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comms critical

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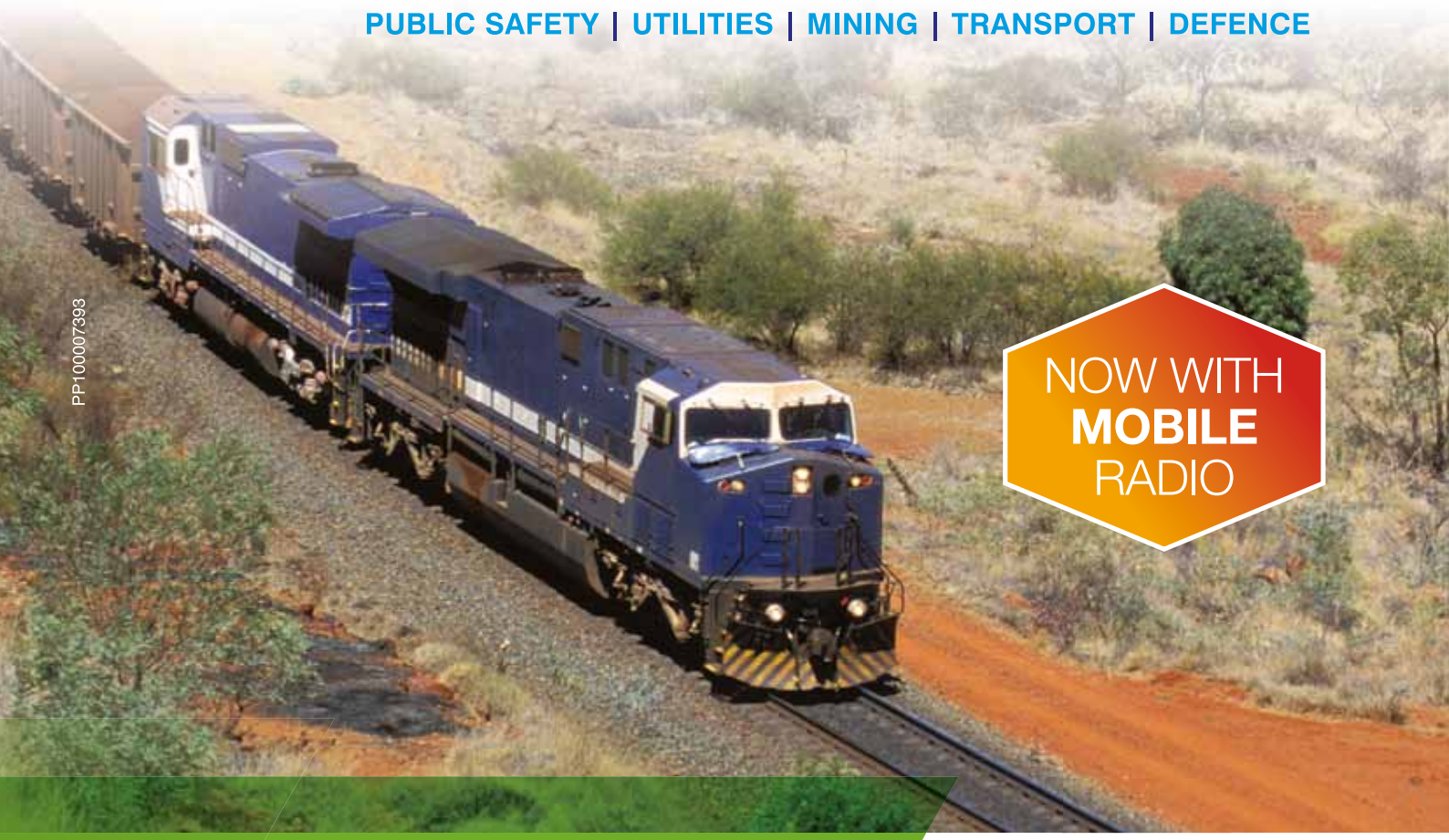

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comms critical

Inside

July/August 2022

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ON THE COVER

VHF is the best solution to cover large open areas. It is ideal for outdoor applications where distance is the primary user need. The extended coverage also makes it easier to build overlapping coverage with base stations.

Benefit from the overlapping VHF coverage and reduce the number of base stations needed to cover the same area compared to UHF. When you choose VHF TETRA Solution, you can impact the bottom line with a significant reduction of the overall costs.

Our cooperation with VHF TETRA radio providers enables us to offer hand-portables and mobile radios with functionality and outstanding audio, complementing ANY customised solution with all the voice and data functionalities expected from TETRA.

Teaming up with Sepura gives access to not only their SC20 Hand-portable TETRA Radio, but also the SCG22 fully-featured TETRA Mobile Radio ensuring crystal-clear audio in every situation and even in noisy environments.

The Funktel VHF FT5 radio provides a full, proven TETRA feature set. To support the VHF frequencies, the radios can be operated using the DAMM MultiTech Outdoor System (BS422) in VHF.

TETRA network architecture is proven through years of operational use in the most harsh environments. It provides an ultra-reliable, dedicated critical communications network with definable levels of resilience customised to specific requirements. The benefits of TETRA are numerous, and so it makes sense to expand TETRA to VHF to include users, who have not previously had access.

For customers running operations in a mix of built-up and rural areas, it is also possible to run both VHF and UHF in the same network using separate BS422 base stations operating the DAMM TetraFlex software. This makes it both easy and affordable to extend an existing UHF network to include VHF in areas where this frequency band is more advantageous.

Damm Australia
www.damm-aus.com.au

Transmit

There has long been a saying, which is a bit of a paraprosdokian (Google it, mate): "May you live in interesting times". Meant to convey double-meaning when spoken to an associate, the saying hides a veiled threat in that interesting times are, at minimal, an annoyance; but, at worst, can be downright harmful. Much preferred would be a life of calm predictability.

I think it is fair to say that currently the world is living in interesting times. From the individual: COVID, low wages, high house prices, share market uncertainty and the price of lettuce. To the collective: war, climate change, global supply chains, nation state belligerence and on and on.

I just read in the newspaper this morning that they have discovered a black hole, not that far away in space (in space terms anyway), that is eating up planets the size of Earth every second! Not even my chocolate labrador is that voracious.

How hard is it for an individual to carry on with a normal life at home and at work, when so much strives to keep the mind distracted? As always, one step at a time.

So it is with our industry.

Big things are indeed afoot, what with the continued spread of digital 5G into all manner of communication fields. Then there is increased call for expanded communications in the emergency responder market, incorporating added extras such as: video, telemetrics, biometrics, geometrics; as well as linkages to satellites, drones and even relevant experts anywhere in the world, instantly.

There is the increasing robotisation of industry, such as mining, transportation and manufacturing. How is that two-way communications controlled and monitored and via what process?

This reliance on modern technology has grown at an exponential rate over the decades, which, interestingly, has required an equivalent increased dependence on connectivity.

One of the major threats is the influx of all manner of companies into the critical comms world, from global digital media giants and multinational communications behemoths to cheeky Kickstarter start-ups and local entrepreneurs.

When I started in this job I set up a glossary of terms used in the critical comms industry. It is important to ensure the right term is used in the right context. I am up to 400 words consisting mostly of acronyms and technical specifications; from 802.11 IEEE to Zone Beam.

Yes, we may live in interesting times but, as Einstein said, "Order is for the stupid, only the genius rules the chaos." He would know.

Good luck to you all.

Phillip Ross, Editor
cc@wfmedia.com.au

Calendar

July

Disaster & Emergency Management Conference
25–26 July 2022
Royal Pines Resort, Gold Coast
https://anzdmc.com.au

Public Sector Comms Leaders Summit
27–29 July 2022
Rex Hotel, Canberra
https://commsroom.co

August

APCO 2022
7–10 August 2022
Anaheim Convention Centre
www.apco2022.org

September

ACRNA 2022 Conference
6–7 September 2022
Novotel, Brighton le-Sands
https://acrna.org/

Firstnet Users Summit
19–22 September 2022
Southpoint Hotel, Las Vegas, USA
https://thepsbta.org/

October

ETSI IoT Week Conference
11–13 October 2022
Sophia Antipolis, France
https://www.etsi.org/

Comms Connect Melbourne 2022
18–20 October 2022
Melbourne Convention & Exhibition Centre
melbourne.comms-connect.com.au

December

Natural Disasters Expo Asia
7–8 December 2022
Simgapore Expo, Singapore
www.naturaldisasterssshowasia.com/

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

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To find out more about the CP50 or the rest of our Australian made range of Commercial radios and accessories, visit www.gmecommercial.com.au

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AUSTRALIAN MADE

UBIQUITOUS CONNECTIVITY IS THE FUTURE OF WIRELESS

HOW ENGINEERS CAN PREPARE

*Jean Baptiste Lanfrey**

Systems capable of seamlessly using satellite, cellular and local area networks are nowadays a must-have.

Connecting people and everything, no matter where they are, has always been the main goal of wireless communications. Whether it is people talking on their mobile phones, vehicle communication (V2X) platforms helping cars negotiate traffic turns or Internet of Things (IoT) devices monitoring smart factories, today's wireless systems are striving to realise that dream.

This power means that ubiquitous connectivity — systems capable of seamlessly using satellite, cellular and local area networks to maintain a fast, secure and reliable online connection — is no longer a nice-to-have feature but a must-have.

For the engineers building these technologies, the challenges of designing wireless systems optimised for ubiquitous connectivity have grown along with their capabilities. These include ensuring a device's compliance with standard protocols for system and device interoperability; optimising multidomain system parameters which integrate algorithms, antenna, array and RF transceiver design choices; and verifying the designs of hardware prototypes with automated over-the-air tests and realistic channel and impairment models.

Fortunately, techniques and best practices exist that engineers can use to design, model and test these systems, ensuring they work together to provide businesses and consumers alike with not only wireless access, but true ubiquitous connectivity.

The evolution of wireless

From a technical perspective, the concept of ubiquitous connectivity is nothing new. However, it has been a challenge to execute for economic, technical and physical reasons. Economically, the number of access points have been historically limited by cost and reserved mainly for high-density population areas.

High throughput links could not be constructed seamlessly over a variety of ranges and distances and each technology has catered to its own niche market. Lastly, physically, each communication link is limited by the interference provided by other systems using the same or adjacent spectra. This has made coordination between various systems a necessity.

While modern high-level wireless systems have overcome many of these challenges, for example: low earth orbit (LEO) satellites are more cost-effective than their medium earth orbit (MEO) and geostationary orbit (GEO) counterparts, with their signals capable of providing substantial throughputs at large distances; but other challenges remain.

5G, Wi-Fi and satellite-based communication devices, for instance, rely on multi-user multiple-input and multiple-output (MIMO) beamforming technology to reach users in the service area. MIMO and beamforming-enabled devices are equipped to send and receive multiple signals, necessitating engineers to optimise use of multiple frequency bands at once.

This, however, requires constant monitoring of available signal space and precise scheduling as well as channel modelling and measurements on both ends of the link to connect two devices.

When designing for ubiquitous connectivity, engineers have typically designated Wi-Fi systems for shorter-range and cellular systems for longer-range communications. These heterogenous types of networks can operate in tandem, so that, for example, signals beamed to a congested cellular service area can be offloaded to a Wi-Fi service network and vice versa.

UBIQUITOUS CONNECTIVITY IS NO LONGER A NICE-TO-HAVE FEATURE BUT A MUST-HAVE.

Bluetooth has a role to play in ubiquitous connectivity as well. While not meant to be part of a high-throughput wireless network, the low power and ISM band usage of its basic rate, enhanced data rate and Bluetooth low energy standards makes the platform ideal for sending short-range signals.

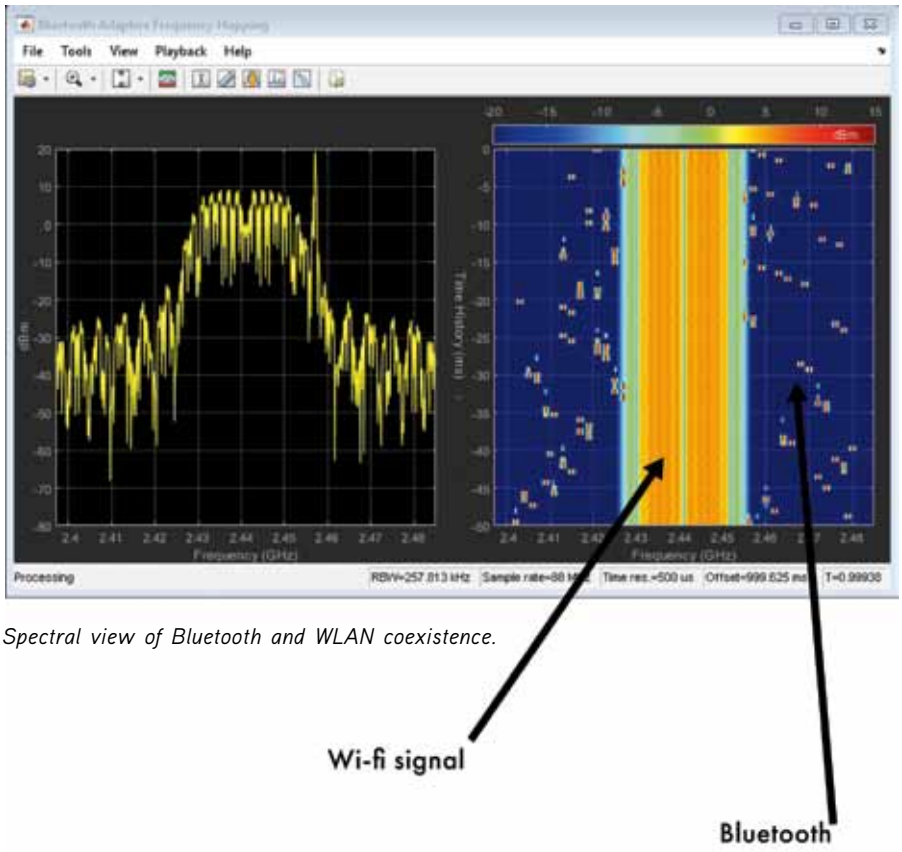
Engineers can leverage the short-range signals provided by Bluetooth as they best indicate whether a device needs to connect to the internet. Alternatively, Bluetooth can also help engineers save bandwidth and keep devices offline when they do not need to be connected.

Ensuring each of these types of networks, broad area networks such as satellite links, cellular wide area networks including 4G and 5G, local area networks (Wi-Fi) and personal area networks such as Bluetooth, are in sync providing ubiquitous connectivity requires extensive testing. For engineers working on these problems, the extensive testing is better conducted through modelling and simulations than with live equipment. This is where the value of large-scale simulation platforms become clear.

Simulation helps engineers achieve ubiquitous connectivity

Solving the challenge of ubiquitous connectivity requires engineers to not only understand the relationships and interferences between all wireless communications protocols and standards in place today, but test the standards' compatibility with each other. Engineers can use large-scale modelling and simulation tools such as MATLAB and Simulink to design, model, test and analyse systems before deployment, ensuring the reliability of their systems long before a physical device is built.

For example, a key challenge when developing cellular network systems is the number and complexity of parameters associated with each mode of operation. Engineers need to understand that each parameter needs to be tested against a variety of channel conditions that can occur in a typical cellular network. If all the testing conditions are not met, the system cannot be certified.



Spectral view of Bluetooth and WLAN coexistence.

Image credit: ©2022 The MathWorks, Inc.

To address this, engineers can use simulation platforms to provide an environment that makes reviewing all potential parameters and evaluating them against other systems easier, faster and more reliable than physical testing. Faster testing methodologies are largely possible due to the advancement of technologies included with MATLAB and Simulink, such as: ease of test waveform generation and use of automatic C code generation, GPUs and parallel computing for accelerating simulations.

Of course, multi-user MIMO and beamforming systems are only as effective as their ability to accurately point to and connect with target devices. This necessitates simulation platforms such as MATLAB and Simulink to make the task of verifying accurate positioning and localisation easier.

These solutions not only provide engineers with industry-standard compliant tools generating individual signals including Bluetooth, 5G, LTE and Wi-Fi but also a visualisation and testing environment enabling them to see the effect of indoor and outdoor RF propagation on maps. This will help them ensure the connections between multiple devices are accurate.

Ubiquitous connectivity continues to be a must-have in the modern world. This ultimately means that simulation platforms too will have to adapt to remain essential for engineers as they design systems capable of seamlessly using a multitude of modalities including satellite, cellular and local area networks, all while maintaining a fast, secure and reliable online connection.

**Jean-Baptiste Lanfrey, Technical Manager, MathWorks Australia*

Lanfrey leads a team of customer-facing engineers. He joined MathWorks France in 2008 and worked with customers in the control design, physical modelling, automatic code generation and verification and validation domains before moving to MathWorks Australia in 2013.

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News

MACARTHUR REGION BOOSTED WITH PSN SITE

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The Public Safety Network (PSN) in the Macarthur Region of New South Wales has been expanded with the completion of a site at Macquarie Fields. NSW Telco Authority Managing Director Kylie De Courteney said that next to Australia's triple zero emergency hotline, the PSN was the most critical communications network in NSW.

The PSN is a radio network used by frontline emergency services, government agencies and essential services to communicate via radio handsets and other devices during emergencies. De Courteney said the NSW Government was investing $1.4 billion to expand the PSN to better protect communities.

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BITESIZE WEBINAR TO GAIN INSIGHTS INTO THE STATUS AND FUTURE OF CRITICAL COMMS

The Australasian Critical Communications Forum (ACCF) chapter of TCCA is hosting a two-and-a-half-hour live, online Bitesize program on the 9th of August, with expert-led presentations to gain insight into the status, transition and future of critical communications. The webinar is curated to give the latest insights to those on the frontline, as well as procurement and commissioning managers in charge of strategic planning.

The event is free for all to attend.

Hear the latest on the Australian Government PSMB and the New Zealand Government NGCC critical broadband initiative and the latest in critical LMR and Broadband 4G/5G technologies from a number of industry experts and suppliers delivering critical communications networks and control rooms.

This CCBitesize live online event will allow you to hear directly from government and industry on issues encompassing the transition from LMR to broadband and what it will mean from a user and operational perspective for Australia, New Zealand and other countries.

Topics include: what does it mean to be mission critical; new and evolving technology standards and products; hybrid networks — MCX integration into LMR networks; advances in network core and RAN accelerating adoption of private networks; global trends in control room solutions; Future Railway Mobile Communication System; and an update on the New Zealand NGCC project.

Speakers include those from NSWTA on PSMB, and NZ Police on NGCC.

To register, visit: criticalcomms.com.au and search for 'Bitesize Webinar'.

Out of vehicle communications

Wireless Pacific's X10DR Out of Vehicle Communication Solution has just shipped 20,000 mobile solution globally. The latest incarnation, the Plus series is available with integrated 'mandown biometeric monitor' capability for its users when away from their vehicle.

While initially developed for emergency critical communication services, the solution is now getting interest from electrical utilities both within Australia and the USA.

The Elite Plus product allows users to communicate up to 500 m radius from their vehicle or 1000 m from each other. Relay Mode is where handsets can mesh with an out-of-range partner's device or the two can even communicate for up to 250 m from each other when completely out of vehicle range should the need arise.

Wireless Pacific

www.wirelesspac.com

Multi-viewer switch

Adder Technology has announced the ADDERView CCS-MV 4224, part of its Command and Control portfolio designed to deliver up to four different video, audio and USB signals to a single workstation in a user-customisable window layout across one or two monitors.

The switch is designed to reduce desktop clutter and present critical information the way the user needs it, in 4K UHD resolution. By moving the mouse cursor between windows users can switch between sources in real time and without latency.

Adder Technology

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Going further in critical communications

News

SUBMISSIONS OF INTEREST CLOSED FOR ACMA REVIEW OF 1.5 GHZ BAND

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Growing interest in the 1427–1518 MHz, 1518–1525 MHz and 1668–1675 MHz frequency ranges (1.5 GHz band), to provide support for new wireless broadband (WBB) and mobile-satellite services (MSS), consequently led to the Australian Communications and Media Authority (AMCA) deciding to review the band. Submissions of interest closed on the 10th of June.

A range of spectrum uses currently support the 1.5 GHz band, including: applications in the mobile (aeronautical mobile), fixed (both point-to-point and point-multipoint), radio astronomy, and meteorological satellite services. Both domestically and internationally, there is increasing demand for spectrum to support WBB services. Inmarsat also announced plans to launch satellites in 2022 that will support MSS use in the 1518–1525 MHz and 1668–1675 MHz frequency ranges in the Asia–Pacific region. Consequently, there is interest also from the satellite industry to review arrangements in those frequency ranges.

ACMA welcomed responses from interested stakeholders, along with comments on specific questions including:

- Are there any international arrangements or technology trends that the ACMA should be aware of?
- What is the demand for access to the 1.5 GHz band for WBB, MSS and broadcasting services?
- Are there any other new services that should be considered?
- What are the ongoing requirements for incumbent services in the 1.5 GHz band?
- Are there any viable alternative options?
- What planning scenarios should be considered in the 1.5 GHz band?


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ACMA LAUNCHES APPARATUS LICENCE FEE CALCULATOR

The launch of the ACMA apparatus licence fee calculator is intended to make the process of applying for a licence to operate a radiofrequency transmitter or receiver a whole lot easier. The free calculator is a one-stop shop for working out the likely associated fees and includes up-to-date pricing and flexibility across mobile and desktop platforms.

It does not require apparatus licensees to register their personal details and will be regularly updated to ensure licensees can make informed decisions about licence options.

The calculator helps estimate annual apparatus licence fees; it does not provide pro-rata adjustments for annual fees, estimate taxes for area-wide licences or reflect charges from any accredited person employed.

Signal and spectrum analysers

Rohde & Schwarz FSW signal and spectrum analyser tests high-end communication components or systems, including: 5G NR FR2 or IEEE 802.11ay / ad chipsets, amplifiers, user equipment and base stations.

The modified front end of the FSW, as well as the microwave hardware optimised for frequencies above 26 GHz, deliver error vector magnitude (EVM) measurement accuracy in the mmWave range. EVM measurements are currently in high demand for 5G base station and component development at FR2 frequencies as well as for high frequency satellite applications.

The analyser wide internal analysis bandwidth allows the characterisation of wideband components and communications systems. Its measurement applications simplify and speed up in-depth analysis of the physical layer, allowing testing at higher frequencies and wider measurement bandwidths.

Rohde & Schwarz (Australia) Pty Ltd

www.rohde-schwarz.com.au

Private wireless network

Private wireless networks leverage LTE and 5G technology and edge computing to support enterprise and industrial applications with high-throughput, low-latency connectivity across building and campus settings. Private wireless can enable solutions for vehicle and logistics coordination at transportation hubs; operations monitoring and security at oil and gas refineries; and network health and operation monitoring for utility companies.

While private LTE/5G solutions provide robust local area connectivity, a dependable wide area network turns a single well-connected location into part of a larger digitised enterprise. Intelsat is working with customers and solution partners to enable every part of the modern enterprise with simplified solutions like FlexEnterprise Hosted.

FlexEnterprise Hosted simplifies the delivery of high-throughput connectivity by removing the need to manage satellite capacity or commit to wholesale services, allowing connectivity to be enabled and changed through Intelsat's web-based portal.

As organisations in sectors as diverse as energy and utilities, mining, manufacturing, public safety and transportation look to new technologies to drive their businesses, Intelsat's solution partners can leverage services like FlexEnterprise Hosted to enable those technologies in places where no connection was possible before. No business location is too remote to contribute to the potential of the digitised organisation.

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www.intelsat.com

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IS LoRaWAN A VIABLE OPTION FOR CRITICAL MESSAGING?

LOW POWER, WIDE AREA IN A TWO-WAY MESSAGING PLATFORM

Brad Welch, General Manager TPL Systems Asia-Pacific

What can take up the slack and replace closed paging networks?

With the shutdown of commercial paging networks in Australia and New Zealand, individuals, companies and emergency responders that have relied on these networks to deliver their critical messaging have been forced to look at other technologies to fill the gap. In most cases they have moved to cellular technologies such as SMS or messaging apps to receive these time-critical alerts.

Although there have been vast improvements in cellular network capacity, SMS is a store-and-forward technology with no message delivery time guarantees. On occasions messages arrive late, which affects critical response times.

The use of cellular data via messaging platforms and apps delivers messages in real time. However, if the device is out of coverage or there is a network outage, time-critical messages can be missed.

Most mobile devices need to be charged daily, which can also become an issue in major disasters where power outages can last for many days.

There are still private and government-run paging networks in Australia and New Zealand with continued investment in the maintenance and expansion of the networks for healthcare workers and emergency responders. There is a deep understanding amongst these organisations that mission-critical paging infrastructure is at the forefront of how they respond to time-critical emergencies such as cardiac arrests or fire response. As these networks are private or government run, they are not available on a subscriber basis so, other than cellular technologies, is there another option available? LoRaWAN is certainly a technology that can be considered.

What is LoRaWAN?

When LoRaWAN is mentioned there are often blank looks and mixed responses, so what is LoRaWAN? This is best described on the LoRa Alliance website as: a low power, wide area (LPWA) networking protocol designed to wirelessly connect battery-operated 'things' to the internet in regional, national or global networks, and targets key Internet of Things (IoT) requirements such as bi-directional communication, end-to-end security, mobility and localisation services.

In essence LoRaWAN is a low power, wide area, radio-based technology designed to monitor and control battery-operated devices in urban and rural locations. Some key features include long battery life for devices in the field, open standards so device developers are not subject to paying licence fees, flexible carrier-grade network models, easily scalable and with end-to-end encryption.

LoRaWAN is one of the fastest growing tech ecosystems with 170 network operators in 171 countries, 550+ members of the LoRa Alliance, 225 million connections growing at approximately 33% year on year, 240 million devices deployed with over 3.2 million gateways. Key uses include: predictive water maintenance and leak detection, control of smart streetlights, and monitoring of water usage, temperature and humidity in agriculture.

Locally, there are two commercial LoRaWAN network operators: National Narrowband Network Co. (NNNCo) in Australia and Spark in New Zealand. Spark and NNNCo have a trans-Tasman agreement simplifying connectivity between both countries.

NNNCo thus far is building its network on customer demand in both rural and metropolitan locations. These include Gold Coast, Newcastle, Hobart, Launceston and Shepparton, for example.

Tony Tilbrook, the CTO/COO of NNNCo, said: "Australia is a very big place, so we need to be creative in our approach. Our approach is 100% IoT coverage where and when you need it. We have flexible technical and commercial applications to provide ubiquitous network coverage."

Spark New Zealand's LoRaWAN network has 179 Marco sites and covers around 70% of the population including most major cities. Spark also offers 'coverage in a box' solutions for indoor and outdoor infill where macro coverage is not available.

Tonie de Vries, Product Manager IoT/Emerging Technology for Spark, said: "Additional macro coverage would be based on customer demand. The network is not built to mission-critical standards; however, it can be used to add resilience to a multi-bearer solution."

Current uses for the network include vaccine refrigerator monitoring, water usage, air quality and vibration monitoring.

How can LoRaWAN be utilised?

Critical messaging needs to be delivered to emergency responders typically in less than 10 seconds.

In the LoRaWAN protocol there are three class operating modes: A, B and C. In Class A communication is initiated by the end device. Each uplink transmission is followed by two downlinks so, for a messaging device, it would need to send an uplink before a message is received, which is not ideal.

In Class B the device is synchronised to the network via periodic beacons so a downlink will open 'ping slots' at scheduled times. The latency is programable up to 128 seconds. There is a possibility Class B could be used if messages are not time critical.

In class C the device receiver is always open so a downlink can be sent at any time so there is no latency, which is perfect for time-critical messaging. The trade-off between the three classes is battery life, with Class A having an extended battery life compared to Class C.

Although there are many thousands of monitoring and control LoRaWAN devices available, there is only one manufacturer of a critical messaging device. TPL Systemes (TPL) in France manufactures the Birdy Slim IoT smart pager.

David Villacastin, the Managing Director of TPL, said: "We manufacture many devices from traditional POCSAG and Flex pagers to cellular 4G pagers. In our product meetings, we identified LoRaWAN as an exciting possibility as an additional bearer to critical messaging. After dedicating R & D resources the Birdy Slim IoT was released in the market in Q1 2020."

The Birdy Slim IoT is an IP67-rated multi-bearer device including a POCSAG or Flex paging receiver, GPS for outdoor location, Bluetooth Beacon for indoor location with SOS and man-down capability. The addition of the LoRaWAN bearer gives the pager the ability to receive messages over POCSAG or Flex as well as LoRaWAN. On receipt of a message the device can send message received, message read and response availability over the LoRaWAN uplink giving it two-way messaging capability.

Real-world example

A fire department in the southern French Alps (SDIS 04) implemented the Birdy Slim IoT with LoRaWAN. It has 1548 volunteer firefighters and covers an area of 6925 square kilometres with a population of 154,500 residents.

Each firefighter carries a Birdy Slim IoT and is initially alerted via standard POCSAG paging. When the pager receives the message a message receipt acknowledgement is sent over the LoRaWAN network. The responder then can send a responding/not responding message back to the CAD operator so there is clear visibility on who is responding to the incident.

If the 'message received' acknowledgment is not received by the CAD, the message is then sent out via LoRaWAN in case the pager was out of POCSAG range. This adds resilience with multiple paths for the critical messages to be delivered.

The GPS position is sent via LoRaWAN to show the responder's location to the fire station when a turnout call is sent. The GPS is used for SOS and Man-Down alerts.

Other industries in Europe where critical messaging is currently used with LoRaWAN include health care (hospital and aged care), agriculture and manufacturing. These include public and private LoRaWAN networks.

Pros and cons

With any technology there are pros and cons, which can give benefits and cause limitations. From a critical messaging perspective, the LoRaWAN pros include: two-way messaging capability, multicast (one message to many devices) if enabled on the network, real-time message delivery with message receipt acknowledgement, easy to deploy and expand with low data costs.

Some of the cons include: LoRaWAN uses class licence frequency bands (923 MHz in AU and NZ) which is competing with other technologies on the band, it may not have the same coverage currently as other technologies and message length limitations of 80–120 characters.

In summary, the use of LoRaWAN for critical messaging is certainly promising. If LoRaWAN networks are designed to mission-critical standards it can be used to enhance traditional paging networks and offer more functionality with two-way messaging with added resilience.

This article is a version of the presentation to be made at Comms Connect NZ 2022.

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Industry Talking

It's full steam ahead now as we conduct events in Sydney and Brisbane, and prepare for the return of the annual gala dinner in Melbourne. Make sure you keep an eye on the ARCIA website for dates; we are all looking forward to catching up with friends and colleagues.

Each of these events will also have a training day attached as ARCIA introduces the new learning management system we have been working on. To be known as the 'ARCIA Academy', it is definitely a slow process building up content and having all the systems in place that make the training worthwhile for a range of candidates. As we look at the pathways that people take for different industry roles, the plan is to start simple and build up technical content over time.

Trying to distil the incredible knowledge that many people in our industry have and getting this into training content is no mean feat. We believe the combination of hands-on practical skills, technical knowledge and targeted micro learning courses will provide huge value to our industry members.

I am proud to say that in our own business, based in Sydney, we have a number of young people in apprentice, technician and software roles. They are remarkable: keen to learn, solve problems and further their careers in our industry — although I admit it is a little scary when they remark they have only heard about the Sydney Olympics. However, my point is there are people out there; we just need to invest in them.

The one area where we need to continue to invest time concerns spectrum management and regulation. Although the ACMA method of releasing discussion papers for gathering information is important, the ACMA format of releasing those papers raises concerns. Recently ARCIA were required to respond to four separate discussion papers in a very short time-frame. It seems as though within the various sections of the ACMA there is no coordination on the release of these papers and, for an organisation with limited resources, having multiple papers to respond to in a limited period is a real issue.

We recognise that the need for input is very important; however, a bit more coordination between sections of the ACMA would make it easier for organisations to manage.

With a change of government at the recent federal election we are again concerned about the disconnect that happens in some important areas of communications infrastructure. For several years now our ARCIA project manager, Geoff Spring (he is also a senior researcher for the Melbourne University Centre for Disaster Management and Public safety: CDMPS), has been following the committee deliberations of the federal government over the need to recognise public safety communications as part of the national critical communications ecosystem. Regrettably there have now been three separate instances where committee deliberations and recommendations have simply been totally ignored with either changes in government or in the re-allocation of ministries.

This means that the emergency communications networks that our public safety agencies rely on every day are not classified as being critical infrastructure and so are not given any degree of priority, either in maintenance or restitution in major disasters. We are astounded that an item of such critical importance can just be pushed aside at the whim of politicians or public servants, especially when we consider the increased incidence of disaster events over recent years.

In the same area of concern, after the Royal Commission into the recent bushfires along the east coast, there were around 150 recommendations made to ensure that future situations would not suffer to the same extent. If we look at the recommendations that relate to radio communications there would appear to be little done. We can only hope that over the next few months we can alert the new government to the fact that the concerns and issues have not just faded away with a change of government; they are still there waiting for the next natural disaster to occur.

Finally the ARCIA committee is considering adding some new awards for our industry to highlight local manufacturing. There is an amazing amount of manufacturing activity across our industry and the incredible innovation these companies demonstrate often goes unrecognised. It is time we celebrated these local achievers. If members have any suggestions on the awards please drop us a line.

Hamish Duff, President
Australian Radio Communications Industry Association

Vehicle fleet management

The Logic Connect cloud-based platform developed by Logic Wireless is compatible with Teltonika tracking devices, offering a comprehensive and affordable vehicle fleet management solution. Teltonika's FMC130 and FMC640 devices connect to Logic Connect via the cellular network using a SIM card without the need for any additional network infrastructure.

The cellular connectivity enables frequent transfer of information on the status of the vehicle, including the direction it is heading, ignition status, integration of the accelerometer and a range of other useful data. The system can store and forward data when outside of the cellular coverage area.

Using the Logic Connect platform, organisations can track the efficiency of their fleet and improve the health and safety of their employees. The platform gives organisations the ability to track their assets, fleets and equipment in real time. They can receive alerts when vehicles are speeding, monitor time spent idling and receive notifications when vehicles enter geofenced areas. The platform can also store vehicle information and set due date reminders for road user charges, registration, WOF or regular servicing.

The above features are applicable to industries such as transport, logistics, agriculture, construction and mining, security and emergency services.

Logic Connect was designed to operate across cellular, land mobile radio, satellite and IoT devices offering flexibility and allowing organisations to select the number and type of connections to meet their operational requirements.

In addition to fleet management functions, the Logic Connect cloud-based platform can be used to manage health and safety risks and improve productivity in a variety of settings.

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GLOBAL BROADBAND DEVELOPMENT IS IMPROVING

OMDIA'S GLOBAL INDEX COMPARING FIBRE DEVELOPMENT ON A COUNTRY-BY-COUNTRY BASIS

The fibre development index for 2021 reveals ups and downs compared to the previous year.

By 2026, the percentage of the global population that is connected to the internet will increase from 58% to 70%, according to Omdia's Global Fiber Development Index (FDI). Of the 70%, 30% of the population will have access to the internet via a mobile device and 40% will have a home fixed broadband connection.

Although the connectivity divide is closing, speed and service inequalities are unfortunately widening.

In Latin America, for example, although 44% of the population will have access to fixed broadband services by 2026, only 5.3% will be on a connection delivering 500 Mbps or more, and only 1% will have speeds of more than 1 Gbps. In contrast, in North America the equivalent factors are 77%, 26%, and 11% respectively, and they are 66%, 40%, and 10% in Oceania, Eastern and South-Eastern Asia. At the other end of the spectrum, only 9% of the African population will have access to fixed broadband, with 84% of those users limited to speeds of less than 30 Mbps.

Singapore continues to lead Omdia's FDI in 2021, followed by South Korea, United Arab Emirates, China and Qatar. The first European countries in the ranking are Spain and Sweden in seventh and eighth positions. They are closely followed by Luxembourg and Romania. The US heads the Americas region and is positioned 18th in the world overall. The 2021 full ranking results are available here.

Australia is ranked 41st out of the 56 countries surveyed; it dropped three places from last year's index. Under 30% of households have fibre to the premises and the average downlink speed is about 300 Mbps. This lists the nation as broadband-ready, with medium-to-high levels of broadband penetration but low levels of fibre investment.

Greater investment in advanced, full-fibre broadband networks is essential to closing this digital divide. To track the market, Omdia created the Global Fiber Development Index in 2020, which monitors investments in fibre across all parts of the network on a country by country basis.

> ALTHOUGH THE CONNECTIVITY DIVIDE IS CLOSING, SPEED AND SERVICE INEQUALITIES ARE UNFORTUNATELY WIDENING.

The Index covers 81 territories and is updated annually. Beyond coverage and household penetration, the benchmark tracks and ranks all elements of fibre network investment, specifically fibre access, mobile fibre backhaul, core fibre backhaul, and overall fibre QoS, which is currently measured by overall average downlink and uplink speed.

The index has been recognised by ETSI's F5G group as being best practice for measuring fibre development.

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NEW ZEALAND POLICE UPGRADE WITH MIMOMAX TORNADO RADIOS

NATIONAL NETWORK NEEDED TO PROVIDE FOR THE FUTURE

Radios selected as part of a nationwide linking replacement and expansion project.

Looking to assure their communications network for several years in the lead-up to the launch of the Next Generation Critical Communications (NGCC) network, New Zealand Police (Police) has selected Mimomax Tornado radios as part of a nationwide linking replacement and expansion project.

Background

Police have 15,000 staff, 11,000 of whom require connectivity in the field. The communications centre receives over 860,000 emergency calls per year and is one of the largest land mobile radio (LMR) networks in New Zealand, covering over 90% of the land area.

Following a network review in 2015, the Police Information and Communication Technology (ICT) team had identified risks in the network relating to the lack of componentry to repair some of the older equipment in addition to difficulties maintaining the correct operating parameters of the equipment. With 20 and 30 dual channel links requiring replacement, the aim was to find a cost-effective solution which could support analog equipment, be deployed quickly and offered a level of futureproofing.

The Police communications network also provides Fire and Emergency New Zealand (FENZ) with its communications across the nation, with the exclusion of the Auckland region. Throughout most of the country FENZ is provided with exclusive channels, which are maintained by Police staff but, for areas where exclusive channels are not available, the channels are shared between FENZ and NZ Police. At the point that Police were investigating their network replacement options, FENZ indicated its desire to expand its exclusive channels and so the network upgrade provided an opportunity to offer a more resilient service to both organisations.

With many of the existing frequency division multiplex dual channel links already in 50 kHz channels, the Mimomax Tornado radio system was found to provide the best solution as it offered three E&M channels for a 50 kHz bandwidth QPSK channel. Furthermore, the 16 QAM version radio could offer up to six E&M channels. While Police generally did not require this level of capacity currently, the extra capacity offered via higher modulation did provide an opportunity for using additional bandwidth for telemetry/SCADA or futureproofing should additional channels be required later.

Designing towards six 9's

One of the first steps in the network design process was to determine the level of availability required. Emergency services typically look for at least five 9's availability, but the Police ICT team worked out this translates to five minutes of downtime per year, typically spread over four or five events.

In an emergency situation, losing more than a minute of service at a time is serious and, as a result, NZ Police decided to aim for less than 100 seconds of downtime in a year; equating to closer to six 9's.

"Given the reliability of the Mimomax equipment and the fact that any of those 100 seconds related to propagation would not occur concurrently, it was estimated that this should probably result in 20–25 seconds of loss of service at any one time, which is more manageable. Once you get above a minute of downtime, people understandably panic," said Richard Hutchinson, Infrastructure Engineer at Police. "Aiming to reach six 9's availability, however, has its challenges with radio propagation as it does limit the distance over which you can run your link."

For this reason, during the design process, most of the Mimomax links were specified

> BY SELECTING THESE RADIOS, WE NOW HAVE THE OPPORTUNITY FOR FUTUREPROOFING OUR COMMUNICATIONS IF CIRCUMSTANCES REQUIRE IT. — RICHARD HUTCHINSON

at QPSK modulation to ensure the required link budget and hence the availability of the link. Some links were designed using 16QAM for the E&M higher channel capacity which could be gained but these links were operating on a correspondingly shorter path. Using 6 element Yagi antennas, Police found it was quite possible to achieve close to six 9's availability on the shorter links when using the higher order modulation.

Terrain challenges

As the deployment phase started, the NZ Police team had the challenge of managing significant terrain limitations for two of their links. The first link was an obstructed path between Queenstown and Lake Hayes, which had Queenstown Hill in the path. "Despite being a non-line-of-sight path, it was also relatively short and the modelling tool had indicated it would work," Hutchinson said. "To our surprise, this link has been remarkably stable and has, in fact, delivered the performance level the modelling tool had indicated."

Another path in Nelson also suffered some fading, which soon became clear was due to tidal movement. Initial modelling had suggested that the two sites would be high enough to suffer no impact from the tidal flow; however, in reality the fluctuation was quite noticeable. "Despite that path suffering tidally induced deep fades, the links have been very well behaved. We have also experienced some significant weather events in both of these regions, but to date, our communications have not been impacted at all," Hutchinson said.

Technology challenges

A further challenge for the Police ICT team related to the fact the FENZ Selcall system is delay sensitive. Care would therefore need to be taken to equalise the delays between repeaters and the network voters as the replacement links were deployed. Fortunately, the Mimomax Tornado radios are able to support both the Police dual UHF link replacement and the FENZ expansion requirements. Furthermore, by careful equipment selection the latency can be made to be identical down the various paths linking the repeaters back to the voter.

In addition, the Police team was concerned that the legacy E&M interface configuration would have resulted in differences in interfacing levels between the Mimomax links and the existing equipment, adding a level of complexity to the installations. "The Mimomax team rapidly worked on a new configuration for the E&M interface," Hutchinson said. "A week later, they had devised a drop-in replacement approach for the Tornado radios, which meant we didn't have to make any further configuration changes on our side."

While one of the selling points of the Tornado radios was the ability to operate in any of the three 400 MHz 50 kHz licensable linking bands, a radio with an internal duplexer would have locked the Police into a specific band, thus creating a requirement to stock a large number of spare radios and retuning on a channel change. Mimomax, however, was able to supply the radios with external duplexers, which offered broad enough bandwidth in each of the three bands to mean that Police are not required to carry large numbers of spares for either the duplexers or the radios.

"The Tornado radios also have a wide operating power supply range which meant we could use whatever power supply system the site already had without needing to create alternative power supplies," Hutchinson said.

The dual polarity antenna system required to support the Multi Input – Multi Output of the Tornado radio system fortunately fit in the same aperture space as the previous linking antennas. This resulted in Police, in some cases, only needing to run an extra feeder before swapping out the antenna.

Built-in futureproofing

When the Police Information and Communications Technology team were originally investigating equipment replacement options, one key consideration was that the Mimomax Tornado radios had initially been developed alongside Tait Communications radios and therefore offered both P25 and DMR capability. "With the upcoming rollout of the NGCC P25 network, we could see a possible benefit of the Mimomax radios not being a sunk cost as there was an option for redeployment in our network due to their ability to support P25 traffic," Hutchinson said. "By selecting these radios, we now have the opportunity for futureproofing our communications if circumstances require it."

Final stages of deployment underway

Police have now deployed 18 of the links with the final links in this project due to be installed throughout the remainder of 2022. "The installation and commissioning of the Tornado radios has been entirely painless — we simply put the radios in, and they just worked!" Hutchinson said.

This article is a version of the presentation made at Comms Connect NZ 2022.

MiMOMax Wireless Ltd
www.mimomax.com

Cloud-based two-way platform

The Logic Connect cloud-based platform developed by Logic Wireless is compatible with Android devices, including smartphones and tablets. This offers organisations the convenience of being able to use the platform across existing cellular or wi-fi capable devices without needing to invest in new hardware.

The Logic Connect platform can enhance productivity and improve health and safety management by providing organisations: emergency alerting; live tracking allowing seamless roaming between outdoors (GPS) and indoor (BLE) areas including multi-level buildings; monitoring the safety of staff in lone-worker environments; proof-of-service reporting, showing when staff have entered a specific area; man-down and motionless detection; storage of voice recordings for auditing and training purposes when connected to ChatterPTT.

Logic Connect was first launched in 2019, following 18 months of research and development, and is now used by a diverse range of organisations in New Zealand, Australia and the UK. Since launching, additional features have been added to the Logic Connect system and development work is continuing on the web-based platform.

Logic Connect is available on a flexible monthly or annual subscription. The system is hosted within a Microsoft Azure cloud and has full redundancy.

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BASF is expanding its polyphthalamide (PPA) range with a variety of flame retardant grades that combine high thermal stability with excellent electrical insulation and low water uptake. They are characterised by high electrical relative thermal index (RTI) values above 140° Celsius while being halogen-free according to EN 50642, thus preventing corrosion and failure of electrical parts when used under moist conditions.

The flame retardant grades are suitable for applications like connectors for power or data transmission in vehicles, appliances and consumer electronics as well as for e-mobility parts, miniature circuit breakers, switch gear and sensors.

All the flame retardant materials in the PPA portfolio keep their high mechanical and dielectric strength at elevated temperatures. They show dimensional stability due to low and slow water uptake as well as a low coefficient of thermal expansion. They allow for V-0 rating at thicknesses down to < 0.4mm and are in agreement with the cable management standard CMS EN 50654 (2018-05).

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5G frequency scanner

The Rohde & Schwarz TSME6 is a full-band, full-standard, high-performance 5G drive test frequency scanner that meets China Mobile 5G drive test standards. It is a stable platform with a dynamic range to make network infrastructure deployment and optimisation effective.

The 5G frequency scanner has been providing testing services for major operators and base station manufacturers around the world since the early stages of 5G deployment. It provides 5G network quality with frequency clearance testing, interference hunting, network performance testing and network optimisation.

The drive test scanner supports parallel measurements of wireless technologies including 5G NR, TDD-LTE, FDD-LTE, NB-IoT, eMTC/LTE-M, WCDMA, EVDO, CDMA and GSM, while meeting operation needs for simultaneous measurements in 3GPP multi-standard networks. The scanner also covers 5G NR frequency bands for sub 6 GHz TDD and FDD, including the 700 MHz, 2.1 GHz and 3.5 GHz frequency bands.

The small and lightweight 5G NR multimode scanner, with low power consumption. can detect multipath propagation, measuring power, delay and Doppler shift and other parameters.

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Telehealth: Critical Connectivity is only a product away

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Telehealth services have been on the rise for several years now. Since early March 2020 telehealth services skyrocketed, more than 86.3 million COVID-19 MBS telehealth services have been delivered to 16.1 million patients, with $4.4 billion in Medicare benefits paid. More than 89,000 providers have used telehealth services.

To protect patients and healthcare providers from COVID-19 transmission, the Australian Government expanded telehealth services. Recognising its important role, on 1 January 2022, the Australian Government made telehealth a permanent feature of our primary healthcare system. This allowed more health professionals to provide care remotely.

On 16 January 2022 the Australian Government announced further changes to the Medicare Benefits Schedule. These changes were aimed at supporting the community and the health system through this evolving health emergency investing $308.6 million, including $106 million for a permanent telehealth for Australian patients.

Telehealth has been transformational to Australia's universal health care and has played a critical role in ensuring the continuity of care for hundreds of thousands of Australian patients during the COVID-19 pandemic, protecting the health of patients and health professionals. It offers greater flexibility to health care as part of universal Medicare. Telehealth can assist healthcare systems, organisations, and providers expand access to and improve the quality of rural healthcare. Using telehealth in rural areas to deliver and assist with the delivery of healthcare services can reduce or minimise challenges and burdens patients encounter. It can also improve monitoring, timeliness, and communications within the healthcare system.

Using information and communications technologies (ICTs) to deliver health services and transmit information over both long and short distances.

It is about transmitting voice, data, images and information rather than moving care recipients, health professionals or educators. It encompasses diagnosis, treatment, preventive (educational) and curative aspects of healthcare services and typically involves care recipient(s), care providers or educators in the provision of these services directed to the care recipient.

Video conferencing is the preferred approach for substituting a face-to-face consultation and is one of the main ways of improving access to healthcare services for patients who live in regional, rural and remote areas.

"While Telehealth has been an important lifeline for people in rural, regional and remote Australia during the pandemic connectivity remains a big issue in rural Australia, and we need to be improving internet infrastructure in the bush otherwise telehealth is difficult or impossible for patients and health practitioners to use," said National Rural Health Alliance CEO Dr Gabrielle O'Kane.

Telehealth is only as good as the bandwidth it occupies.

The post pandemic workforce has emerged from lock down and created an unprecedented demand for connectivity, as we settle into the 'new normal', the need for innovative connectivity solutions is now more critical than ever.

The Cellferno is a revolutionary product to the Australian market, developed using innovative mobile technology which delivers high-speed data for basic internet access to mission-critical applications. Connectivity is the new currency in light of current global restrictions, with connectivity solutions like Cellferno critical for consumers and businesses in order to digitally navigate restrictions. Cellferno can provide users with super-fast internet speeds and connectivity, with the single box design containing multiple antennas and a built-in modem to capture the best possible signal outdoors. With a single ethernet cable powering the Cellferno device, it can be connected directly to a computer, network switch or a WIFI access point to provide high-speed internet to devices within range.

Cellferno's focus is on speed, it can act as a primary internet for areas with poor internet, cellular or NBN service with speeds up to 2.5Gb/s. The Cellferno M2000 5G Fixed Wireless unit provides multi-gigabit data speeds by combining both 4G and 5G carriers. Supporting the latest 5G NR standard along with an incredible Cat-22 4G LTE chipset. The unit has dual-sim redundancy, IP67 weatherproof casing that supports Australia's temperature extremes, this unit is ideal for enterprise and industrial customers demanding high data rates with high reliability.

"The need for better connectivity is still critical, with people staying at home, organisations are continuing to support a return to work and work from home balance, businesses using online tools or platforms, and the necessity of web-based learning."

"Cellferno is an extension to Powertec's current mobile broadband product offering, providing an additional high-speed connectivity solution to our product portfolio."

— Powertec Training Manager, Paul Boyce.

In this current climate of wireless dependency, Cellferno delivers the ultimate high-speed internet connectivity solution, especially where cable-based internet is not available. The Cellferno has allowed Powertec to provide fast reliable internet connectivity to clients in a previously fragmented area. The fixed wireless solution is taking on the NBN, or inadequate broadband connections, across many rural areas across Australia.

Australians living in the bush are missing out on billions of dollars of medical care each year because there aren't enough doctors and nurses to treat them, says the sector's peak body, which is calling for an overhaul of how governments pay for rural healthcare.

The National Rural Health Alliance (NRHA) estimates that 7 million people, or about 28 per cent of Australia's population, are forgoing $4 billion of healthcare because of a lack of GPs, specialists and allied health workers such as psychologists and physiotherapists in rural and remote areas.

The Australian Broadband Advisory Council released the Health Expert Working Group's report into enhancing Australia's digital health ecosystem. The report focuses on how connectivity, technology and data can support new models of care, like the accelerated use of telehealth during the COVID-19 pandemic. One of the key recommendations from the report was extended reach of health services, particularly in regional rural and remote areas and for Aboriginal and Torres Strait Islander communities by improving patient connectivity.

Although internet infrastructure is available to almost all Australians, more than 2.5 million remain offline, the take up of the NBN continues to close the gap in access for rural Australia, however, there are substantial differences in digital inclusion between Australians living in rural and urban areas.

Contact our team of experts today about our innovative connectivity solutions on 1300 769 378, email sales@powertec.com.au or visit www.powertec.com.au to view the full range of products.

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Radio Matters

Welcome back world, it is good to see you.

On a recent flight to Wellington I realised I have not flown for a while and was very happy that Air New Zealand have once again updated their safety video 'Tiaki, care for Aotearoa'.

As funny as some of the old ones were, they can get very old, very quick. 'Kakapo' was running for several years and it was long, only halfway through and we were already in the air. We have had some terrible ones: 'Randa' got pulled after a month, it was just a mess and confusing to boot.

The latest iteration has a quote that for me, as a father, hits home: "We don't inherit the world from our ancestors, but we are leaving it to our children." This, along with the recent carbon neutral developments from the government, are driving us to think more sustainably as a country and see how the development of technology is going to afford us these graces.

There are many out there that claim the world is already beyond saving and that cow burps alone will be the downfall of humanity; or: the cobalt mined for batteries is causing more damage to the environment than the burning of fossil fuels, wind turbines will absorb all the wind and cause birds to get lost, solar will take all the sun away and, don't forget, the earth is flat and the Southern Hemisphere is a myth!

Bravo to you fellow *Discworld* fans, you have done well, which of these claims could be from US senators? I could go on but, when I encounter these people, I point out that I am a senior government employee that works with government and private agencies and can confirm some things they think may be correct but, I cannot tell anyone which ones, so please do not ask me!

As a boy that grew up in a New Zealand rural setting and travelled the vast farmlands of the south, I feel we are going to be held accountable for the most natural of resources. It is no secret that New Zealand relies on its primary industry to run, but how do we unlock the potential for a transformation to carbon neutrality? Carbon credits, emissions trading, bovine antacids? Sounds like an accountant trying to fix a multi burner.

Are we smarter than this? I for one feel we are and look to the diverse technology we are becoming accustomed to.

The iPhone opened the world to the idea of mobile phones being more than a way to communicate. Now so far developed it is really just bigger, better, faster but with no real new innovation. Two-way radio is now so reliable and dependable that it is the go-to for any critical communications. Plus, for many small to medium enterprises, even for their day-to-day running.

Add to this its plethora of accessories physical and virtual that you can now leverage with simple radio solutions and there is no excuse for making excuses around communications. Especially now that the added layer regarding IoT integration over WAN is a reality.

I am proud to be part of this innovative and energetic industry.

John Laughton
Chairman
Radio Frequency Users Association New Zealand

AX1500 4G router

D-Link has launched the G415, an AX1500 4G smart router that allows a mobile carrier's SIM card to share 3G and 4G mobile network access through a Wi-Fi 6 network or any of its three Gigabit ports. With its LTE CAT 4 support, it can download at up to 150 Mbps without having a fixed broadband connection.

The IEEE 802.11 AX standard helps the router reach a maximum 1500 Mbps data rate, giving users the ability to take the router with them and share the internet connection via the mobile network. The G415 also features an SPI firewall with stealth mode so that connected devices will be secure when connected to the internet.

It also features bidirectional MU-MIMO technology to handle more simultaneous users at faster data rates and OFDMA technology to serve more device connections at once to significantly reduce network latency.

Designed with built-in Eagle Pro AI capabilities and by using the Eagle Pro AI app, the router analyses traffic and optimises the home network through its AI engine. The AI Wi-Fi Optimiser continuously scans and monitors the network to keep users connected to the best Wi-Fi channel.

The Traffic Optimiser automatically prioritises and allocates bandwidth to different applications and provides users with feedback of which devices are causing congestion. The AI Assistant aggregates actionable information to keep users updated on the network quality.

The app also features an embedded speed test for checking internet speeds as well as support for Amazon Alexa and Google Assistant voice control.

D-Link Australia Pty Ltd
www.dlink.com.au

Buyers' guide to mobile solutions
for emergency services vehicles

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The continued expansion of digital technologies and applications in emergency vehicles goes hand-in-hand with reliance on mobile broadband solutions. From police cars to ambulances, to fire and rescue services, first responders and their support teams need uninterrupted 4G LTE and 5G connectivity wherever they go. Emergency service vehicles are equipped with a broad range of connected technologies, including IoT devices such as surveillance cameras and digital signage, Wi-Fi channels for mobile command centres, telematics systems, automatic vehicle locators (AVL), and much more. Luckily, many of today's in-vehicle routers and network management platforms are flexible enough to support such diverse needs. However, it's important for emergency services organisations to match unique agency needs with the best possible solution, taking into account the importance of automatic failover between multiple mobile carriers, data security features, and centralised network management.

The digital transformation of emergency services

In an industry where every second counts, technology and connectivity matter more than ever. First responders use a variety of ruggedised tablets, computers, devices, and applications to reduce response time and keep their communities safer. In addition to outfitting their vehicles with the latest safety and rescue equipment, police, firemen, and paramedics can improve efficiencies with the integration of surveillance cameras, telemetry data, and real-time GPS information.

Choosing a networking solution for vehicles

Enterprise-grade 4G LTE and 5G routers that are purpose-built for vehicles provide secure, reliable connectivity over nationwide cellular networks. And with a cloud-based network management platform in place, IT teams can use dashboards full of rich connectivity and security analytics to centrally make proactive adjustments and perform key troubleshooting duties, instead of having to visit each vehicle every time a change needs to be made. Even the best in-vehicle solutions have key differences to account for prior to a fleetwide purchase and deployment. For example, emergency service IT teams need to decide whether they need automatic failover and failback between multiple carriers for increased reliability.

Option 1: Single-modem router

In a wireless router with an embedded modem featuring two SIM slots, the radio can only connect to one active SIM card at a time, which is a cost-effective option for organisations that have a minimal budget for cellular data usage. The presence of a second SIM within a software-defined modem enables IT teams to easily and remotely change the WAN connection in any vehicle from one cellular carrier to another. Cradlepoint's NetCloud Service for Mobile and wireless edge routers include SIM-based auto carrier selection. This feature detects the carrier of an installed SIM, loads the correct firmware and configuration settings automatically, then connects. Technically, wireless failover is possible with single-modem, dual-SIM routers. However, it's not ideal. When the software detects an outage and switches to the secondary SIM, it can take minutes, not seconds. Further, the system cannot predict whether the second carrier will offer a better connection. If a shift back to the first carrier is necessary, the vehicle could be offline for several minutes.

Option 2: Dual-modem router

Using a wireless router with two carriers active within separate modems is the best way to ensure always-on connectivity in emergency service transportation vehicles. This solution is the only option for providing instant wireless-to-wireless failover, or WAN link redundancy. This is an essential service for emergency response teams who are constantly travelling in and out of good signal areas for particular cellular carriers. Cradlepoint's SD-WAN features constantly monitor and measure both cellular connections, using intelligent path selection based on cellular signal strength, throughput, latency, and data plan consumption. The most important traffic — such as GPS and AVL data — can be assigned to the stronger link while less important applications remain connected over the weaker cellular signal. Modems with dual-SIM capabilities enable support for multiple carriers in a single router. Cradlepoint's NetCloud Service for Mobile, advanced wireless edge routers, and proprietary software technologies unlock the power of 4G LTE and 5G cellular networks to transform operations for a new era of emergency services.

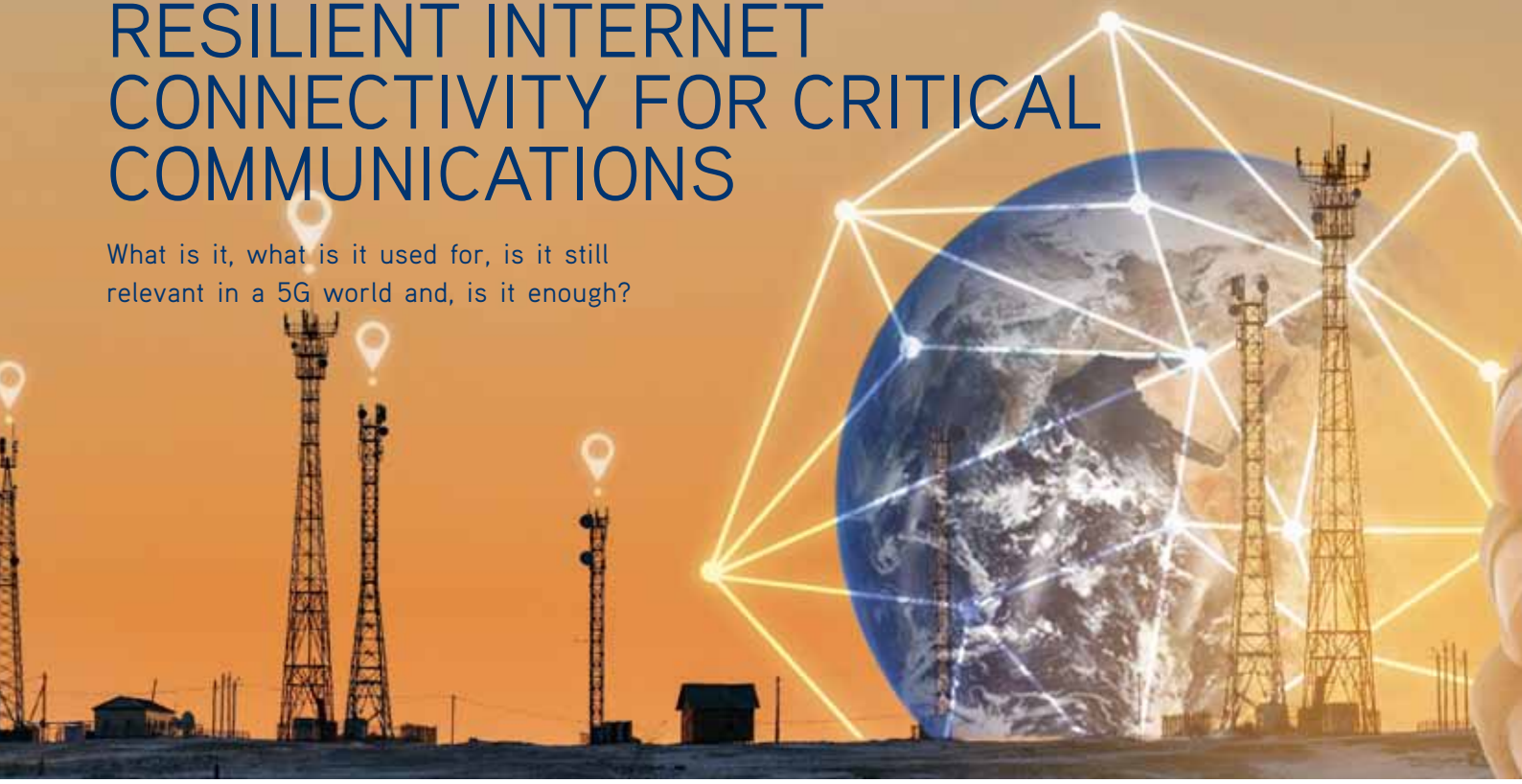
cradlepoint
PART OF ERICSSON

Cradlepoint Australia Pty Ltd
www.cradlepoint.com/au

BONDED CELLULAR AND BEYOND

RESILIENT INTERNET CONNECTIVITY FOR CRITICAL COMMUNICATIONS

What is it, what is it used for, is it still relevant in a 5G world and, is it enough?



Cellular bonding refers to combining two or more cellular connections. The combination provides more bandwidth for uploads and downloads. It also provides connection resiliency in situations where cellular networks become congested due to high traffic, or in remote areas where cellular signal strength may be diminished.

There are many other factors that may impact cellular reception and the available bandwidth, which bonded cellular technology can address.

Key advantages of cellular bonding:

- Connection resiliency when networks are congested.
- Connection resiliency in fringe coverage areas.
- Greater upload and download bandwidth.
- Expanded coverage with carrier diversity.

Carrier diversity delivers greater resiliency

Carrier diversity: ie, using connections from different mobile network providers, delivers even greater resiliency. Should a connection drop, packet loss occur, available bandwidth diminish or the latency not meet the needs of the application, packets are re-routed across the other connections in the bonded link.

Upload and download speeds on mobile networks vary. While the global average download speed is 48 Mbps and upload speed is 12 Mbps, actual speeds vary greatly by country, carrier, specific location and the degree of congestion on the network. See diagram.

It is not unusual for users to only have 1 Mbps upload speed from a single connection, especially where crowds gather and cause network congestion, or in fringe coverage areas. But many applications require more than that. Take video as an example, approximately 5 Mbps upload bandwidth is required to send high-definition, low-latency live video. For 4K UHD streams, approximately 25 Mbps upload bandwidth is needed.

Applications relying on wireless internet connectivity, particularly those needing higher upload speeds to transmit uninterrupted high-quality live video or real-time data, can use multi-modem cellular bonding devices to aggregate multiple cellular connections to achieve the required bandwidth and connection resilience. These connections may be with the same or different carriers.

These devices use 3G/4G (including LTE)/5G modems to connect to the carrier networks.

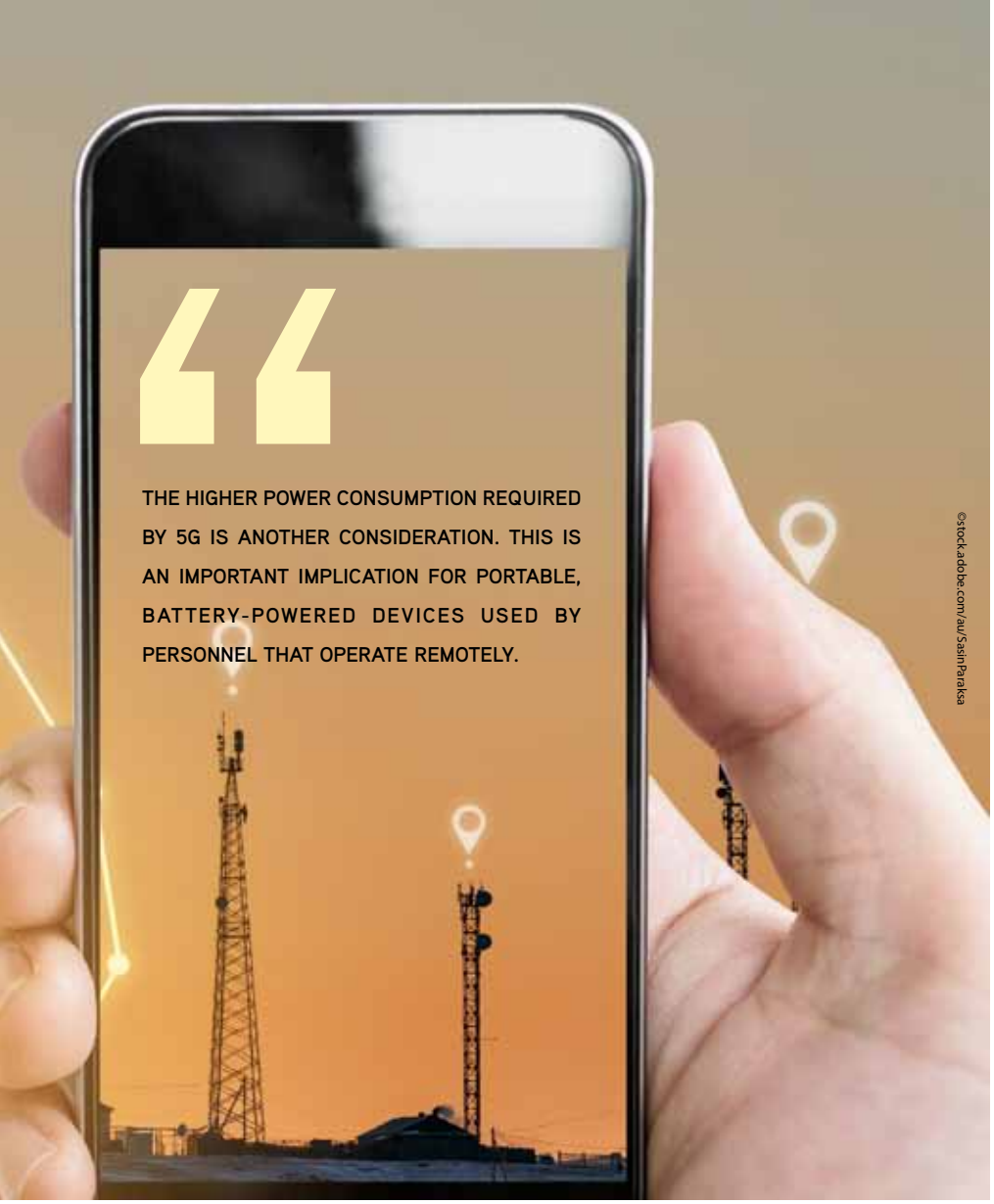
Isn't one connection enough?

While the upload and download bandwidth provided from a single carrier may be sufficient in a specific location, relying on a single connection leaves organisations vulnerable, especially if they need resilient connectivity while in motion: such as in a vehicle, or in nomadic situations where someone is moving from one location to another, but typically stationary. Mobile journalists and first responders are good examples of personnel that are frequently moving locations while they operate remotely.

No single carrier provides 100% coverage in every location. Carrier network coverage becomes an additional risk on top of the network congestion risk and the risk of degraded service in fringe coverage areas. For critical communications, carrier diversity is essential.

What about failover or load balancing solutions?

Failover solutions do not aggregate bandwidth, but instead use one connection at a time and switch to the next connection



if the first connection fails. However, the performance of the first connection may degrade significantly before the failover occurs, providing a poor experience.

Meanwhile, load balancing solutions use a number of connections, but if a connection fails, the session is terminated and a new session must be initiated on another connection. This interruption is not acceptable for critical communications that depend on persistent connectivity.

What about 5G?

The arrival of 5G holds tremendous promise to transform telecommunications with faster speeds and less latency when connecting to the network, as well as enabling many more devices to connect to the internet. Yet despite this, connectivity challenges will remain. While the bandwidth from a single 5G connection may be sufficient for data-intensive applications, such as real-time, high-definition video, reliance on a single connection leaves organisations vulnerable and the coverage challenge remains.

Much like with 4G networks, carriers will have coverage gaps and 'dead zones' in cities and urban areas plus it will take time for 5G networks to roll out, especially networks using high-band millimetre wave (mmWave) spectrum that promises blistering speeds and low latency. Since 5G mmWave networks face greater challenges penetrating building materials than 4G LTE frequency bands, there are also implications for 5G coverage in buildings.

The higher power consumption required by 5G is another consideration. This is an important implication for portable, battery-powered devices used by personnel that operate remotely.

Since 4G LTE and 5G will co-exist for quite some time, choosing bonded cellular technology capable of aggregating the various generations of network technologies from multiple carriers remains key.

Resilient internet connectivity for critical communications

While bonding cellular connections may provide enough bandwidth for high-quality live video and real-time data exchange in mobile and nomadic scenarios, there are scenarios where aggregating other connections makes sense for greater connection diversity, resiliency and continuity.

From broadcasters and production companies, to public safety and government agencies, to enterprises spanning a wide variety of industries, organisations depend on internet connectivity for critical communications. In many situations, an unstable connection or a network outage is not simply an annoyance, it can have catastrophic implications.

Dejero
www.dejero.com

Factors impacting cellular reception and available bandwidth

1. Obstructions (hilly terrain, dense foliage, large buildings).
2. Weather conditions (humidity, heavy cloud cover, fog, precipitation, electromagnetic interference, temp inversions).
3. Number of users.
4. Location (city, urban, rural).
5. Building materials (metal, concrete, tinted and low-e glass).
6. Data-intensive applications.
7. Spectrum bands.
8. Stationary versus in motion.
9. Proximity to tower.

Single bus-load distribution panel

The DISICT180SE-12IRC is an upgraded version of the Helios Power Solutions single-bus, 12-output, fused DC distribution panel from the distribution Series 2 family of intelligent DC distribution panels. This model replaces the DISICT180S-12IRC.

The distribution panel is a 1RU, 180 A, single-bus, fused DC distribution panel. It is designed for 12 and 24 VDC installations and supports 180 A peak/150 A continuous system current.

The DC panel provides 12 fuse-protected outputs, nine ATO-fuse outputs rated to 25 A each and three J-CASE-fuse outputs rated to 40 A each. Included are five digital input contacts for site monitoring sensors, such as door, smoke and fire alarms.

Features include a processor for improved security features, including TLS1.2 support, full SNMP control via MIB files, a user session logout feature and network watchdog functionality.

Helios Power Solutions

www.heliosps.com.au

IMS network communication suite

The Nokia Cloud Native Communication Suite (CNCS) is a simplified, IMS-based product designed as a single Cloud Native Network Function (CNF). This approach, based on a modular architecture composed of independent functions, is designed to simplify the deployment and operability of the IMS Voice Core, reducing installation and upgrade time. It provides automated deployment and configuration, reducing footprint, and lowers costs through operational savings of life cycle management.

Dedicated network elements, such as the Session Border Controller (SBC), Call Session Control Function (CSCF), Telephony Application Server (TAS) and Media Resource function (MRF) are encapsulated as microservices into the CNF.

Nokia Cloud Native Communication Suite claims it improves energy efficiency by 10% to 20% compared to other IMS voice cores, because its software architecture improves common resource utilisation and internal messaging performance, requiring less infrastructure for the IMS voice service.

Nokia Cloud Native Communication Suite is optimised for fixed, 4G, 5G and Wi-Fi deployments.

Nokia Solutions and Networks Singapore Pte Ltd

www.nokia.com

Wireless ear buds

Sennheiser Sport True Wireless brings audio performance for outdoor users, no matter how intense the environment. Its adaptable acoustic feature offers a choice of open and closed ear adapters, allowing users to tailor their listening experience, with the Sennheiser sound.

The TrueResponse transducer, designed and engineered in Germany, is powered by a 7 mm dynamic driver that delivers bass and clarity without distortion, even at high volume.

The open ear adapters in combination with the Aware EQ settings help to reduce body-borne noise but still allow some outside sounds to enter for better situational awareness. Bluetooth 5.2 compatibility and support for audio codecs like SBC, AAC and aptX allow connection to mobile devices, smart watches, smart TVs and other devices for a seamless audio experience.

The earbuds can be customised with a choice of ear adapters in three sizes and four different ear fins to withstand any workout. With an IP54 rating, the earbuds are dust and splash resistant and can also easily withstand sweat, rain and even the beach.

It has a battery life of 9 h and another 18 h with the charging case.

Sennheiser Australia Pty Ltd

en-au.sennheiser.com

CASE STUDY

Bavarian PSOs reduce emergency response times

The Ministry of the Interior of the German federal state of Bavaria has awarded a framework contract to Motorola Solutions to deliver up to 55,000 Advisor TPG2200 TETRA two-way radio pagers to the federal state's emergency services.

When road accidents, natural disasters and other dangerous events occur, Bavaria relies on the state's firefighters, emergency personnel and healthcare workers to secure public safety. In these critical moments, speed, reliability and encrypted digital communication is of crucial importance. Motorola Solutions' two-way pagers alert emergency services via the nationwide TETRA digital radio network, designed for reliable performance in all conditions.

The Advisor TPG 2200 TETRA pagers have a lightweight, ruggedised and compact design designed for easy carry in any scenario. When an emergency occurs, users can read and respond to alerts on the pager's backlit, two-inch colour display, even in situations with low visibility. The device is IP54-rated for dust and water protection with a battery life of up to 48 hours to last any shift.

The scope of the framework agreement includes a TETRA Integrated Terminal Management (iTM) solution that enables emergency services to manage software upgrades remotely, helping to minimise labour and operational costs.

Motorola Solutions Australia Pty Ltd
www.motorolasolutions.com.au

Oscilloscope

The Rohde & Schwarz RTP oscilloscopes combine high signal integrity measurements with fast acquisition for real-time analysis.

The models come with a 13.3″ HD touchscreen and a redesigned front panel. The 16:9 screen format displays waveforms while allowing settings to be altered and changed. The front panel provides direct access to primary instrument settings.

The oscilloscopes are available in different bandwidth models from 4 to 16 GHz with a sample rate up to 40 gsamples. All models also support bandwidth upgrades right up to 16 GHz.

At the core of the RTP is the acquisition and processing ASIC, which enables an acquisition rate of 750,000 waveforms. To capture and analyse long events or sequences, the standard acquisition memory has been increased to 100 Mpoints per channel, with a further upgrade option of up to 3 Gpoints per channel.

The unit is compact and light; the cooling system and silent fans also make it quiet.

Rohde & Schwarz (Australia) Pty Ltd

www.rohde-schwarz.com.au

Portable rugged server

Developed for field-deployable media management applications, the RE2624M delivers data transfer and offloading data from portable media even in demanding environments.

Equipped with up to 16 cores, the system supports a variety of workloads, including virtualisation, data processing and other I/O-intensive tasks. The four external 10GbE connectors deliver fast uplink for media transfers to downstream users.

Using industry-standard bays, the server can be customised to accept any form of standard or non-standard media to accommodate countless applications in a single system, such as: secure data transfer from command post or forward operating base; mission planning for multi-domain distribution using single-source inputs from various media platforms; plus any scenario using various media formats that require a common data input or extraction.

It is lightweight at approximately 15.88 to 18.14 kilograms. Overall dimensions are 37.11cm x 23.42cm x 56.34cm.

The server compresses performance into a portable unit. With dimensions that meet commercial aircraft guidelines for carry-on luggage, for maximum protection the protective case is made of carbon fibre and sealed for IP65 protection levels.

Metromatics Pty Ltd

www.metromatics.com.au

Speech privacy system

Yamaha Unified Communications has released the VSP-2 Speech Privacy System for the United States and Canada. The VSP-CU2 control unit features user-selectable sound types and volume levels and supports two, four or eight VSP-SP2 speakers. The sound masking system can be installed quickly into any space to keep conversations confidential.

The system prevents information leakage without emitting distracting sound-masking audio, creating an environment that makes it easier to converse. The system layers in three key features for sound masking: Info-Masking Technology, which is developed to mask the human voice in unwanted areas with a sound level that is 8 decibels lower than conventional systems; environmental audio with four audio options mixed to the speech sound masker; as well as four types of sound effects that are added to unobtrusively distract others from hearing private conversations.

The control unit allows users to power the system on and off, select their preferred sound effect (guitar, piano, music box or digital device) and environmental sound (forest, brook, urban clatter or air conditioner) and set the performance and volume level for a personalised room environment.

The system can be installed around huddle spaces, in open conversation areas and in front of and between small to medium rooms. For installation, the small, lightweight speakers can be mounted to the ceiling or wall.

The back of the control unit features a speaker switch (2, 4 or 8) and four EQ options based on the configuration of the speakers.

Yamaha

uc.yamaha.com

NIST FINDS WIRELESS PERFORMANCE CONSISTENT ACROSS 5G MILLIMETRE-WAVE BANDS

METHODOLOGY DEVISED TO SEE IF FREE-SPACE PROPAGATION IS FREQUENCY INVARIANT

Popular belief is that propagation loss at higher frequencies is greater than at lower frequencies.

Settling a key dispute in the wireless communications field, researchers at the National Institute of Standards and Technology, USA (NIST), found that transmission performance is consistent across different bands of the millimetre-wave (mmWave) spectrum targeted for high-speed, data-rich 5G systems.

Wireless systems are moving to the mmWave spectrum at 10–100 gigahertz (GHz), above crowded cellular frequencies as well as early 5G systems around 3 GHz. System operators tend to prefer lower bands of the new mmWave spectrum. One reason is that they are influenced by a formula that says more signals are lost at higher frequencies due to smaller wavelengths resulting in a smaller useful antenna area. But until now, measurements made by many organisations of this effect have conflicted.

NIST researchers developed a new method to measure frequency effects, using the 26.5–40 GHz band as a target example. After extensive study in the laboratory and two real-world environments, NIST results confirmed that the main signal path, over a clear 'line of sight' between transmitter and receiver, does not vary by frequency, a generally accepted thesis for traditional wireless systems but until now not proven for the mmWave spectrum. The results are described in a new paper.

The team also found that signal losses in secondary paths, where transmissions are reflected, bent or diffused into clusters of reflections, can vary somewhat by frequency, depending on the type of path. Reflective paths, which are the second strongest and critical for maintaining connectivity, lost only a little signal strength at higher frequencies. The weaker bent and diffuse paths lost a bit more. Until now, the effects of frequency on this so-called multipath were unknown.

"This work may serve to demyth many misconceptions about propagation about higher frequencies in 5G and 6G," NIST electrical engineer Camillo Gentile said. "In short, while performance will be worse at higher frequencies, the drop in performance is incremental. So we do expect the deployment at 5G and eventually at 6G to be successful."

The NIST method emphasises measurement procedures and enhanced equipment calibration to make sure only the transmission channel is measured. The researchers used NIST's SAMURAI (Synthetic Aperture Measurement UnceRtainty for Angle of Incidence) channel sounder, which supports design and repeatable testing of 5G mmWave devices with unprecedented accuracy across a wide range of signal frequencies and scenarios. The NIST system is unique in that antenna beams can be steered in any direction for precise angle-of-arrival estimates.

NIST's main innovations in the new study, as discussed in the paper, were calibration procedures to remove the effects of channel sounder equipment from the measurements, extension of an existing algorithm to determine from a single measurement how individual paths vary by frequency, and studies in an industrial control centre and a conference room to classify the types of paths involved and determine any frequency effects.

National Institute of Standards and Technology
https://www.nist.gov/

ACMA ignores the best spectrum opportunity for the next industrial revolution

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It appears ACMA is assisting Treasury for the short-term as opposed to supporting industry for the long-term.

The present spectrum reallocation proposed for the 3.4 to 4.0 GHz band is in effect totally ignoring the future of technology gains for many industries. The proposal from the ACMA to package up the spectrum in blocks for auction is designed specifically to gain the biggest cashflow for the Treasury and ignores worldwide trends that are seen as the vanguard of the fourth industrial revolution.

If we look at other jurisdictions, both France and the United Kingdom have recently announced additional spectrum allocations for wireless broadband (WBB) that are designed for industrial and other uses. The United States FCC has allocated a block of 150 MHz of mid-band spectrum for the citizen broadband radio service (CBRS), basically an open spectrum allocation that can be used for many different WBB and technology advancements.

The OnGo Alliance from the USA states that there are hundreds of thousands of devices now being operated in systems within that band; this gives many economical benefits as well as creates an environment that has encouraged many new equipment suppliers into the markets. It would be reasonable to assume that if a similar system were operating here in Australia that our many entrepreneurial organisations would develop products for both local and international markets.

Within the present allocation proposals from the ACMA for the spectrum here, there is little allocated to low-power, in-plant licensed services in the metropolitan areas and no indication from the ACMA regarding an open-access system like CBRS. History shows that access to spectrum will enable many new technologies and applications to flourish.

The outcome of the present band allocations proposed by the ACMA is for spectrum licence format by auction as the preferred outcome. This creates the maximum cash return for the government in the short term; however, it slams the door shut on other potential applications as once the spectrum is put under spectrum licensing it is highly unlikely to return to other options in the future.

In addition to the ACMA not giving sufficient credence to private WBB networks in this consultation paper, during the third quarter of 2021 the ACMA announced that they would be doing some research into the private LTE markets and demand. ARCIA welcomed this announcement and contacted the ACMA to see how we could help; we were advised that the research would commence early in 2022. Recent follow-up enquiries were advised that due to staff issues the research project had been deferred until later this year. Yet, even though the research has not even commenced, the ACMA is planning on allocating valuable spectrum for WBB use without any serious consideration of a market segment that other jurisdictions see as being critical.

According to the ACMA consultation there is only one chance to set in place the best allocation planning for this important spectrum. How can this be done correctly if one of the most important market opportunities is ignored?

ARCIA represents the interests of many wireless players in Australia with a focus on private networks. As 5G becomes an important ingredient to grow the economy, ARCIA is concerned that the ACMA's short-term budget fix is bad news for long-term productivity.

It is important to remember that the broader economic benefits involved in WBB spectrum allocation are much greater than the short-term gain to Treasury. This is the prime opportunity to recognise that WBB technology is going to underpin our economy for years to come; let's make sure the opportunity is not wasted! The public carriers can afford to operate in mmWave spectrum, industry needs mid-band!

Ian Miller, Executive Officer, Australian Radio Communications Industry Association (ARCIA) Inc.

Talkpod N5 SMART SERIES

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

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

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

(03) 9898 5988 sales@talkpodaustralia.com.au

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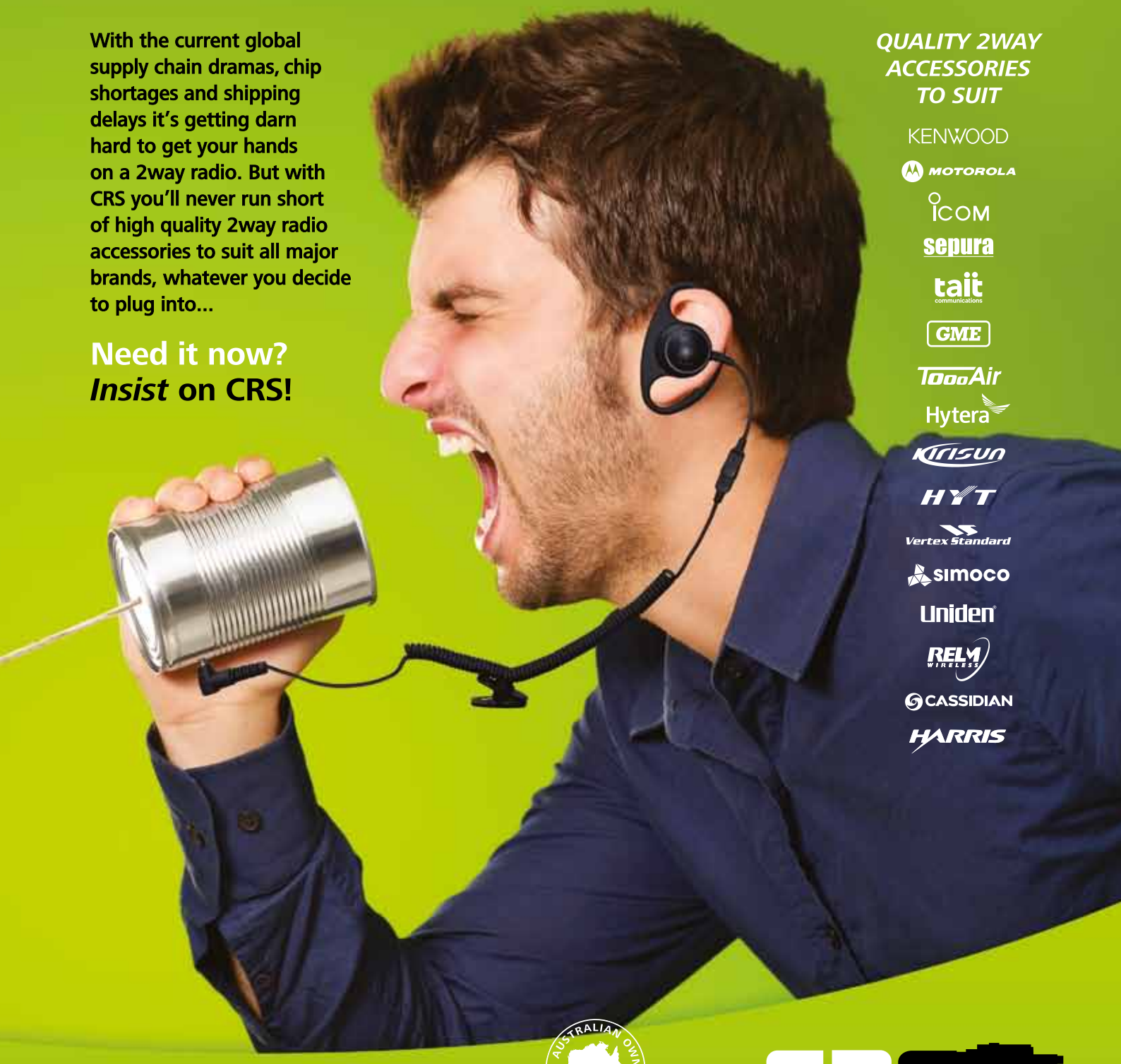

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