Starlink has chosen not to provide coverage in the 70 km Inner RQZ to avoid having its subscribers create interference to the telescopes, but this limitation is currently being re-evaluated. Some mining activities may be restricted or may need to find alternative technologies, and CSIRO has worked constructively with several companies to find solutions. Similarly, some remote monitoring systems for pastoral stations cannot be used, but CSIRO is available to work on alternatives.

In summary, CSIRO is available to work with the radiocommunications industry and local people to facilitate essential communications while preserving the radio quiet that underpins future science. Please contact the author for further discussions if there are questions or concerns.

**Carol Wilson is a radiocommunications engineer at CSIRO. Her early research was on satellite propagation, and at CSIRO she has led projects on radiowave propagation for Wi-Fi, broadcasting, mobile and point-to-multipoint systems. Since 2015 she has been Chairman of ITU-R Study Group 3 on Radiowave Propagation, developing standard models for use in global spectrum regulations. She is currently part of the observatory Site Entity team, focusing on the prediction and prevention of RFI at Inyarrimanha Ilgari Bundara, the CSIRO Murchison Radio-astronomy Observatory.*

CSIRO
https://www.csiro.au/

ICOM

How the World Communicates

INTRODUCING

IC-F6130D
UHF DIGITAL TRANSCEIVER

IC-F5330D
VHF DIGITAL TRANSCEIVER

IC-F6330D
UHF DIGITAL TRANSCEIVER

IP740D
HYBRID HANDHELD LTE UHF RADIO

Designed to Support Your Critical Comms

iDAS ICOM DIGITAL ADVANCED SYSTEM NXDN™

Icom offer a unique and diverse range of Communication Products, from Land to Sea, to Air and Satellite. Icom Australia have the expertise to support integration for wide-area and critical communications, including P25.

For support, contact our Systems team
sales@icom.net.au
(03) 9549 7500

Made in JAPAN

www.icom.net.au

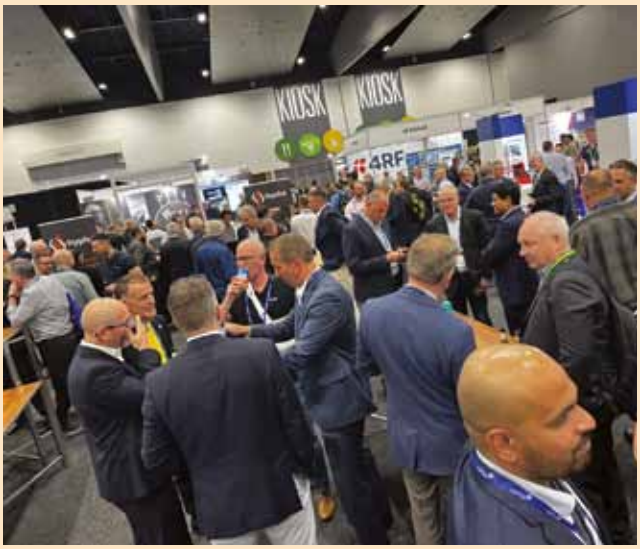
COMMS CONNECT: KEY 2023 DATES FOR LIVE AND VIRTUAL EVENTS

The team at Comms Connect have announced 2023 dates for their live events in Christchurch and Melbourne, as well as the first of their virtual training courses for the year.

The next edition of the Radio Communications 101 online course will now take place in the week of 6 February, with five two-hour sessions running on each day that week. Full details and registration are available at https://www.comms-connect.com.au/event/radio-comms-101/.

Comms Connect NZ will take place from 13–14 June at Te Pae Convention Centre in Christchurch, following the success of the event held in 2022 at the new venue. Following the initial strong response to exhibition stand sales opening, the organisers are now contracting some extra space at the venue. A call for conference papers will go out to the market in late January.

Comms Connect Melbourne will again be held at the Melbourne Convention and Exhibition Centre from 18–19 October. An expanded floor plan has already been launched and initial feedback points to a 25–30% larger exhibition than 2022. A call for conference papers for this event will go out in March.



For exhibitor enquiries, please contact Tim Thompson at tthompson@wfmedia.com.au or Liz Wilson at lwilson@wfmedia.com.au. For any general enquiries, contact events@wfmedia.com.au or visit www.comms-connect.com.au.

NOKIA AND TPG TELECOM HIT 5G UPLINK SPEED OF 2 GBPS

iStock.com/Rawf8

Nokia and TPG Telecom have announced they have hit a milestone 5G uplink speed of 2 Gbps, which they achieved during a live demonstration at the Nokia 5G Futures Lab in Sydney.

The new Australian 5G uplink record, which follows on from a number of Australian 5G speed records announced by Nokia earlier in 2022, should enable Nokia and its customers such as TPG Telecom to offer ultrahigh-performing, low-latency services for industrial and IoT applications that are heavily reliant on high-speed uplink connectivity. The solution is expected to be fully deployed next year as devices that support this capability become available.

The live demonstration involved a commercially available Nokia AirScale 5G mmWave base station utilising TPG Telecom's 26 GHz spectrum to connect, over the air, to a 5G device powered by a Snapdragon X65 5G Modem-RF System featuring fourth-generation Qualcomm QTM545 mmWave antenna modules. Additionally, Nokia deployed its Carrier Aggregation (CA) technology to fully leverage the available spectrum assets; the CA set-up included four component carriers of 100 MHz each in the 26 GHz band. The demonstration also leveraged Nokia's 5G Core to provide the speed, intelligence and security for testing the delivery of new advanced 5G services.

"We are very proud of this achievement and other mobile technology innovations we continue to develop with Nokia," said Giovanni Chiarelli, Chief Technology Officer at TPG Telecom. "This demonstration is important as it shows the huge potential of 5G mobile technology and gives a glimpse of the high-speed services that will one day be available to customers and businesses right across Australia."

Once deployed, 5G mmWave technology will create new service opportunities for both consumers and industries. For consumers it will allow real-time, multi-user, ultrahigh-definition, bidirectional video streaming and augmented reality content for smartphones or wearable devices for immersive experiences. For industries it will enable streaming of massive amounts of data directly from embedded IoT sensors and industrial robots over 5G, allowing the real-time control of industrial processes using powerful 5G-connected edge compute nodes.

"Superfast uplink speeds are critical to fully realise the huge benefits of 5G networks, particularly as we look to emerging technologies like augmented intelligence, machine learning, advanced sensors and robotics that are set to transform industries and economies with huge safety, productivity and efficiency outcomes as we move towards the metaverse era," said Dr Robert Joyce, Chief Technology Officer at Nokia Oceania.

When the sale really isn't a sale...

NO NEED TO DESPAIR! CRS is always there.

"Hey diddle diddle
the dog did a piddle
'cause the bone on sale
turned up stale.
You're stuck in the middle
when prices are fiddled and
the 'bargains' you bought
all just failed."

QUALITY 2WAY ACCESSORIES TO SUIT

KENWOOD
MOTOROLA
ICOM
sepura
tait communications
GME
TOOOAir
Hytera
KIRISUN
HYT
Vertex Standard
simoco
Uniden
RELM WIRELESS
CASSIDIAN
HARRIS
MIDLAND

Forget Black Friday, Cyber Monday, EOFY Sales, Boxing Day Sales … at CRS Accessories you always get quality products at great prices.

Want the best?
***Insist* on CRS!**

AUSTRALIAN OWNED AND OPERATED

Phone 1300 307 334
www.crsaccessories.com.au

CRS ACCESSORIES

iStock.com/primeimages

SINGAPORE EXTENDING 5G STANDALONE COVERAGE TO SEA

The Marine and Port Authority of Singapore (MPA) has announced a plan to achieve full 5G standalone (SA) coverage over the country's anchorages, fairways, terminals and boarding grounds by mid-2025. Maritime 5G coverage for Singapore's offshore southern coasts will reduce turnaround time and improve efficiency for ships coming in and out of the country.

5G coverage in port waters is also set to enable the establishment of Singapore's 5G@SEA, the world's first public and largest 5G maritime testbed to trial, innovate and commercialise maritime 5G use cases over the next decade. The project is being co-funded by a collaboration between the MPA and the Infocomm Media Development Authority (IMDA), a statutory board under the Ministry of Communications and Information — a key enabler in supporting Singapore's maritime ambitions.

"As a nation with high ambitions for the transformative powers of 5G, we have rolled out our inland 5G coverage," said Lew Chuen Hong, Chief Executive of the IMDA. "In partnership with MPA, we now look to extend 5G coverage offshore. We look forward to being able to be one of the world's first countries for automated ship movement and remote pilotage. IMDA is excited to see the next round of maritime innovation as we support Singapore's efforts as a global maritime capital."

Singapore's 5G@SEA maritime testbed is a collaboration between IMDA's 5G Innovation and Ecosystem Development Programme and MPA's Innovation Lab. Local mobile network operator M1 will provide 5G SA offshore coverage for the southern coast of Singapore, including the surrounding waters of the southern islands, in order to trial new maritime 5G use cases targeted at enhancing the efficiency and safety of maritime operations and management. These potential use cases include telemedicine to enable crew welfare at sea, delivery drones, maritime surveillance and autonomous vessels, as well as remotely controlled task-based robots — such as ship inspection and autonomous firefighting robots — that are used for more dangerous and labour-intensive tasks.

"The launch of M1's 5G standalone network provides low-latency, responsive, secured and high-throughput mobile connectivity to ensure more precise and reliable communications between the ships and the port," said M1 CEO Manjot Singh Mann. "5G has the capability to resolve longstanding pain points and it will become the natural technology of choice for the maritime industry.

"As the first country to extend 5G standalone coverage to sea for maritime operations, M1 is excited to partner MPA and IMDA to co-develop 5G solutions that will not only transform the industry but benefit the whole of Singapore's maritime economy."

NEW ALGORITHMS TO SECURE TETRA NETWORKS AGAINST CYBER ATTACKS

In order to adapt to technology innovations and potential cybersecurity attacks, including from quantum computers, ETSI's Terrestrial Trunked Radio and Critical Communications Evolution (TCCE) technical committee has completed work on new algorithms designed to secure TETRA networks for at least the next 20 years.

These new specifications, ETSI TS 100 392-7 and ETSI TS 100 396-6, have been developed in close collaboration with experts from the ETSI quantum safe cryptography group. This work was carried out with the support of The Critical Communications Association (TCCA), the global representative organisation responsible for the enhancement of the TETRA standard.

TETRA is a digital private mobile radio (PMR) and public access mobile radio (PAMR) technology for critical communications. It is widely used by public safety agencies around the world as, in addition to secure and resilient network communications, it also offers direct peer-to-peer critical communications without the need for a supporting network in situations such as natural disasters and emergencies. Demand for TETRA technology is expected to increase at a CAGR of 4.7% in the 2021–2026 forecast period, according to Omdia, as nations want to deploy networks shared by all public safety organisations and first responders to fully interoperate with other services during emergency situations.

"It is vital to keep the TETRA cryptography updated with the latest cybersecurity algorithms when you realise the variety of sensitive organisations and applications TETRA systems serve," said Brian Murgatroyd, Chair of the TCCE committee. "The EU Parliament and Commission, for instance, use a secure TETRA system to protect their building and communication networks — a scenario where failure or security compromise is unthinkable."

"These new air interface encryption algorithms will support TETRA into the foreseeable future," added Dave Chater-Lea, Vice Chair of the TCCE committee. "They are designed to withstand brute force attack beyond the year 2040 even if quantum computers become a viable means of attack, with new over-the-air key management algorithms and authentication keys to further strengthen the security of the standard."

"This upgrade of the TETRA standard confirms and reinforces the efforts of the TETRA industry community to support TETRA as the optimal mission-critical communication technology for the long-term future," concluded Francesco Pasquali, Chair of the TCCA's TETRA Industry Group (TIG).

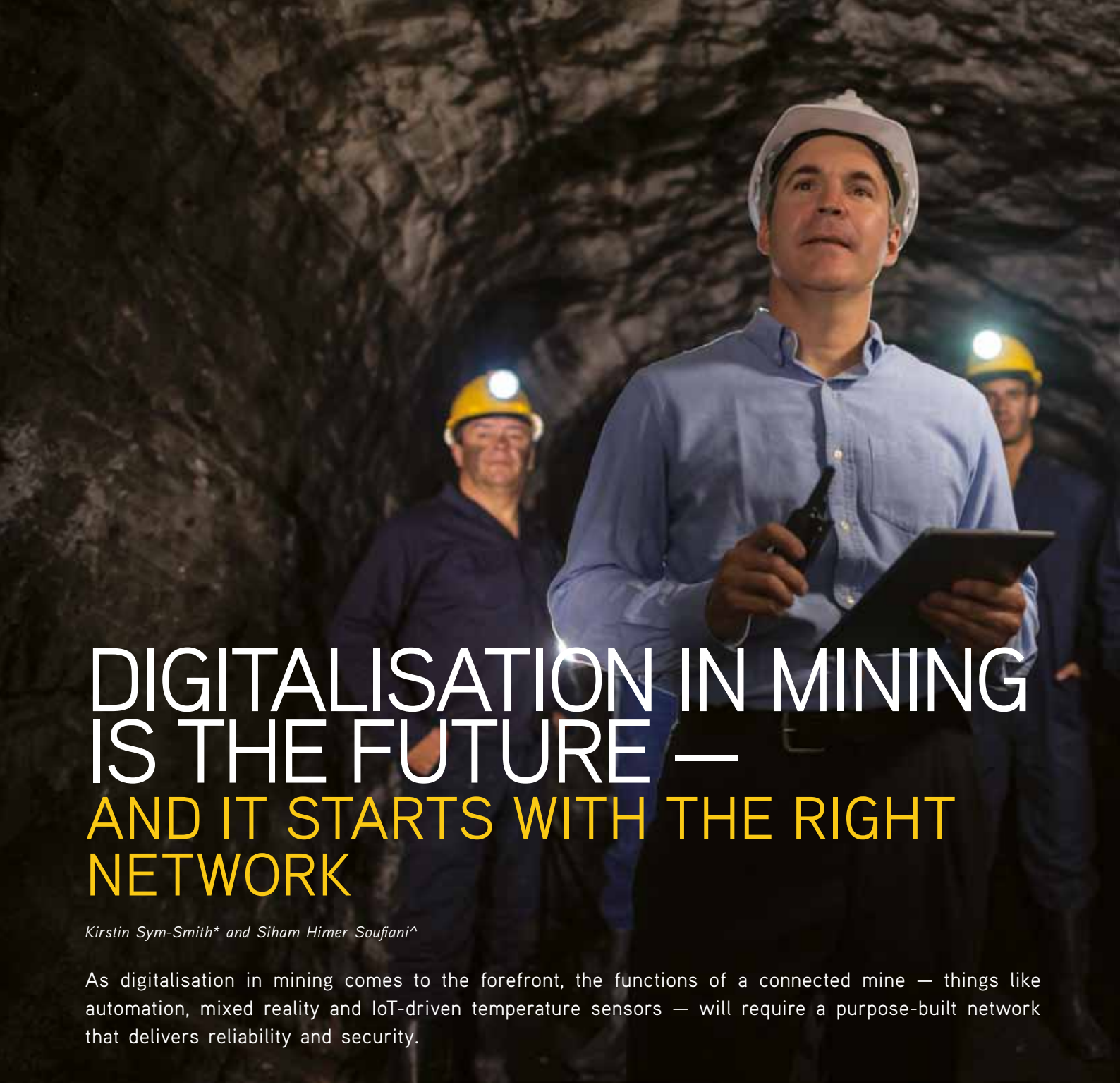
iStock.com/Vladimir_Timofeev

Trusted, proven TETRA
Now in VHF band

- Extend coverage
- Reduce operational costs
- Full accessory portfolio

For further information visit
www.sepura.com

sepura
Going further in critical communications



DIGITALISATION IN MINING IS THE FUTURE — AND IT STARTS WITH THE RIGHT NETWORK

Kirstin Sym-Smith and Siham Himer Soufiani^*

As digitalisation in mining comes to the forefront, the functions of a connected mine — things like automation, mixed reality and IoT-driven temperature sensors — will require a purpose-built network that delivers reliability and security.

The smart mine is the mine of the future

The global mining equipment market is expected to grow to $125.7 billion by 2025, growing at a compound annual growth rate (CAGR) of 5% from 2021–2025, driven by increased adoption of smart technologies like automation and remote-controlled machinery. That's a sign that companies know digitalisation in mining is the future.

But all the new use cases and exciting smart technologies have one thing in common — they need to be powered by fast, reliable and secure connectivity solutions. And it won't be enough to simply connect these devices to wireless (or fixed) broadband. The right kind of connectivity, and the right kind of network, purpose-built for a rugged environment like mining, is critical to achieving the efficiency and safety results a smart mine can bring. In addition, mining companies are being squeezed by some of the labour and supply chain issues facing nearly every industry today, creating pressure to cut costs and get more ore from existing mines.

Mining companies are justifiably excited about technologies like automation, mixed reality, digital twinning and more. They have the potential to create operational efficiencies, save money and time on repairs by making maintenance smarter, and increase safety by taking human workers out of dangerous situations. But all this cutting-edge technology won't help if it's not connected by the right kind of network.

A network to meet mission-critical needs

Demand for things like the rare minerals needed to make today's high-tech devices is fuelling the growth of what's already a $500 billion global industry in mining.

To meet these needs, mining operators need a cellular network built specifically for their use cases of today and tomorrow. A commercial LTE network, designed for consumer traffic that consists mainly of video and data download, doesn't have the same high security, flexibility and upstream traffic needs to handle the demands of an industrial environment like a mine. A few examples:

- **Traffic priority:** A purpose-built, private LTE network allows mine operators to prioritise traffic to critical functions in a

mine, like ventilation. It's a way to ensure the most data-heavy parts of a connected mine have the bandwidth they need to stay operational. It can also be a way to increase efficiency by running low-capacity systems like an IoT temperature sensor network in a different way than a remotely operated digger.

- **Upstream vs downstream:** A commercial LTE network is mostly 'downstream' traffic, meaning that it primarily uses it to download data; things like streaming media, downloading photos or applications, or digital media like books. So, the network is designed to prioritise this traffic. But in an industrial environment, the heavy traffic use is upstream. An IoT-enabled network of sensors reporting temperature or air quality data or a remote vehicle sending live video feedback to its operator requires robust upload speeds. Private LTE networks can provide up to 45 Mbps upstream capability.
- **Low latency:** Many of the most exciting new use cases for digitalisation in mining depend on not only high speeds and reliable connectivity but low latency. Things like remote operation and VR-assisted maintenance simply won't work if there's too much lag between the operator and the device.
- **Dynamic network:** A connectivity solution such as Wi-Fi or VHF leaky feeder, which the mining industry has traditionally used to power digital devices, is inadequate for these new use cases. Beyond the bandwidth and speed requirements, networks in industrial situations must be dynamic, able to move as the mine expands or capacity needs to be sent to a certain area of the facility.
- **Redundancy:** Many of the connected functions in the digitalisation of mining are critical, involving worker safety or the structural integrity of the mine itself. A major advantage to an industrial LTE system over a commercial network is full redundancy, ensuring all equipment and systems will remain covered. Networks with built-in redundancy also allow operators to keep critical functions up and running, even when things need to be repaired or upgraded. In addition to redundant coverage, these networks are also purpose-built for the harsh environmental conditions of a mine.
- **Local core:** One of the features of a private network, compared to commercial LTE, is that the data is stored and processed locally rather than sent to a remote site or the cloud. This has several benefits, including security and improved processing power to handle more data for things like camera feeds and real-time environmental sensors.
- **Ability to upgrade:** Private networks in industrial settings like mining mainly deploy 4G/LTE mobile broadband. But as the industry continues to adopt new technology like automation, digital twins and VR, applications will require higher speeds, higher throughput and lower latency. Luckily, the installed equipment can be seamlessly upgraded to 5G without requiring costly hardware overhauls.

A reliable, secure and integrated platform for the mine of the future

All of these factors will be important considerations for mine operators as they bring connectivity to more aspects of the mine and introduce new technologies to make operations smarter, safer and more efficient. It's an exciting time for the industry, but this digitalisation in mining needs to rest on the bedrock of a robust and reliable connectivity solution. The connected mine of the future needs more than a connectivity platform that's good enough. An industrial LTE network, purpose-built for the needs of a mine, can be the enabler for a productive and valuable digital transformation.

**Kirstin Sym-Smith is Director of Business Development, Mining Industry, Ericsson North America.*
^Siham Himer Soufiani is Senior Solutions Director within Ericsson's MANA Enterprise and Emerging Business team.
This article was previously posted on the Ericsson blog and has been republished here with permission.

Ericsson Australia Pty Ltd
www.ericsson.com/au

CASE STUDY

Enhanced online training for NSW firefighters

Fire and Rescue NSW (FRNSW) has chosen telecommunications carrier Vertel to implement Beaconsim — a Finnish-based operative field communications simulator provider — to deliver enhanced training for first responders.

Firefighters work in hazardous conditions and are exposed to a much greater risk of injury and death than most other workers, so firefighter safety is of paramount importance to FRNSW. Every fire department must have appropriate measures for firefighter safety, including proper training.

FRNSW recognised the need to invest in an online training solution that offered flexible and remote learning opportunities for its firefighters and used real-life scenarios that could strengthen and refresh pre-existing skills. It also had to be accessible from personal devices, including laptops, desktops and mobile phones.

"FRNSW chose Vertel based on its longstanding reputation of delivering best-in-class communications solutions for emergency services," said Paul Barnes, Director of IT Operations & Communications at FRNSW. "The Vertel team listened to FRNSW's requirements and, along with its partner Beaconsim, delivered a customised solution that would meet our needs."

Beaconsim offers fully-fledged solutions for critical communications training and planning for networks including TETRA, LTE, 5G, DMR, digital PMR, Tetrapol, mesh, P25 and proprietary networks. The advanced radio command and control dispatcher simulators are reality-based, easily controlled by the trainer and designed to measure learning.

"With Beaconsim, the online training simulation is specifically tailored to FRNSW," Barnes said. "Vertel and Beaconsim spent a week onsite looking at the operations and taking videos and recordings to create the best, most relevant online interactive training program. The program is designed so responders must walk through the training step by step before they can move on to the next part of the training.

"The solution ensures that FRNSW receives quality training in a safe, low-stress environment, especially for its first responders who want to increase their level of knowledge. Once training is completed, they can leverage those capabilities in real-life situations where effective communication is sometimes the difference between life and death."

Tony Hudson, Commercial Director at Vertel, said, "It is critical that FRNSW has confidence in its training program and can ensure that everyone has access to the best training available and has completed it to the best of their ability.

"Vertel has a longstanding history in delivering communications solutions for emergency services. This means we understand the importance of public safety, the safety of emergency services workers and the impact of critical network services going down. Vertel and Beaconsim have delivered a unique solution that helps FRNSW ensure that first responders are trained in the best way to improve operations and minimise risk."

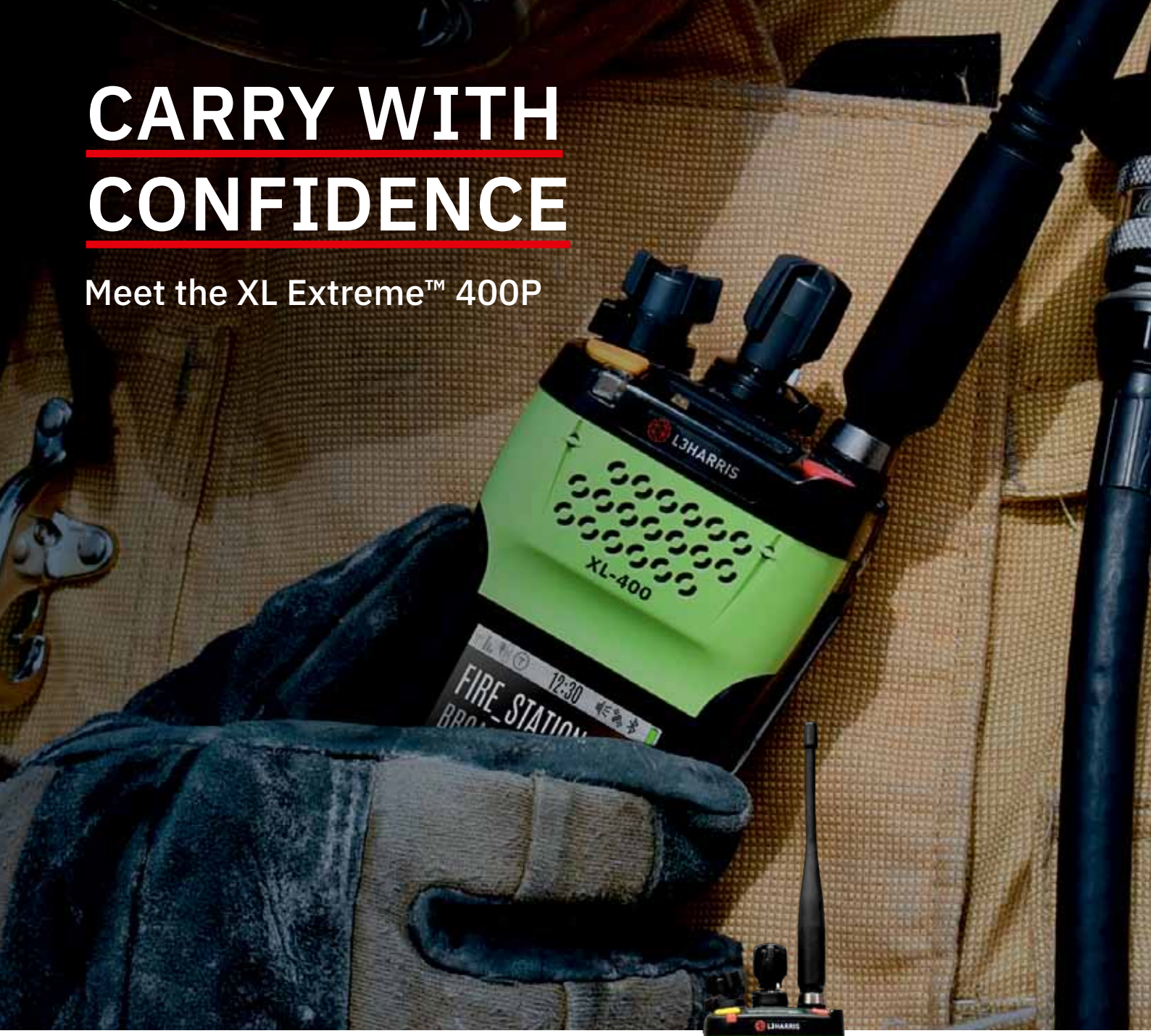
Barnes added, "The cost-effective training solution is reality-based, measurable and easily controlled by the trainer. Since implementing the advanced radio command and control dispatcher simulator, approximately 20% of FRNSW firefighters have participated in and completed the course, which is also available to new recruits and any firefighter who wants to refresh their knowledge. With simple learning management system (LMS) integration and enhanced scalability, choosing Vertel and Beaconsim was an easy decision for FRNSW."

Beaconsim CEO Elina Avela concluded, "Through our partnership with Vertel, Beaconsim can offer FRNSW the same quality of training in advanced radio dispatcher command simulation as we have done in many others in locations including Finland, Asia, the Middle East and Africa. Ultimately, it doesn't matter what technology is implemented — if the responders don't know how to use it, the whole operation is in jeopardy. That's why comprehensive and user-focused training programs are so important, along with reliable networks."

Vertel
www.vertel.com.au

CARRY WITH CONFIDENCE

Meet the XL Extreme™ 400P



You don't flinch in the face of danger. Neither should your radio. The **XL 400P** is tailor-made to keep your team connected in the most extreme conditions. **ALL IN**

XL EXTREME™ 400P

Built to the most rigorous fire standards.

+ Extreme durability
+ Extreme simplicity
+ Extreme connectivity

Scan with camera.

L3HARRIS™

UHF quarter-wave stub EMP RF protector

The Benelec 176124 EMP Stub Lightning Surge Protector is designed to help protect valuable radio equipment from lightning strikes and surges. The technology is designed to provide a wide range of benefits over traditional EMPs, employing a quarter-wavelength short circuit stub-based technology.

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

The UHF device covers the full 380–520 MHz band. Other options are available for 5G bands. The device is available in other connector types including 4.3–10 and 7–16 DIN variants.

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

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

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

Benelec Pty Ltd
www.benelec.com.au

2.4 GHz wireless intercom system

Riedel Communications has unveiled the Bolero 2.4 GHz wireless intercom system. Instead of Bolero's standard DECT band, this iteration operates on the 2.4 GHz band, allowing users in regions where DECT carrier frequencies are either limited or unavailable to profit from Bolero's versatility and feature set in navigating difficult RF environments.

Compared with other 2.4 GHz wireless intercoms, the product is claimed to have double the operational range and to support more than twice the number of beltpacks per antenna. It enables internationally operating customers like touring, cruise ship or OB production companies to use the same globally available frequency range to work across various regions, thereby improving team communication.

The device uses a practically identical feature set and offers the same three network modes as the DECT version: Integrated, Standalone Link and Standalone 2110 (AES67). The 2.4 GHz band limits use to eight beltpacks per antenna instead of 10, but allows for connectivity anywhere, with just one 'Global' region for 2.4 GHz antennas.

The 2.4 GHz iteration also comes with Bolero's high-clarity voice codec and its multipath tolerant receiver (ADR) technology adapted to 2.4 GHz, allowing the system to continuously adapt to changing RF reflection environments. With NFC touch-and-go beltpack registration, an ergonomic, robust beltpack design and three modes as beltpack, desktop key panel or walkie-talkie, it is easy to use, sleek and versatile.

Riedel Communications Australia
www.riedel.net/en/

Real-time location system

Avalue Technology's RENITY ARTEMIS real-time location system uses ultra-wideband technology, which has high accuracy (within 30 cm) for indoor positioning systems. This key feature makes the system especially suitable for medical facilities, manufacturing plants, construction sites and other fields that do not allow positioning error values.

The geo-fence function only needs to mark a specific range on the map, and the system can distinguish the range and assign permissions to specific tags, which can be used for personnel management, security management, equipment management, etc. New applications can be created according to the needs of the field.

Other advantages include low power consumption, high stability and the ability to easily interface with other management system APIs. The system uses a generation of chips that support 7.98 GHz.

Avalue
www.avalue.com.tw

Antennas for Wi-Fi6 and Wi-Fi6E

Antenova has announced three antennas for Wi-Fi6 and Wi-Fi6E — a surface mounted antenna, a flexible antenna and an external antenna. All three antennas use the 2.4, 5 and 6 GHz bands and support IEEE standards 802.11a/b/g/j/n/ac/ax.

The SMD antenna, named Billi (part number SR43W078), measures 15 x 6 x 1 mm and requires only 1 mm of clearance on the PCB. This makes it a low-profile solution for slim devices with a small space for the antenna. In tests the antenna showed high efficiency across all three bands. It is suitable for pick-and-place manufacturing processes.

The FPC antenna, named Lotti (part number SRF3W077), is a flexible antenna measuring 30.0 x 8 x 0.15 mm. It has a self-adhesive mounting for easy integration into small designs. The antenna does not require a ground plane on the PCB and also showed high efficiency in tests.

The third antenna is Nitida (part number SRE3W084), an antenna for external mounting. It is supplied with an SMA connector and offering a waterproof variant. It is simple to add to a design because it does not require a matching network.

The antennas will be suitable for high-performing wireless devices that combine mobility with high throughput, eg, routers and USB dongles for Wi-Fi6 and Wi-Fi6E, games consoles, set-top boxes, surveillance cameras, networked IoT devices and MIMO systems. The Lotti and Nitida antennas connect directly to a PCB, which makes for an easier integration and a shorter design cycle. The emerging Wi-Fi7 standard will also utilise the 6 GHz band, so manufacturers choosing one of the antennas now will be positioned to deliver ultrafast Wi-Fi7 speeds in future.

Antenova Limited
www.antenova.com

Industry Talking

iStock.com/flo

Happy New Year and welcome to 2023. We are all wondering what the new year will bring; hopefully on the east coast we get a break from floods, fires and everything else that has been happening. During Comms Connect in Melbourne it was noted that in NSW, since the fires of 19–20 season, there have been over 500 local government area emergency declarations. There are only 125 local government areas in NSW, so many places have had multiple situations to deal with. Is it any wonder people are over it and need a break!

Our new CEO has hit the ground running and has been busy preparing for new events and programs in 2023. At the end of 2022 Paul has visited members in Victoria, Western Australia and Qld as well attending the Perth and Brisbane Sundowners.

Sundowners are a great way to get the industry locals together and in 2023 ARCIA intends to do more of these around Australia. If you would like to suggest a time and location for a Sundowner in your area, or maybe even help to organise one or help to tie one to a local event, please reach out to a local committee member or Paul Davis.

We also had many members attend the ACMA RadComms event to hear about many new areas of spectrum regulation and use cases. It is often worthwhile to attend these events to get an idea of what is coming to the market with new spectrum uses; some may compete with our industry, but often new applications can work in conjunction with our services and systems. One of the presentations shown at RadComms was the anticipated demand for 653,000 technical workers for Australia by 2030 (Tech Council, Accenture and Digital Skills Organisation 2022). It is very clear that Australia needs a skilled workforce across all sectors.

The CEO and executive are working hard on getting relevant technical training for our industry to become available as we know there is demand from a variety of sectors. What we are seeing is demand for basic RF knowledge, industry-specific information and comprehensive training courses. ARCIA is planning to have both face-to-face and online training session in 2023. At this moment they will start in late March in Perth for all our WA members.

As Paul Davis has been listening to our members and partners, we are also hearing from many businesses in the manufacturing sector. There are many companies in Australia making RF-based products, something that as a country we can be very proud of. ARCIA is looking for ways to promote our local industries, especially given the current weakness in supply chains. As technology moves and new opportunities arrive our industry can adapt, and the association intends to foster growth in the industry any way we can.

Lastly, the first official event for 2023 will be the committee planning days in Brisbane. The association has a huge agenda to fill in 2023 and there is a lot of work to be done. While our new CEO has the focus to achieve great things, the vast experience of the committee members needs to deliver the groundwork to allow that to happen.

Hamish Duff, President
Australian Radio Communications Industry Association

Emergency services fleet management: ambulance vehicles case study

In emergency services, each in-vehicle sensor, camera, digital display and smart device needs reliable, always-on connectivity to function.

Emergency services need to consider today not only how that connectivity will be delivered, but also how to efficiently incorporate so many new devices into a Wireless WAN (WWAN) infrastructure. Hint: widely available LTE and 5G, centralised cloud-based network management, and purpose-built wireless edge routers.

How can IT teams deploy connected fleet technology efficiently and at scale?

When the deployment of connected fleet technology devices includes complicated hardware and cloud-based components, there is a greater chance for costly mistakes that can compound over time. This is especially true for devices utilising SIM cards for cellular connectivity.

When deploying new devices, the responsibility for their registration frequently falls on the user. This means that all the steps required to configure the router — including inputting serial numbers into a cloud management system, registering SIM cards with a connectivity management platform (CMP), and more — have to happen prior to provisioning. When multiplied over dozens, hundreds, or thousands of devices, workloads can be not only challenging, but also expensive.

Cradlepoint NetCloud Cellular Intelligence for 5G includes a live view of 5G cellular health; 5G data usages tracking and forecasting; location tracking with integrated 5G coverage maps; speed and performance validation over 5G; and a health and reporting dashboard. In addition, Cradlepoint recently announced Cellular Intelligence which includes SIM Management based on the integration of Ericsson's IoT Accelerator with Cradlepoint's NetCloud and other databases. Customers can now activate and manage cellular routers, SIMs, and data plans from a single pane of glass.

By choosing a zero-touch deployment option for vehicle routers — where settings, configurations, and firmware come pre-provisioned — emergency services can enjoy a much faster time to service with fewer touchpoints per device.

How do LTE and 5G wireless routers simplify enterprise fleet management?

Even after eliminating deployment bottlenecks, emergency services organisations still face fleet management questions regarding ongoing connectivity, router and IoT support. Managing the network using a device-by-device approach may work for small fleets, but it's a model that doesn't scale due to the compounding complexity, time and resource requirements, and the potential for errors and security flaws.

To effectively manage in-vehicle networks and

iStock.com/MattGush

connected devices across a fleet, organisations need a network management solution that is cloud-based, integrates with the existing WWAN deployment, is accessible from anywhere, and provides easy access to essential data generated by onboard routers and IoT systems.

Southern California ambulance Fleet Uses Cloud-Managed LTE for Location-Based Dispatching

US-based Care Ambulance Service relies on its fleet of 300 ambulances and support vehicles, staffed by highly trained first responders, to save lives in Southern California. However, they can't do their jobs effectively unless their dispatchers at headquarters have access to vehicle location data that is always up to date. Care Ambulance's IT team deployed Cradlepoint NetCloud Service for mobile throughout their entire fleet. The service includes routing, a WiFi access point, GPS and telematics integration, WiFi-as-WAN, and cloud configuration and troubleshooting, all delivered via an in-vehicle LTE router with 24x7 support and a limited lifetime warranty. They monitor, manage and troubleshoot the entire network remotely through Cradlepoint NetCloud Service's single-pane-of-glass platform — efficiently keeping emergency personnel securely connected to the patient care records and specialised tools they need to protect communities.

How can fleet telematics and location tracking save time and money?

Extensibility is another key feature of cloud-based router management solutions, allowing fleets to employ a wide range of telematics in LTE- and 5G-connected vehicles.

Like many first responder organisations, Care Ambulance uses Computer-Aided Dispatch (CAD) to match its vehicles and field personnel with the right emergencies, which greatly improves response time. CAD is only as reliable, though, as the GPS-based location data that is constantly being sent from the vehicles to headquarters. Unfortunately, the company's previous connectivity solution, a 3G platform, routinely dropped its connection. Care Ambulance Service replaced its 3G routers with Cradlepoint NetCloud Service for mobile, which includes cloud management of purpose-built routers featuring embedded LTE.

In-vehicle Mobile Data Terminals (MDTs) receive emergency call information from the CAD system and, using always-connected GPS data, automatically send that crew to the situation nearest their current location. This all-in-one cloud-managed solution includes a built-in stateful firewall and WiFi.

With always-on Cradlepoint LTE connectivity and reliable real-time vehicle location data, Care Ambulance trusts that its CAD system is dispatching ambulances and first responders to the locations where they are needed most.

Improving vehicle lifecycles with predictive maintenance

Costs incurred from unplanned downtime repairing vehicles and connected fleet technology can quickly balloon and become unsustainable. Manager gives Care Ambulance's IT professionals remote access to WAN analytics, which allows them to troubleshoot coverage issues from headquarters rather than driving out into the field or pulling vehicles out of the line of duty. The team pushes out security and firmware updates to the entire fleet with one click, all remotely.

"In the past, the network solutions in our ambulances received updates twice a year during a lengthy, in-person process. With reliable LTE solutions, we can push out security and firmware updates over the air at any time," said Ben Baker, Director of Communications & Information Technology at Care Ambulance Service.

Cradlepoint's NetCloud Service for Mobile and wireless edge routers unlock the power of connected fleets, enabling highly reliable access to applications such as IoT, GPS and telematics in emergency services. Cradlepoint solutions help IT teams and fleet managers better serve citizens, improve organisational operations, and save money.

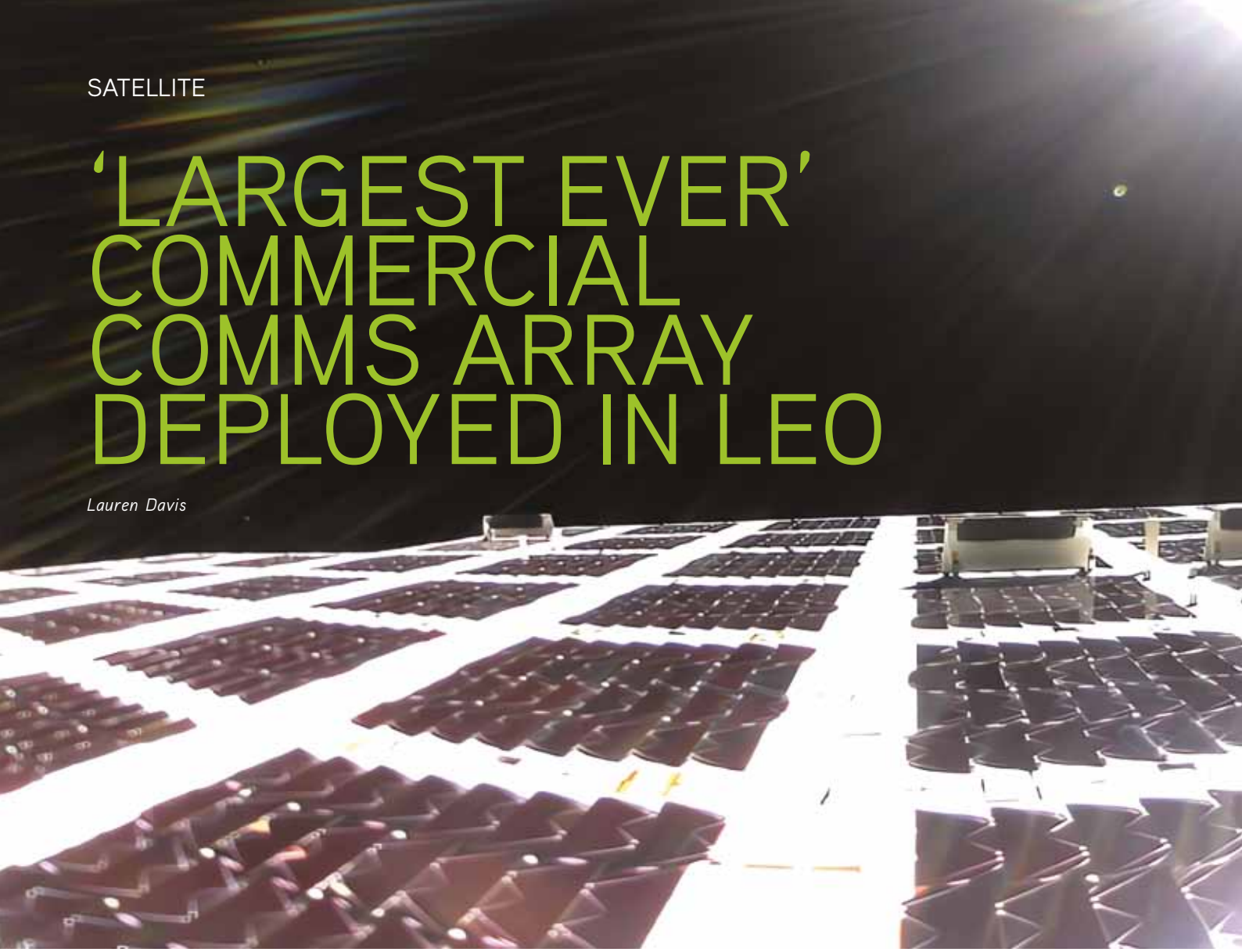
cradlepoint

PART OF ERICSSON

Cradlepoint Australia Pty Ltd
www.cradlepoint.com/au

'LARGEST EVER' COMMERCIAL COMMS ARRAY DEPLOYED IN LEO

Lauren Davis



Satellite manufacturer AST SpaceMobile has reached a milestone in its mission to build the first and only global cellular broadband network in space to operate directly with standard mobile phones, having successfully completed deployment of its test satellite and communications array, BlueWalker 3 ('BW3'), in orbit. The goal of the network is to eliminate the connectivity gaps faced by today's five billion mobile subscribers and finally bring broadband to the billions who remain unconnected.

BW3 is being billed as the largest ever commercial communications array deployed in LEO, spanning 64.38 m^2 in size — a design feature critical to support a space-based cellular broadband network — with an expected field of view of over 776,996 km^2 on the surface of the Earth. It is designed to communicate directly with cellular devices via 3GPP standard frequencies at 5G speeds, testing the technologies that AST SpaceMobile will need for its planned commercial service.

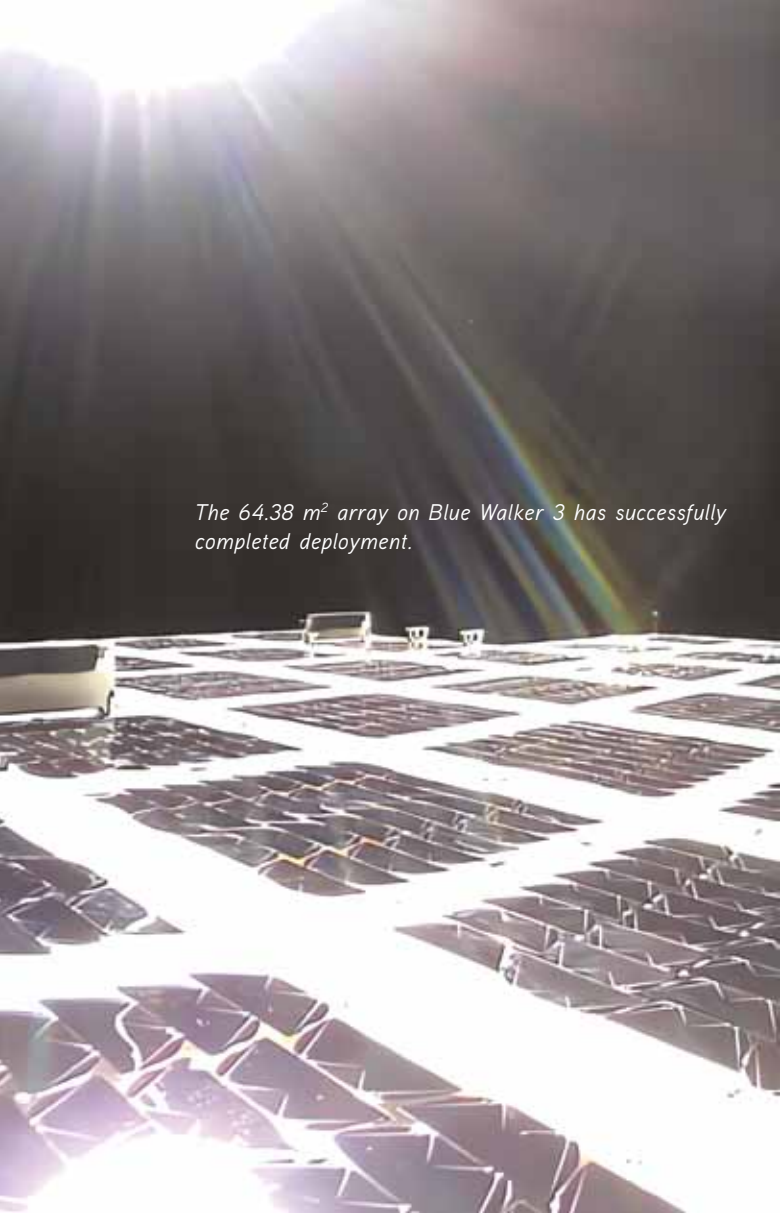
The satellite comprises a large, flat, thin array built from identical components called Microns; solar cells collect energy on one side, and on the other side, many small antennas form a phased array. These antennas work together to form tight communications beams, which are an efficient way to push a strong signal from space to Earth. These beams of coverage are similar to those created by a terrestrial cell tower, and should help ordinary phones 'see' BW3 without any modifications. The array can also 'hear' mobile phone signals hundreds of kilometres away.

BW3 was designed to fold into a cube, which was sent into low Earth orbit by rocket back in September. AST SpaceMobile engineers subsequently contacted the satellite, oriented it to regulate power and temperature, and eventually directed it to unfold on 14 November. The unfolding process was powered by energy stores in hinges that connect the Microns together, and was made possible by years of R&D, testing and operational preparation.

AST SpaceMobile has scheduled a rigorous test program to ensure BW3 is doing everything it needs to do, and aims to work with mobile network operators (MNOs) to fine-tune ground equipment, software and operations. An experimental licence from the US Federal Communications Commission allows the company to test in Texas and Hawaii, with further testing planning across all six inhabited continents. If all goes well, the company hopes to make the first cellular broadband connections from a satellite directly to ordinary mobile phones — a major step towards building the world's first space-based cellular broadband network.

"Every person should have the right to access cellular broadband, regardless of where they live or work. Our goal is to close the connectivity gaps that negatively impact billions of lives around the world," said Abel Avellan, Chairman and CEO of AST SpaceMobile.

"The successful unfolding of BlueWalker 3 is a major step forward for our patented space-based cellular broadband technology and



The 64.38 m² array on Blue Walker 3 has successfully completed deployment.

paves the way for the ongoing production of our BlueBird satellites."

AST SpaceMobile has agreements and understandings with MNOs globally that have over 1.8 billion existing subscribers, including a mutual exclusivity with Vodafone in 24 countries. Interconnecting with AST SpaceMobile's planned network will allow MNOs — including Vodafone Group, Rakuten Mobile, AT&T, Bell Canada, MTN Group, Orange, Telefonica, Etisalat, Indosat Ooredoo Hutchison, Smart Communications, Globe Telecom, Millicom, Smartfren, Telecom Argentina, Telstra, Africell, Liberty Latin America and others — the ability to offer extended cellular broadband coverage to their customers who live, work and travel in areas with poor or non-existent mobile coverage, with the goal of eliminating dead zones with cellular broadband from space.

"We want to close coverage gaps in our markets, particularly in territories where terrain makes it extremely challenging to reach with a traditional ground-based network," said Luke Ibbetson, Head of Group R&D, Vodafone and an AST SpaceMobile director. "Our partnership with AST SpaceMobile — connecting satellite directly to conventional mobile devices — will help in our efforts to close the digital divide."

Tareq Amin, CEO of Rakuten Mobile and Rakuten Symphony and an AST SpaceMobile director, added, "Our mission is to democratise access to mobile connectivity; that is why we are so excited about the potential of AST SpaceMobile to support disaster-readiness and meet our goal of 100% geographical coverage to our customers in Japan. I look forward not only to testing BW3 on our world-leading cloud-native network in Japan, but also working with AST SpaceMobile on integrating our virtualised radio network technology to help bring connectivity to the world."

Smart managed PoE+ switches

D-Link A/NZ has launched its DGS-F1210 Series smart managed PoE+ switches. The four latest models offer 8, 16 and 24 PoE+ ports, with Long Reach and extended PoE capability, to supply 802.3af/at PoE and connectivity on Ethernet cables up to 250 m long. The switches also provide a feature set including VLAN, LACP, RSTP, MSTP, ERPS and more.

With a variety of port options, users can provide power for their PoE-powered devices including IP cameras, CCTV devices, VoIP phones and Wi-Fi access points. The switches are designed to suit almost all type of requirement, including a 24-port Gigabit Ethernet switch with an extended PoE budget of 380 W.

Built-in 6 kV surge protection effectively protects each switch against sudden electrical surges caused by events such as lightning strikes or unstable electrical current. It also reduces the chances of any connected equipment being damaged from electrical surges, minimising the need for equipment repairs or replacement.

The series features sub-50 ms recovery due to its Ethernet ring protection switching (ERPS) capabilities, while its spanning tree protocols (STP) enable alternative paths for Layer 2 failover. Link aggregation (802.3ad) and quality of service (QoS) with weighted round robin (WRR) are also enabled, so that VoIP and IPTV applications run smoothly and seamlessly. The network OAM also helps enable service providers to fulfil their service-level agreements and provide carrier-grade service.

The series maintains strict control over network access due to IEEE 802.1X port/host-based access control, VLANs and RADIUS authentication, enhanced by IP-MAC-Port Binding at the user level. Loop protection guards the network from broadcast, multicast and unicast flooding, while access control listing (ACL) bolsters network security without sacrificing switch performance.

With support for PoE, connected devices can be powered in remote locations where an electric outlet is difficult to access, making deployments easier. Should power-related issues occur there are also capabilities such as a PoE Watchdog, in addition to surge protection, on all Gigabit Ethernet ports and cable diagnostics for quick troubleshooting. The web Interface is easy to navigate and user-friendly, making the switches simple to configure.

D-Link Australia Pty Ltd

www.dlink.com.au

CASE STUDY

Multi-site connectivity for Australian Antarctic Division

iStock.com/Marc-Andre_Leĩourneux

Communications and IT services provider Speedcast has announced that it has conducted systems deployments for the Australian Antarctic Division (AAD) to improve overall communications capabilities at multiple research sites in Antarctica.

The AAD operates year-round stations in Antarctica and depends on Speedcast connectivity to complete research, send data and keep in touch with the rest of the world while operating from the southernmost continent. The latest systems deployments are part of an ongoing, strategic program demonstrating the strong partnership between the AAD and Speedcast.

Applying learnings from Speedcast's recently deployed communications solution on AAD's resupply and icebreaker vessel, the RSV *Nuyina*, the AAD is looking to establish best practices for ensuring the highest levels of connectivity across its land-based sites. Providing the flexibility of a multi-path telecommunications platform, Speedcast's SD-WAN and TrueBeam smart network management solutions are being delivered to meet the AAD's remote communications requirements, while also facilitating growth opportunities for the future — including the ability to add LEO services.

As part of the agreement, the existing primary communications system is being enhanced, along with the supply, implementation and commissioning of a secondary solution at AAD's three Antarctic research stations and on Macquarie Island. These connectivity needs are primarily driven by the AAD's work health and safety program, as the research stations are in extremely remote locations on ice.

As the environment presents dangerous conditions for personnel, site access for AAD staff is only provisioned during the summer season. While unmanned in the winter, if the primary communications system is unavailable for any reason, the sites could be relegated to having no data collection or communications capabilities for months until the summer season returns. A secondary communications link ensures that the remote sites have an extra layer of safety and redundancy.

"Speedcast's communications solution for AAD delivers exciting technology innovation and network automation to keep their remote research stations connected, ensuring 100% uptime at the end of the Earth," said James Trevelyan, Senior Vice President of Enterprise and Emerging Markets at Speedcast.

"Since joining forces as AAD's connectivity partner, we've been able to offer a solution to increase their network capacity 100-fold. The research stations' systems deployments enable the delivery of a strong workplace health and safety program for AAD's highly skilled personnel who spend extended periods of time in the very harsh, remote site locations, conducting critical scientific research efforts."

Speedcast
www.speedcast.com

Handheld radio module for warfighters

L3Harris Technologies has announced its Iridium Distributed Tactical Communications Systems (DTCS) mission module, enabling push-to-talk voice and data for warfighters worldwide.

The module connects the L3Harris AN/PRC-163 multi-channel handheld tactical radio to the US Space Force's DTCS network, providing warfighters in the field with secure voice and data communication without having to carry a separate Iridium satellite radio. This enables warfighters to stay connected anywhere on the battlefield and provides commanders with additional versatility exercising command and control. The ability to stay connected in virtually any situation should allow for better planning and responsive execution of missions.

Warfighters armed with the AN/PRC-163 and DTCS mission module can now communicate using any combination of satellite communications, mobile ad-hoc network, or line-of-sight modes even in situations when one or more connection methods are not available. Small, power-efficient and easy to use, the mission module attaches directly to the radio, or through a tethered cable, and is controlled from the radio's existing control panel.

Harris Corporation
www.harris.com

SISO LTE IoT antennas

Panorama Antennas' LPA-7-42 series is a range of efficient, omnidirectional, multiband antennas for IoT devices. Covering 698–960/1427–4200 MHz, thus providing futureproof functionality, the antenna range can be used for IoT applications including ticket machines and destination boards. It is suitable for either external or internal installation.

The design of the antenna enables simple wall mounting using the supplied screws and wall plugs, adhesive pad mounting or mast mounting using the supplied cable ties. The omnidirectional radiation pattern allows for easy placement and flexible installation.

The antennas are suitable for use in industrial and domestic environments with cellular modems/routers for IoT and M2M wireless connectivity applications. The high performance of the antenna helps maximise first-time connection rates and minimise revisits and communication issues after installation, thereby reducing lifetime costs.

The antennas are fitted with integrated flame-retardant RG174 cable and a variety of connectors. Panel-mount versions and versions fitted with low-loss cable for longer cable runs are also available.

Panorama Antennas Pty Ltd
www.panorama-antennas.com

Automotive multi-band GNSS module

The u-blox ZED-F9K-01A is a high-precision GNSS module with embedded advanced hardware, software and the latest-generation IMU (inertial measurement unit) to provide a self-contained positioning solution. The module supports both L1/L2/E5B and L1/L5 bands for maximum flexibility, satellite availability and security. It combines multi-band and multi-constellation global navigation satellite system (GNSS) technology with dead reckoning high-precision RTK (real-time kinematic), which enables decimetre-level accuracy.

The product natively supports the u-box PointPerfect GNSS augmentation service. It delivers multiple GNSS and IMU outputs in parallel to support all possible architectures, including a 50 Hz sensor-fused solution with low latency. It enables real-time applications, while the optimised multi-band and multi-constellation capability maximises the number of visible satellites even in urban conditions.

The device includes a dependable protection level output and security features including anti-spoofing and anti-jamming. Operation up to 105°C makes it possible to integrate the product anywhere in the car without design constraints.

The product primarily targets ADAS applications, paving the way to full car autonomy. Being a fully integrated solution that includes the latest u-blox R&D technology for automotive, it should help OEMs reduce their development efforts and time to market.

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

Radio Matters

Following on from the successful conference and gala dinner held in Christchurch in June 2022, RFUANZ used the opportunity to leverage the MOU that was signed between RFUANZ and ARCIA in 2021.

I and two of our committee members, Graham Markson (Summit Radio Solutions Ltd) and Carl Garner (Ashley Communications Ltd), attended the Comms Connect Melbourne conference in October. This was the first time I had attended a Westwick-Farrow flagship event and I was not disappointed.

We planned to make the most of the short time we spent in Melbourne and it was very interesting for us to see how things work on the other side of the ditch. From federal government to state government to local territories, the constant push for investment in critical communications and the way the interstate relationships work was very interesting.

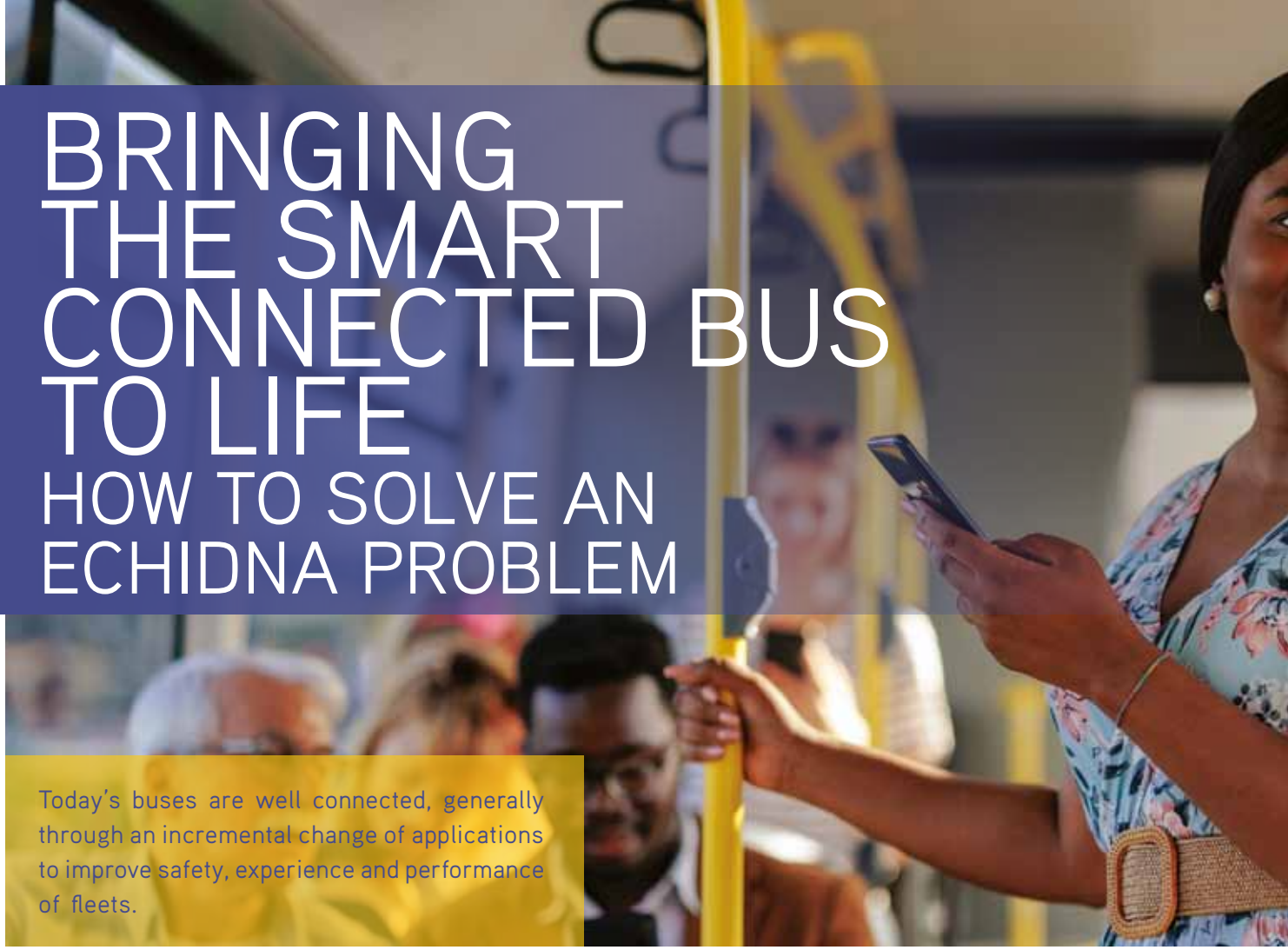
On Day 1 we attended the pre-conference training sessions. The sessions were very informative, with a well-poised narrative of the global situation with regards to critical communications being clearly evident.

On Day 2 we had an early start to get around to the 50 exhibitors, two full streams and 30-plus speakers. In the evening we attended the ARCIA Industry Awards and Gala Dinner. The local entertainment was on point, being entertained with some local comedy.

On Day 3 we were invested around advertising for Comms Connect Christchurch 2023. All the vendors that we didn't have in 2022 were on our radar to meet with and promote the NZ conference.

Overall, our time was well spent and connections were made. We achieved our objectives as a committee to highlight our event in June 2023 with existing and new exhibitors, so come one come all to Te Pae Comms Connect and the RFUANZ Annual Gala Dinner on 13 June 2023, in Christchurch.

John Laughton
Chairman
Radio Frequency Users Association New Zealand



BRINGING THE SMART CONNECTED BUS TO LIFE

HOW TO SOLVE AN ECHIDNA PROBLEM

Today's buses are well connected, generally through an incremental change of applications to improve safety, experience and performance of fleets.

Data connectivity is integral to public transport — passenger information, fleet and driver management, and ticketing systems depend on it. Each application comes with its own proprietary hardware, software and connectivity. It's the overkill equivalent of needing a new phone for each app you use.

Some buses have 10+ systems onboard and so external antennas create an 'echidna' bus, where each application needs its own box, installation, maintenance and connection.

Reimagining public transport connectivity to deliver the smart connected bus

The smart connected bus uses mobile data networks to share information with other vehicles and infrastructure. This connection:

- provides communications to and from the driver
- provides communications and announcements to passengers
- improves passenger safety
- enables real-time video streaming in emergencies
- assists drivers to deliver better customer experiences
- monitors buses to improve maintenance and performance
- provides compliance and performance regimes through automation
- brings a continuous improvement approach to fleet operation.

It's an exciting window into the future of highly connected smart transport.

Why drive the connected bus

1. Rebuild passenger trust

Getting passengers back on public transport post-COVID is a challenge for public transport operators and authorities. This comes down to trust, comfort and feeling safe.

Building trust demands taking action. People need timely, accurate information before and during their journeys to feel safe. This relies on scheduling systems producing accurate data about arrival times, passenger loading or delays.

Customers want to get this information their way — typically, on their mobile devices. As more operators prioritise equity and accessibility, how we deliver data to differently-abled commuters is crucial. Customer communication needs to outline accessibility details across different transport modes to help personalise transport planning and provide information in accessible, inclusive formats.

Safety and security are second only to reliability. The ability to rapidly process security data and identify events is a game changer for safe travel; the ability to monitor and report on safety and security events on moving vehicles is becoming more critical.

2. Support the driver experience

The operational needs of operators are becoming more complex, just as passengers are. Retaining and supporting drivers is critical to every transport network with all-time low unemployment and a shift from driving as a preferred profession. Support strategies being employed by operators and supported by technology and communications in connected buses include:

- more flexibility in managing rosters — dynamic planning during operational days
- turn-by-turn navigation guiding drivers on unfamiliar routes
- performance monitoring and gamification
- predictive systems to accurately predict arrival times.

3. Monitor assets, conditions and people

Real-time condition monitoring of buses and infrastructure improves fleet reliability and safety. This can include:

- real-time monitoring and recording of bus status including engine condition, tyre pressure, driving behaviour, incidents and issues
- real-time feedback on electric vehicle charge and integration with charging management services

- advanced driver assistance systems (ADAS) feeding black spot data to drivers for safer driving.

4. Support as infrastructure evolves

As well as operational needs and challenges, bus operators can manage a wide range of infrastructure transitions.

- Cities across the world are evolving their ticketing systems to support a much wider range of ticketing media, increasing demands on vehicle communications infrastructure.
- From 2025 all new vehicles in Australia must be zero emission. This global trend will see large-scale, accelerated fleet refreshes.
- An upgrade to 5G, then quickly to 6G, will enable data transmission with much lower latency. This will drive greater investment in cooperative intelligent transport systems — the first step to bringing autonomous vehicles to Australia.

These infrastructure changes pressure operators to consider on-bus solutions and plot out change management.

5. Grab the big opportunities of big data

Connected buses create opportunities for:

- buses to act as moving digital sensors within a smart city
- buses as mobile infrastructure and road condition monitoring services
- developing digital twins of the transport network and bus fleets, enabling preventative maintenance
- leveraging AI to monitor video feeds on vehicles — improving safety and security.

Avoiding the echidna bus

The echidna bus appears when legacy systems converge.

Operators have vehicles at different stages of their life cycle and want to maximise their asset lives — introducing connectivity in mixed fleets with flexibility for future changes may involve adding new infrastructure to an already crowded bus.

Many operators have buses resembling echidnas on wheels, with each existing or future onboard service requiring its infrastructure and communications network. NEC teams have counted up to 14 different communications networks coming off buses, each system having its own 3G/4G comms bearer and GPS.

There is often little integration between on-bus services, so drivers don't have a complete view of all on-bus systems and may have a confusing mishmash of displays. This extends to the services in the back office: ops staff source data from multiple sources, creating inefficiencies and duplication.

The connected bus made simple

So, how do we create the best-case connected bus?

1. **Standardise communication channels.** Start with standardisation and requesting shared future-ready gateways (5G/DSRC ready) that serve as the hub of new bus systems. Next, consider the drivers. Take advantage of tablet technology, which can surface information from all these services to the driver through a simple, intuitive interface, mandating shared vehicle infrastructure for solutions providers. Bye bye, echidna.
2. **Open and emerging standards.** Define or leverage emerging standards such as ITxPT for subsystem communications and infrastructure sharing. Ensure support for open standards such as SIRI and NeTEx.
3. **Shared infrastructure.** Procure the hardware, creating multi-application driver displays and comms gateways in conjunction with coach builders. Plan for adding new features in the vehicle lifetime.
4. **Standardise device selection.** Install core hardware elements during builds and enable through-life services with software upgrades.
5. **Standardise the back office.** Mandate for service level integration in back-office systems via API integration of the different data sources coming off vehicles. Work for platform-level integrations targeting 'single pane of glass' OCC for simplified operations.

Planning your connected bus with a local partner

NEC enables smart transport in over 100 cities on four continents encompassing smart ticketing, safety and security, fleet management and telematics. The company has been developing AVL and telematics solutions in Australia for 12 years, and its research and development team is leading the way in exciting new smart transport initiatives — like the connected bus.

NEC is keen to work with operators to help plot a path to tomorrow's connected bus. The company's free one-day workshop covers existing and future fleet needs, understanding today's technology and operations, and roadmap options. Attendees will also receive a follow-up report covering fleet details and systems inventory; technology and operations overview; roadmap options; and financial analysis.

This article was previously posted on the NEC blog and has been republished here with permission.

NEC Australia Pty Ltd
www.nec.com.au

Communications for Mining

Improving Safety and Efficiency

Image credit: iStock.com/qwerty01

Mines are frequently dirty, dusty or wet, which can be a risk to onsite equipment.

Image credit: iStock.com/hsvrs

In large mining environments, where critical communications are essential both above and below ground, miners' communication systems are a vital link back to the control room and to team members or other colleagues, providing the capability to warn of any issue through voice but also through automated features or via data sharing.

Mining environments are often dirty, wet, dusty or a combination of all three. Vision and awareness can be limited and the noise of machinery can be overwhelming. In this environment, a miner's radio is their crucial connection to get advice or help, to warn colleagues and to help maintain site safety.

However, more than providing a voice connection, the radio can use powerful data connectivity to

VHF TETRA improves coverage in dangerous underground locations, ensuring operations can continue and downtime is minimised.

Image credit: iStock.com/GI_ELLE

Drones can be used to improve situational awareness on mining sites.

help improve the teams' operational awareness, improving both safety and efficiency. Examples of this type of connectivity could include:

Connection to Safety Equipment

Radios can be connected to existing safety connection via Bluetooth or Wi-Fi. This can mean that crucial warnings, for example from gas detection devices or door lock systems, can be alerted to the user but also shared via the radio network to other team members.

Enabling Safe And Secure Site Access

Radios can enable access to secure areas, for example into blast zones, explosive stores, operational zones or specific buildings. Radios can interact with Bluetooth or RFID tags, or create automated actions when crossing geofences, to ensure smooth, safe access is enabled.

Share Status And Location

Radios can report a user's location and their status, whether outdoors, indoors or even underground, meaning workers with the availability and necessary skills can be efficiently and quickly deployed.

Protect Lone Workers

Radios can detect if a lone worker has been hurt or incapacitated, sending a warning to nearby colleagues to ensure help is requested quickly.

Solutions to suit user needs

Handling Mass Data

Use of a broadband critical communications device can further enhance this capability, by enabling mass data to be utilised. Examples of this could be streamed video from a body cam or drone, providing better situational awareness to all key staff. Using either a secure Wi-Fi or a 4G/5G connection, the ability to transfer still images or video is a significant leap forward in the capability of critical communications devices, but crucially still comes in the robust package demanded by users in the field.

Underground or Extensive Outdoor Sites

Sepura offers TETRA solutions in both UHF and VHF frequencies. VHF signals carry further in open spaces, enabling a cost-effective but powerful TETRA solution that provides crystal clear audio. Below ground, the greater signal propagation of the VHF frequencies proves ideal, providing complete coverage in dangerous environments where safety is paramount.

Meanwhile, UHF frequencies work well in built up areas and around large structures. Sepura can offer either VHF or UHF networks, or even hybrid solutions, based upon the customers' particular needs and site geography.

Sepura radios and accessories will keep working even in hot, dirty environments.

Staff Safety

Both TETRA and LTE solutions allow for automated actions from the radio. These enable users to focus on key actions while the radio performs simple maintenance tasks. These can be made to suit the operation, but examples could include:

- Talkgroup changes based on geolocation triggers
- Registering a pool user with a specific employee
- Creating alerts based on data, for example expiry of safety certificates, training needs or similar

Tough Accessories to Last and Last

Designed in conjunction with users, Sepura's accessories are designed to perform again and again in harsh environments. Long-lasting batteries maintain service across long shifts and can be charged repeatedly without performance degradation, while audio accessories provide loud, clear audio and environmental protection in harsh environments.

Charging accessories are flexible, based around users' needs, with desk and vehicle-based options along with mass charging facilities. The vehicle accessories provide an identical user interface to hand portable radios, supporting users on the move.

For more information and to arrange a trial of Sepura products, please contact www.sepura.com.

sepura

Sepura
www.sepura.com

Multifunctional real-time spectrum analyser

Anritsu introduces the Field Master MS2080A, a multifunctional spectrum analyser that integrates nine instruments into a single package for time and cost efficiencies in the most demanding field environments. Covering 9 kHz to 4 GHz, the product has high performance and features for a compact and portable spectrum analyser, bringing distinct benefits to interference hunting and 5G/LTE base station installation and maintenance (I&M) applications.

The MS2080A combines fast sweep speed of 45 GHz/s, advanced user features such as interference source location by triangulation, and good RF performance, including ±1 dB amplitude accuracy. Additionally, it supports a cable and antenna analyser, power meter and 5G/LTE analysis to make it a useful general-purpose instrument that addresses measurement requirements for legacy and emerging wireless networks.

An optional real time spectrum analyser (RTSA) is available to provide real-time spectrum analysis with 2.5 μs probability of intercept (POI). The RTSA has up to 40 MHz analysis bandwidth and DANL of <-150 dBm, making it suitable for capturing intermittent and digitally modulated signals that can be hard to identify. Spectrograms allow irregular and drifting signals to be captured, recorded and displayed.

The MS2080A supports a full range of measurements for 5G frequency range 1 (FR1) radios to 4 GHz, to support I&M of 5G New Radio (NR) and LTE base stations. Gated sweep analysis for transmitter quality measurements to verify FR1 carriers is provided. The device offers full-channel, power-based and 5G/LTE modulation quality measurement-based coverage mapping for over-the-air (OTA) testing.

The MS2080A is a highly durable analyser that performs in the most challenging environments. It is said to be the only instrument in its class to provide 5 W of continuous RF input overload protection, preventing costly damage to the instrument's front end when used close to high power transmitters or in a high signal level environment.

A large 10″, 1280 x 800 resolution display meets the demanding IK08 specification for direct knocks and drops. A soft case provides IP52 environmental protection to safeguard the instrument during transport or rain. Weighing less than 4 kg, the product is small, compact and easy to carry.

Anritsu Pty Ltd
www.anritsu.com

9-in-1 combination antenna

Quectel Wireless Solutions has announced the YB0027AA combination antenna, the first of a series of combo antennas that combine high-performance cellular, Wi-Fi, Bluetooth and GNSS antennas. The 9-in-1 antenna can integrate a wide variety of antennas to achieve communication functions including 5G MIMO, 4G, GNSS and Wi-Fi/Bluetooth. It can be screw-mounted on devices and also supports multiple connector types and cable lengths.

The product offers a flexible and high-performance antenna solution for outdoor applications and is suitable for a wide range of applications in which multiple connections are used, including vehicle-mounted antennas in emergency service vehicles, emergency service networks, autonomous vehicles and remote monitoring applications, such as in buses and shipping port machines, broadband failover and remote television broadcasting.

By combining one L1/L5 GNSS active antenna with eight 5G/4G MIMO antennas in a single antenna box, the product meets users' needs for high-performance 5G connectivity. It is also available in alternative antenna configurations within the same housing, dependent on user requirements.

Compact in size, with a circumference of 162 mm and a depth of 56 mm, the antenna also meets the IP69K standard for protection against ingress of dust, high temperature and water pressure. This means the product is suitable for areas in which equipment is exposed to the weather or to regular cleaning by high-pressure jet washers.

Quectel
www.quectel.com

LunaSAR concept graphic.

Image credit: NASA/Reese Patillo

SMARTSAT CRC AND NASA COLLABORATE ON ASTRONAUT EMERGENCY COMMS

The SmartSat Cooperative Research Centre has announced an agreement to further develop new search and rescue (SAR) beacon technologies in partnership with NASA. It is the latest in a long history of cooperation in the field of SAR between Australia and the United States, with NASA and SmartSat having previously collaborated to advance satellite-based emergency communications and SAR by combining communications and navigation technology.

The latest project is studying a new SAR system for future human exploration on the surface of the Moon, known as LunaSAR. It acknowledges that astronaut safety is paramount and the ability to reliably communicate an emergency incident must be maintained, even if other services are not available.

Similar to distress beacons on Earth, the system will provide miniature low-power radio beacons mounted on space suits and lunar rover vehicles. The technology will support SOS and two-way messaging over a lunar orbiting satellite constellation. It will also allow the beacon location to be accurately determined, in the absence of GPS. This information will be provided securely and quickly to both the mission control centre on Earth and the response team on the moon, who are able to take immediate action.

Under the agreement, NASA's Search and Rescue Laboratory (SARLab) at the agency's Goddard Space Flight Center will bring experts to the project to help guide and review the technical direction. NASA will also provide access to unique and comprehensive test facilities for assessment of performance of the new technology as it is being developed by the SmartSat-funded research team, led by industry partner Safety from Space. The research team will design a new specialised beacon for extra-terrestrial environments based on a new waveform. As well as direct Artemis applications, they will also investigate the potential for enhanced services to extend beyond SAR to broader emergency management such as natural disaster warning systems.

"NASA is delighted to advance technology in this field, which will allow our astronauts exploring the Moon to do so knowing they have a system focused solely on their safety," said NASA Search and Rescue Office Chief Dr Lisa Mazzuca. "This is pioneering work that takes such a dedicated international partnership to get to fruition."

Mazzuca's SAR team has the full support and sponsorship of the Space Communications and Navigation (SCaN) Program at NASA Headquarters. SmartSat is meanwhile meeting with a number of space industry organisations and emergency services representatives to discuss applications for the SAR beacon technology in both terrestrial and space environments.

"This agreement is not just a fantastic development for Safety from Space's low-power, high-efficiency safety technology, it signals that Australia's space sector is developing globally important technologies," said SmartSat CEO Andy Koronios. "NASA has been instrumental in the development journey for this essential safety technology — and while it is early stages, we now have the further potential of this Australian-developed tech playing an important role in lunar and Martian exploration missions under the Artemis program."

Safety from Space co-founder Dr Mark Rice added, "Having had the support of NASA to modernise our second-generation beacon for use on Earth, we are delighted to be entering into an exciting new phase of our development. This agreement will open exciting new opportunities for our technology for users, including emergency management professionals and first responders, as well as helping us to develop important safeguards for astronauts on space missions."

PUBLIC SAFETY INFRASTRUCTURE A $2 BILLION OPPORTUNITY

SNS Telecom & IT, a global market intelligence and consulting firm, has released a research report indicating that annual spending on client and application server platforms associated with mission-critical push-to-talk (PTT) and group communications, for public safety broadband subscribers over both commercial and dedicated 3GPP networks, will reach nearly $1.8 billion by the end of 2025. The report also claims that annual investments in public safety LTE and 5G network infrastructure will exceed $2.3 billion by the end of 2025.

Mission-critical PTT and group communications

Many commercial and dedicated public safety broadband networks already utilise some form of PTT technology to support group communications for first responders and other critical communications user groups, and dozens of vendors have developed both client and application server implementations that are compliant with the 3GPP's mission-critical PTT (MCPTT), mission-critical video and mission-critical data specifications, collectively known as MCX. In addition, a number of suppliers — including Ericsson, Samsung, Nemergent Solutions, Etherstack and Streamwide — have launched LMR-3GPP MCX interworking function solutions that bridge traditional land mobile radio (LMR) systems with MCX services over 3GPP networks to support standards-based communications interoperability between narrowband and broadband networks.

Production-grade deployments of 3GPP standards-compliant MCX services, beginning with MCPTT functionality, are continuing to accelerate in national markets across North America, Asia, Europe and the Middle East. Early adopters range from national public safety networks — such as South Korea's Safe-Net, the United States' FirstNet and the UK's Emergency Services Network — to mobile operators such as Verizon, Southern Linc, Telus, SFR, KPN, Swisscom, Telia, Føroya Tele and STC (Saudi Telecom Company). In the coming months, France's Radio Network of the Future, Spain's SIRDEE public safety broadband network, Finland's VIRVE 2.0 mission-critical broadband service and several other national-scale public safety broadband projects are also expected to introduce MCX services as well as LMR-3GPP interworking capabilities where required.

In conjunction with the commercial maturity of additional 5G-focused 3GPP Release 17 and 18 features — specifically multicast-broadcast services, 5G NR sidelink for off-network device-to-device (D2D) communications, non-terrestrial network integration and support for lower 5G NR bandwidths — MCX services are expected to drive 3GPP networks to a position to be able to fully replace legacy LMR systems by the mid-to-late 2020s. National public safety communications authorities in multiple countries have already expressed a willingness to complete their planned narrowband-to-broadband transitions within the second half of the 2020s.

Public safety LTE and 5G network infrastructure

With the commercial availability of 3GPP-standards compliant MCX, high-power user equipment (HPUE), isolated operation for public

safety (IOPS) and other critical communications features, LTE and 5G NR networks are increasingly gaining recognition as an all-inclusive public safety communications platform for the delivery of real-time video, high-resolution imagery, multimedia messaging, mobile office/field data applications, location services and mapping, situational awareness, unmanned asset control and other broadband capabilities, as well as MCPTT voice and narrowband data services provided by traditional LMR systems. A myriad of fully dedicated, hybrid government–commercial and secure multi-operator core network (MCON)/mobile virtual network operator (MVNO)-based public safety LTE and 5G-ready networks are already operational or in the process of being rolled out throughout the globe (South Korea, the US, the UK); moving from field trials to wider-scale deployments (France, Spain, Finland, Sweden, Hungary); or in the pre-operational phase (Switzerland, Norway, Germany, Japan, Australia, Canada).

Even though critical public safety-related 5G NR capabilities defined in the 3GPP's Release 17 specifications are yet to be commercialised, public safety agencies have already begun experimenting with 5G for applications that can benefit from the technology's high-bandwidth and low-latency characteristics. For example, the Lishui Municipal Emergency Management Bureau is using private 5G slicing over China Mobile's network, portable cell sites and rapidly deployable communications vehicles as part of a disaster management and visualisation system. In neighbouring Taiwan, the Hsinchu City Fire Department is using an emergency response vehicle that can be rapidly deployed to disaster zones to establish high-bandwidth, low-latency emergency communications by means of a satellite-backhauled private 5G network based on Open RAN standards.

In addition, first responder agencies in Germany, Japan and several other markets are beginning to utilise mid-band and mmWave spectrum available for local area licensing to deploy portable and small-scale 5G non-public networks to support applications such as ultrahigh-definition video surveillance and control of unmanned firefighting vehicles, reconnaissance robots and drones. In the near future, we also expect to see rollouts of localised 5G NR systems for incident scene management and related use cases, potentially using up to 50 MHz of Band n79 spectrum in the 4.9 GHz frequency range (4940–4990 MHz), which has been designated for public safety use in multiple countries including but not limited to the United States, Canada, Australia, Malaysia and Qatar.

A number of significant challenges continue to plague the market. One of these is the lack of a D2D communications capability, as the ProSe (Proximity Services) chipset ecosystem has failed to materialise in the LTE era due to limited support from chipmakers and terminal OEMs. However, the 5G NR sidelink interface offers an opportunity to introduce direct-mode, D2D communications for public safety broadband users, as well as coverage expansion in both on-network and off-network scenarios using UE-to-network and UE-to-UE relays respectively.

Another barrier impeding the market is the non-availability of cost-optimised commercial off-the-shelf RAN equipment and terminals that support operation in certain frequency bands such as Band 68 (698–703 MHz/753–758 MHz), which has been allocated for PPDR (public protection and disaster relief) broadband systems in multiple European countries.

Nevertheless, SNS Telecom & IT estimates that the market for public safety LTE and 5G infrastructure will grow at a CAGR of approximately 13% between 2022 and 2025, from $1.6 billion at the end of 2022 to more than $2.3 billion by the end of 2025. Meanwhile, annual investments in MCX-related client and application server platforms will grow at a CAGR of approximately 20% between 2022 and 2025, from >$1 billion at the end of 2022 to nearly $1.8 billion by the end of 2025.

More information can be found in the company's report 'The Public Safety LTE & 5G Market: 2022 – 2030 – Opportunities, Challenges, Strategies & Forecasts', which presents an in-depth assessment of the public safety LTE and 5G market including the value chain, market drivers, barriers to uptake, enabling technologies, operational models, application scenarios, key trends, future roadmap, standardisation, spectrum availability/allocation, regulatory landscape, case studies, ecosystem player profiles, strategies and forecasts. The report's key findings are available at https://www.snstelecom.com/public-safety-lte.

SNS Telecom & IT
https://www.snstelecom.com/

EVERYTHING OLD IS NEW AGAIN

How often have we heard that saying over the years, from fashion to fads in toys for children and many other aspects of life. Even in our own industry it also occurs; years ago people would listen to the 'wireless' for information, then we were trained to use the more modern term of 'radio', but now we are back to talking about 'wireless broadband'. In this process of change, has anything really happened? Certainly the frequency of operation and the modulation format have changed, but the basics are still the same.

At the recent ACMA RadComms conference it was interesting to see some of the new ways that spectrum is utilised, including geolocation techniques, drone control from long distances and other similar things that all seem to be new. Yet when you sit back and analyse what is happening and how it all works, these are just different applications of the laws of physics that have ruled our communications and radio spectrum use always. It is these new ways of using the same old techniques that make our innovators world leaders.

ARCIA recognises that many of these innovators have been able to nurture their ideas to a commercial outcome; products and developments that have applications in a global market. This is one of the ways that as Australians we can foster and support our local innovators to generate a resurgence in Australian manufacture. We may not have the ability to compete head-to-head with the major manufacturing countries, but we have proven that we can adapt products to enhance the mainstream market needs. Examples are organisations like PWC, who have designed and manufacture cordless microphones; Zetifi, who adapt and enhance Wi-Fi products to suit the agricultural markets; and many more small organisations who are also doing great things.

To explore these organisations and perhaps help them to grow, ARCIA will be pulling local organisations together for a 'manufacturers forum' to see what they are doing successfully and see if we can help them to grow their markets and capabilities. As an organisation, ARCIA has always believed other spectrum users should be encouraged and that we should help them with their spectrum discussions as much as we can. Our approach with the ACMA has been based on decisions being fully transparent and recognising the specialised needs of as many legitimate users as possible.

Over several years we have recognised the scientific spectrum segments and have discussed their unique needs with CSIRO representatives on multiple occasions. Through both discussions and our own familiarity with the Radio Quiet Zone (RQZ) in central Western Australia, as well as the future SKA which will open many new and exciting avenues for space exploration, we recognise their specific needs. One of the things that we do recognise and ask our industry members (as well as all radio communications users) is to respect the RQZ parameters.

In Carol Wilson's article on the SKA elsewhere in this magazine, she points out that the SKA will not create problems for satellite phones or other communications systems — but we should also remember to be careful with other forms of communications. Devices using Wi-Fi, or UHF CB, or commercial systems perhaps should be turned OFF or at least have their use minimised in the RQZ area. Have you ever stopped to realise that most radio receivers also emit radio interference? Although the level of that signal may be very low, it is thousands of times higher than the signals the SKA will be trying to listen for. So please respect the RQZ, and remind others to do that as well.

Ian Miller is Executive Officer of the Australian Radio Communications Industry Association (ARCIA).

FREE

for industry and business professionals

The magazine you are reading is just **one of 11** published by Westwick-Farrow Media. To receive your **free subscription** (print or digital, plus eNewsletter), visit the link below.

wfmedia
connecting industry

www.WFMedia.com.au/subscribe

GME Commercial. The only Australian manufacturer of UHF Radios.

GME places a strong emphasis on the delivery of market-leading products with an unwavering commitment to producing communications equipment of the highest possible quality, right here in Australia.
This emphasis allows GME to maintain a significant advantage over offshore competitors, through a deep understanding of the unique requirements of our customers and the conditions faced in the harsh Australian environment.

GME COMMERCIAL

gmecommercial.com.au

AUSTRALIAN MADE AND OWNED