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BASE STATION (IBS)

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ON THE COVER



The KENWOOD ProTalk™ TK-3710X CB portable radio combines traditional CB functions with the flexibility of a 450–520 MHz LMR radio.

The TK-3710X offers a host of features including Dual Watch and Voice announcement of both the channel table and CB channel assignments, and features KENWOOD's customary audio quality. It has a distinctively ergonomic form that's easy to hold and operate, and is ruggedly built to MIL-SPEC quality with an IP67 rating. A 4-step battery status indicator notifies the user immediately of the amount of charge remaining by visual indication (icons) or tone alert, while the backlit LCD with 8-character, 13-segment aliases and icons provides an easy-to-read channel and function and display day or night. And the convenient 128-channel/128-zone capability accommodates virtually any current or future capacity requirement for single- or multiple-site radio systems.

The ProTalk TK-3710X will ship complete as a kit with radio, antenna, battery and charger making it easy for both the reseller and the end user when ordering. KENWOOD has also been mindful of existing users in its design of the radio, using the same 2-pin accessory port and charger base as the previous model, making it a cost-effective replacement as there is no need to purchase new accessories.

Market verticals for this unit include construction, security, recreational users and mining, making it a suitable low-cost option for those looking for a reliable communications solution.

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The summer bushfires have taken an awful toll on communities right along Australia's eastern and southern regions, and left a trail of destruction in their wake. Lives lost, homes and businesses incinerated, livestock and wildlife decimated, and bushland and habitats razed. The recovery process is going to take years, although, sadly, some communities may never fully recover.

While everyone is now trying to pick up the pieces, during the heat (no pun intended) of the crisis there was one thing that stood out, as it does with every major natural disaster — the vital role played by reliable, mission-critical communications in keeping emergency services personnel informed of what needed to be done, and when to safely withdraw when conditions became too severe.

The fires destroyed some of the very infrastructure needed to keep those communications lines open, and it is to their great credit that all the relevant government agencies, communications firms and individuals worked together to ensure that damaged infrastructure was up and running again as soon as possible.

We have several articles in this issue that outline the lengths gone to to ensure communications networks remained up and running. We especially thank the NSW Telco Authority for its assistance in providing information during what was probably its busiest ever stretch of spring and summer months.

The world's largest get-together of communication policy experts took place late last year. The ITU's World Radio Conference, held this time in Egypt, sets the scene for many of the major communication developments that will take place in the following years. This issue's lead article profiles many of the outcomes from the conference and outlines Australia's participation and priorities.

Jonathan Nally, Editor
jnally@wfmedia.com.au

March

IWCE 2020

30 March–3 April
Las Vegas
iwceexpo.com

May

Comms Connect New Zealand 2020

6–7 May
LHEC, Wellington
comms-connect.co.nz

June

Critical Communications World 2020

17–19 June
IFEMA, Madrid
critical-communications-world.com

Comms Connect Sydney 2020

24–25 June
Hilton Hotel, Sydney
sydney.comms-connect.com.au

August

APCO 2020

2–5 August
Orlando, Florida
apco2020.org

AFAC20

25–28 August
Adelaide Convention Centre
afacconference.com.au

November

Comms Connect Sydney 2020

17–19 November
MCEC, Melbourne
melbourne.comms-connect.com.au

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



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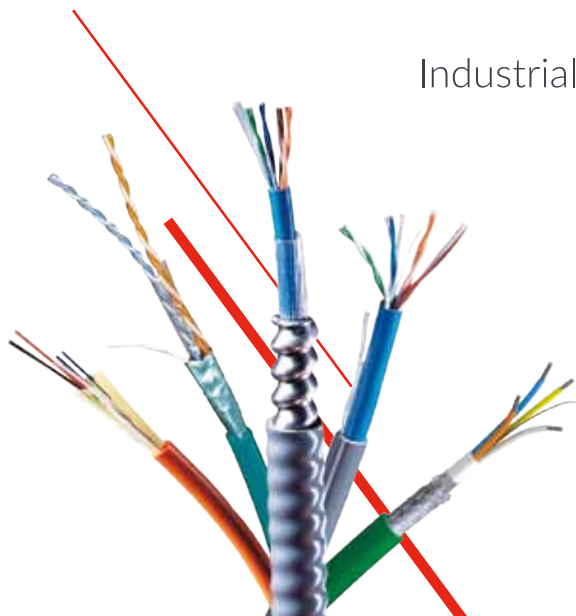
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AUSTRALIA AND THE WRC — SEEKING SPECTRUM HARMONY

Jonathan Nally



Australia's delegation to the WRC-19 focused on advancing the nation's legitimate interests in spectrum policy and technology matters.

Every three or four years, the International Telecommunication Union (ITU) holds the World Radiocommunication Conference (WRC), where changes to the Radio Regulations are considered. The Radio Regulations is the global treaty governing the use of RF spectrum and satellite orbits.

WRC-19 was held from 28 October to 22 November 2019 in Sharm el-Sheikh, Egypt. More than 3000 state and industry delegates from 163 countries and 424 representatives of 130 organisations participated. Australia sent a delegation of 31 government and industry representatives, led by the then Department of Communications and the Arts.

Historically, Australian engagement in WRCs had been led by the Australian Communications and Media Authority (ACMA) as the WRC was considered to be a technical forum. While the WRC continues to be a technical forum, agendas are increasingly also covering policy matters. So in 2017, the federal government transferred responsibility for Australian engagement in the WRC to the Department, recognising that departments of state are better placed to respond to policy matters. The Department and ACMA still work closely together in preparing for WRCs, with the ACMA continuing to lead on technical matters.

The WRC-19 agenda spanned the mobile phone, satellite, aeronautical, maritime, scientific, defence and transport sectors. Agenda items typically consider whether particular RF spectrum can be shared without causing harmful interference. Each WRC also sets the agenda for the next WRC. The global telecommunications industry is closely engaged in the meeting, including mobile and satellite companies.

The head of Australia's delegation to WRC-19 was departmental Assistant Secretary Cathy Rainsford.

"Australian radiocommunication experts from government and industry engage in international study groups of the ITU throughout the 3- to 4-year World Radiocommunication Conference cycle," Rainsford said. "Experts also meet domestically to contribute to studies and prepare to represent Australia at international and Asia-Pacific preparatory meetings."

Preparatory work

The Australian Preparatory Group for WRC-19 comprised about 50 experts and provided advice to government to inform decisions on

Australia's positions on each agenda item. The group included representatives from:

- the mobile industry (AMTA, Telstra and Optus)
- the satellite industry (NBN Co, Optus, Myriota, Intelsat, Inmarsat, Globalstar, Pivotal, Iridium, Boeing, Airbus, Omnispace, O3b, Telesat, Viasat)
- the broadcasting industry (Free TV, Commercial Radio Australia, Prime, SBS)
- the amateur radio community
- the Communications Alliance
- government agencies that rely on spectrum (Department of Defence, Airservices Australia, Australian Maritime Safety Authority, Australian Space Agency, Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation).

Membership of the Preparatory Group can change over time, with membership open to any interested party who agrees to guidelines for participation.

"Over the four-year preparatory period before WRC-19, Australian delegates participated in 41 ITU Radiocommunication Sector meetings," Rainsford said.

"These meetings review studies into issues on the WRC agenda to examine whether interference is likely to occur between radiocommunication services, and what technical and regulatory measures could be adopted to prevent or minimise harmful interference.

Based on the results of studies, the ITU Radiocommunication Sector develops a technical report (the Conference Preparatory Meeting report) providing options for possible adoption at WRC.

There was regional preparatory work, too, conducted by the Asia-Pacific Telecommunity (APT), the regional intergovernmental telecommunication organisation. The APT's member countries include Australia, China, India, Iran, Japan, Korea, Mongolia, New Zealand, Pakistan, Pacific and South-East Asian countries. A series of five meetings preceding the WRC enabled APT member states to negotiate views for the APT region to present at international meetings.

Australia's WRC aims

According to Rainsford, the "overarching objective for Australia at WRC-19 was to ensure that international arrangements through the Radio Regulations treaty continue to be



consistent with the rational and efficient use of Australia's sovereign assets in the radio frequency spectrum".

Other Australian objectives were to:

1. Establish new globally or regionally harmonised radiofrequency spectrum allocations, identifications and coordination arrangements (including technical or operational requirements) that:

- are technically feasible (ie, will not cause unacceptable interference to existing radiocommunication users, particularly safety and emergency services);
- respond appropriately to changing technology and industry practice;
- promote regulatory certainty to enable investment;
- promote economies of scale to reduce equipment costs;
- promote global interoperability of new and evolving technologies and services across all sectors, including to support Australia's international capabilities;
- align with Australia's domestic spectrum policies and priorities.

2. Ensure continued protections for, and strengthening of international cooperation on, scientific uses of the spectrum including radioastronomy, meteorology, earth exploration and space weather monitoring.

3. Ensure continued protections for, and strengthening of international cooperation on, navigation and safety services, including aeronautical and maritime radiocommunications.

4. Strengthen international cooperation on shared global radiofrequency spectrum and satellite orbit resources.

"Australia's primary interests in the WRC-19 agenda were the evolution of 5G mobile broadband, connectivity on planes and ships, deployment of large satellite constellations, and scientific and transport safety uses of spectrum," Rainsford said.

Spectrum for 5G

The conference agreed new global identification of spectrum for future use by 5G mobile broadband in the 24.25–27.5 GHz, 37–43.5 GHz and 66–71 GHz bands. Other bands between 45.5 and 48.2 GHz were also identified for mobile broadband use in some countries.

These identifications will provide large contiguous blocks of spectrum for deployment of 5G, promote economies of scale in 5G equipment development and manufacture, and enable service interoperability for international roaming.

Underpinning the agreement to identify spectrum for 5G were regulatory limits to protect meteorological satellite sensors from mobile broadband operating in the 24.25–27.5 GHz band. Going into WRC-19, there was consensus that protection was required, but significant contention on the level of protection.

The compromise outcome provides a staged approach. Between now and 2027, temporary interference limits will be applied to mobile broadband, becoming more stringent in 2027 when 5G rollouts reach maturity.

Large satellite constellations

The need to address spectrum 'warehousing' in light of filings for new very large satellite constellations was addressed at WRC-19 by a new regulatory framework for the staged deployment of these constellations over a seven-year period.

The new rules provide a set of milestones for deployment to avoid large non-geostationary (NGSO) satellite systems (some up to 75,000 orbital slots) being filed with the ITU but never deployed, tying up these scarce resources indefinitely.

The outcome reflects Australia's objectives and should promote a competitive global NGSO satellite industry and provide broadband around the world.

Broadband on aircraft and ships

WRC-19 agreed international conditions for operation of 'Earth stations in motion' (ESIM) in the frequency bands 17 GHz and 28 GHz. ESIM commonly provide satellite Wi-Fi on aircraft and cruise ships.

The outcome includes regulatory limits to protect satellite and terrestrial radiocommunication systems, including 5G mobile broadband networks in 28 GHz being deployed in Korea, Japan and the US.

It is expected that the aviation and maritime industries will benefit from expanded service provision by satellite networks.

Transport safety communications

Australia successfully negotiated a result that supported ongoing studies on rail spectrum but avoided restrictions on any particular bands in the Radio Regulations. This outcome supports Australia's rail industry to be able to continue using the specialised rail hardware that operates within current national mobile allocations.

Australia successfully opposed international regulation for Intelligent Transport Systems (ITS). Any regulation specifying particular technologies or frequencies would restrict fast-evolving development of ITS technologies that connect vehicles, improve traffic management and assist safe driving.

The WRC outcome also aligns with the class licensing arrangements put in place by ACMA in the 5850–5925 MHz band in January 2018.

Improved maritime safety

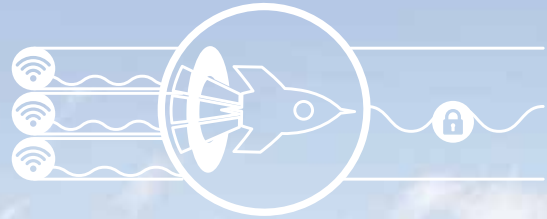
WRC-19 successfully paved the way for addition of the Iridium satellite system to the



Head of the Australian WRC Delegation, Cathy Rainsford, submitting her credentials at the start of the WRC.



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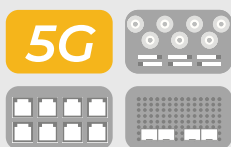


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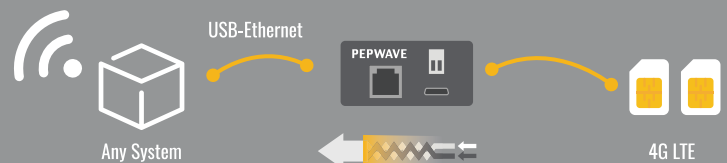
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Global Maritime Distress and Safety System (GMDSS) as a second service provider, opening a monopoly previously held by Inmarsat. Iridium's system will expand GMDSS capacity and coverage, especially in polar regions.

Regulatory changes took into account radioastronomy and aeronautical services operating in frequency bands adjacent to the Iridium system.

Gender declaration

Early in the conference, agreement coalesced to develop a declaration Promoting Gender Equality, Equity and Parity in the ITU Radio-communication Sector. At WRC-19, only 18% of participants were women — an increase of just 1% from WRC-15.

The declaration is a statement that ITU member states recognise that more is needed to facilitate the full participation of women in this space.

Australia's interests

While Australia doesn't have any particularly special domestic requirements that differ greatly from those of other countries, there are aspects for which we need to lobby at WRCs.

"International spectrum allocations can affect the availability and cost of communications equipment for Australian consumers and industry; for example, mobile phones and base station equipment. Australian WRC positioning takes this into account and generally supports harmonisation where economies of scale would lower costs for Australian consumers and industry," Rainsford said.

"Australia is lucky to enjoy a relatively low-interference environment, as we are an island nation with few neighbours close by. Our geography also means we rely on both terrestrial and satellite technology for communications, whereas some administrations are more reliant on one or the other," she added.

"A key goal is to avoid international regulations that would constrain Australia's ability to manage spectrum domestically, including to take advantage of our geographic isolation.



Cathy Rainsford and members of the Australian Delegation to WRC-19, signing the final acts at the conclusion of the conference.

"We also support international cooperation as the best way to safeguard and improve important aeronautical and maritime communications, and to ensure scientific uses of spectrum can continue to supply important information (eg, meteorological sensor data) to Australia."

Spectrum squeeze

Spectrum and satellite orbits are scarce resources, naturally limited in availability, and there is inevitable competition among major manufacturers and technologies vying for access to spectrum.

"With the rise of mobile phones over the last three decades, more and more spectrum has been sought to underpin high-speed mobile broadband and communications. At the same time, consumers and industry are demanding connectivity everywhere, which drives demand for spectrum from the satellite industry," Rainsford said.

"The international radiocommunication community continues to recognise that co-operation and compromise delivers better outcomes (more spectrum and less interference) for everyone," she added.

"Australia encourages cooperation and compromise on the international radiocommunications stage. While demand is increas-

ing, improvements in technology mean that spectrum can be used more efficiently, and makes viable the use of spectrum at higher frequencies."

What are some of the next big challenges for international spectrum regulation?

"Australia will continue to work towards international arrangements that provide certainty for interference management and flexibility to allocate spectrum efficiently, to its highest value use," Rainsford said.

"Technologies using wireless connectivity, and spectrum that underpins it, continue to evolve. Spectrum needs to be managed for both new entrants and existing users.

"Increasing the efficiency of spectrum use, including through spectrum sharing, is likely to require continued international cooperation."

Looking ahead to WRC-23

The conference agreed an agenda for the next WRC in 2023, comprising 19 agenda items and two areas for study.

One band, 7025–7125 MHz, will be considered for potential global identification for mobile broadband. Significant spectrum will be considered for identification for mobile broadband in Region 2 (Americas), including 3300–3400 MHz, 3600–3800 MHz and 10–10.5 GHz, while 6425–7025 MHz will be considered for mobile broadband identification for Region 1 (Europe, Africa and post-Soviet states).

The satellite industry is seeking regulatory arrangements for operation of ESIM with non-geostationary-orbit satellite constellations in several bands between 17 and 30 GHz, and for operation of ESIM with geostationary-orbit satellites using 12.75–13.25 GHz.

The scientific community will explore use of extremely high frequencies to support Earth exploration satellite services in 231.5–252 GHz, and an upgrade of the status of the space research service in 14.8–15.35 GHz.

Other agenda items include several potential adjustments for satellite, aeronautical and radio navigation spectrum.



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TELSTRA PART OF 5G FUTURE FORUM

Leading 5G tech firms from across the globe have joined forces to form a forum to “accelerate the delivery of 5G and mobile-edge computing-enabled solutions around the world”. The members of the 5G Future Forum will work together to develop interoperable 5G specifications across key regions, including the Americas, Asia-Pacific and Europe. The Forum’s founding members are Telstra, Verizon, Vodafone América Móvil, KT Corp and Rogers. “Telecommunications companies are in the driver’s seat when it comes to creating opportunities for their customers to take advantage of the world of possibilities enabled by 5G,” said Telstra’s Group Executive for Networks and IT, Nikos Katinakis.

More info: bit.ly/2VhcO9m



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VICTORIAN TRAINS TO RECEIVE COMMS UPGRADES

Metro Trains’ X’Trapolis and Siemens fleets will soon receive wireless data recorders, allowing engineers to monitor the condition of key train systems in real time and prevent faults. The upgrade comes alongside the \$75 million Comeng life extension project, which will see the Comeng trains fitted with improved communications equipment and safety features, including high-definition CCTV cameras, according to the Victorian Government. These cameras have better clarity and a wider field of view to help ensure passengers’ safety and support Metro and Victoria Police investigations, the government said. “Monitoring trains in real time will lead to a safer and better performing railway — that’s great news for passengers,” Metro CEO Raymond O’Flaherty said.

More info: bit.ly/2PiEreA

Smartphone with PTT

The Samsung Galaxy XCover Pro is a rugged smartphone with a physical PTT button. The device is water and dust protected to IP68, and withstood all 21 of the MIL-STD-810G rugged tests in addition to withstanding repeated 1.5 m drop tests.

Features include a 6.3” edge-to-edge display with Gorilla Glass 5, octa-core processor, 64 GB internal storage with up to 512 GB storage on a MicroSD card, 4 GB RAM and a 25 MP camera. The performance, large screen and physical PTT button enables users to smoothly run business applications alongside PTT, GPS tracking, man-down, lone worker and safety applications, and more. The XCover Pro runs Android 10 and is protected by Samsung Knox, Samsung’s security platform built from the chip up for strong protection.

The Samsung Galaxy XCover Pro is available from Samsung Partner IMPULSE Wireless, which also offers a free trial of the unit, accessories and applications including PTT and lone worker/man-down/worker safety.

IMPULSE Wireless

www.impulsetwireless.com.au



Ethernet switches

The EKI-2720 series comprises industrial ITS-orientated Ethernet switches that are suitable for intelligent traffic system network communication. Each device within the series features 16 copper ports as well as an additional four fibre ports. Their high port-density design allows for mass short-distance device connectivity within 100 m and serves long-distance, intercity network communication up to 110 km. Furthermore, the ports are designed to provide resilient wire deployment for future expansion needs.

To enhance safety, the EN50121-4 specifies emission and immunity levels; providing performance criteria for signalling and telecommunications (S&T) apparatus. These devices are designed to comply with EN50121-4 and are therefore suitable for trackside applications such as video surveillance, emergency phones and signalling systems.

Defined by the National Electrical Manufacturers Association (NEMA),

NEMA TS2 specifies operational performance for intelligent transportation system equipment in applications like road condition signs and traffic lights. Devices in this series are NEMA TS2 certified and can operate in extreme temperatures (-40 to 75°C) and harsh vibrational environments. They are best suited for ITS applications like road surveillance, intersection monitoring and traffic control.



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MASTERCOM APPOINTS DALE DOYLE AS GM

Australian two-way radio communications firm Mastercom has appointed Dale Doyle as its first female general manager. Doyle has decades of experience in a finance career that has included working for major stockbroking firms and international banking, training staff and implementing advanced computer-based accounting systems. She began her employment with Mastercom more than 13 years ago as the company's financial controller. "I am absolutely thrilled to take on the role of general manager and look forward to making a positive impact on this ever-growing, well-established business." Mastercom has recently undergone a considerable growth in operations and has more than doubled its staff numbers from 10 to 26.

More info: bit.ly/32kbJv



AIR NEW ZEALAND'S BROADBAND MILESTONE

Inmarsat's GX Aviation solution has powered more than one million free in-flight Wi-Fi broadband sessions for Air New Zealand passengers in the space of a year. GX Aviation is available on almost 25 aircraft within the Air New Zealand fleet, operating on Trans-Tasman, Pacific Island, US and London routes. "The fact that over one million sessions have been enjoyed by passengers since the free-of-charge model was introduced in December 2018 is testament to incredibly strong demand for high-speed, reliable and easy-to-access in-flight broadband," said Chris Rogerson, Inmarsat Aviation's Regional Vice President for Asia Pacific. More info: bit.ly/2vYRqv



Mobile networking solution

Cradlepoint NetCloud is a service-based platform that spans from cloud to mobile edge to help make deploying, managing and evolving an in-vehicle network easier and less resource-intensive. Users can centrally configure, monitor, visualise, control and troubleshoot their network — WAN to LAN and link to app — from a web console. They can also configure routing, security, LTE, SD-WAN and Wi-Fi functionality at the network, rather than appliance level. The service aims to ensure that LTE connections originate properly, persist throughout the duration of the connection and perform with efficient use of LTE bandwidth.

The COR IBR1700 LTE router is designed to meet the demanding requirements of emergency services, mobile command centres, public and private transit, commercial truck fleets and near-shore vessels. With the available Gigabit-Class LTE modem, higher processing power and broader extensibility options, the device is designed to provide reliable communications both inside and outside of the vehicle. With vehicles running onboard public Wi-Fi and direct-to-cloud applications, mobile networks require high security. Offering multi-zone firewalls, IDS/IPS, internet security and FIPS 140-2 certification, the company aims to mitigate security risks for mobile networks and users.

The routers are sold as part of a NetCloud Solution Package, which includes NetCloud software, purpose-built hardware, 24x7 support and limited lifetime warranty.

Cradlepoint Australia Pty Ltd
www.cradlepoint.com

Cable analyser

The DSX-5000 copper cable analyser enables testing and certification of twisted pair cabling for up to 10 Gigabit Ethernet deployments. It can certify shielded and unshielded structured cabling systems from Category 3 to 7A and Class C to FA at Level V accuracy. It is available to rent from TechRentals.

In addition to a Taptive user interface, this instrument features high-speed testing which includes nine second, Category 6 auto test and built-in alien crosstalk testing capability. PLA004 (Cat 6A/Class EA) and CHA004 (Cat 6A/Class EA) adapters are included.

The device can identify potential errors from improperly installed cabling which can result in downtime, bottlenecks and lost productivity. It is designed to provide high-speed cable certification and accuracy with the aim to help technicians to do more in only a fraction of the time.

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KEEPING THE MET CONNECTED WITH TETRA

Jonathan Nally

With the ESN delayed, the London Metropolitan Police is refreshing its TETRA network to maintain services and add innovative capabilities.

The London Metropolitan Police (the 'Met') is in the middle of a major project to refresh its fleet of TETRA radios, replacing 2004-era units with new Sepura SC20 and SC21 handsets. The refresh was prompted by delays in the introduction of the Emergency Services Network (ESN), a mobile broadband system that was supposed to have been operational by now but which has been delayed until 2022. The refreshed TETRA handsets — which have some innovative capabilities — will keep the Met's personnel connected until then.

The Met is responsible for policing the greater London region, an area of about 1500 square kilometres. To accomplish this task it has 31,000 officers. To put those numbers into perspective, the state of Victoria is more than 150 times the size of London, yet London has 22 police officers per square kilometre against Victoria's 0.7.

London is, of course, in many ways quite an extraordinary place. It has a resident population of more than 9 million, plus there are 65 million visits to the city per annum from elsewhere in the UK and from abroad. Heathrow Airport is Europe's busiest, and the city is home to 164 diplomatic missions and numerous historic places and important buildings. The Met alone has around 200 police buildings.

In addition to the Met, there are two other police forces — the City of London Police (responsible for the central financial district) and the British Transport Police (BTP). All up, between the three forces there are around 35,000 officers engaged in keeping the city safe and secure, almost all of whom need radio contact. That number might seem staggering to Australasian readers, but it is dwarfed in scale by the London Underground, which has its own TETRA network with 95,000 handsets.



bring their own IT... [and plug it] in to our systems so that they've got connectivity.

"Interoperability is pretty good, [and] certainly better than when I joined 27 years ago," he added.

At a local level there is a body called the LESLP, the London Emergency Services Liaison Panel, which produces a guide on how London's emergency responders will work together; and nationally there is the JESIP, the Joint Emergency Services Interoperability Programme, which provides very clear guidance on how agencies should work together and what everyone's responsibilities are.

"JESIP came about as a result of a number of incidents where I suspect liaison left a little to be desired," Fleckney said. "But now everyone, from the rank of sergeant and up, has to do JESIP training. And that has to be repeated every three years."

The TETRA refresh project

"By far and away the most important work I've been involved in since I took up my current post was the operational evaluation and replacement of TETRA handsets for the entire Met Police, which resulted in us purchasing 32,000 Sepura SC20 and SC21 hand-portable radios," Fleckney said.

The UK policing community, through the Police ICT Company, negotiated a framework to leverage the buying power of the whole of the UK policing market. "And that did two things for us," he said. "The most obvious thing is [that] it got our suppliers to offer their best and final costs to us. It also meant that the majority of procurement rules — which in the UK can be quite restrictive — were completed as part of the establishment of the framework, not repeated each time a force wanted to purchase, leaving us to concentrate on the decisions as to what handsets were best for us, and it severely reduced the time it would take to review and purchase new handsets."

The delays with ESN and the age of the existing fleet led the Met to review what should be done. The advantages of the framework (reduced time and cost) made the answer clear — replace the entire fleet of TETRA radios.

"There were a number of handsets available to us from two separate manufacturers, and three key reviews were carried out," Fleckney said. "Firstly, a commercial review — total cost of ownership over a varied period of time. [Then] a technical review, which was broadly a paper-based exercise comparing and contrasting the specifications of each handset.

"And most importantly, from my perspective anyway, was the operational review," he said.

The Met gave officers samples of handsets from one manufacturer and then after a couple

The Met began using vehicle radios in the 1930s, and in the 1960s began issuing personal 4-channel VHF sets to officers. That's the way it stayed until the 1990s, when digitally trunked handsets were introduced. In 2003 the national Airwave TETRA network was established, and the Met's system grew to have 45,000 handsets and 4000 vehicle sets.

While the US had its 9/11 moment for critical communications, it could be argued that London's equivalent moment occurred in 1988, when there was a horrible underground railway station fire at Kings Cross. "We had no method of communication underground, neither did the ambulance service nor the fire brigade — no-one knew what was going on downstairs," said Inspector Chris Fleckney, who is responsible for the Met's TETRA radio network.

"The suggestion from the Fennell Report into the disaster was, you need to have a

better way of communicating underground. I think in those days it probably wasn't technically possible with our VHF network," he said. "Although the BTP gained capability, the Met didn't then actually get an operationally working radio system down into the tunnels until 2008."

Interoperability

Like most large cities, London hosts many regular and occasional major events, one of which is the annual Notting Hill Carnival, which attracts one million people into a very small neighbourhood with narrow roads that were laid down 150 years ago. In such a locality, interoperability with other emergency services organisations is critical.

"For something like that we will have London Fire Brigade and London Ambulance Service representatives sitting in our control room, each with direct links to their own control rooms," Fleckney said. "They will

POLICING

of weeks swapped them for handsets from the other manufacturer. The trial showed that both sets of handsets were not yet quite up to the job.

"What we clearly needed to do, we needed to offer both manufacturers the opportunity to optimise their handsets for our use," Fleckney said. "Both companies worked well with us to produce an optimised version of their handset and both performed significantly better the second time around."

"We carried out focus groups where officers from around the Met with different specialisms looked at individual parts of the radio, right down to the PTT button, to understand which handset they preferred and why," he added. "Obviously there were differing opinions, but by the end of it the answer was clear — there was a strong preference for the Sepura models."

Capabilities

Perhaps critically, a number of features offered by Sepura's handsets took their capabilities beyond those of a standard TETRA unit and helped close the gap between expectation and reality.

"We worked very hard with Sepura to personalise their products to suit our needs. We were really, really pleased with the way Sepura reacted to that," Fleckney said.

"There's one particular part of that which is called 'subscriber class by talk group,' which is not a well-used piece of TETRA functionality. There's only one other manufacturer that offers it as far as I'm aware. And I'm not aware of anyone else in the world that uses that functionality."

"We use it to basically give a cell site a subscriber class, and then only people on certain talk groups will affiliate to that cell site, which helps us smooth out the load. And we considered that to be quite a difficult thing to achieve," Fleckney added.

"We asked Sepura — we were really open with them — and said if you can't do this, there is no point in you wasting your marketing



The Sepura SC20 and SC21 radios.

budget trying to sell us these terminals. And they went away and came back and said 'we can do it'. We were a little sceptical at first, but they achieved it and it works."

Fleckney said his users like the software, and the improved power (1.8 watts) and sensitivity, as well as the large (for TETRA) colour screen. "Bearing in mind our desire for a rapid rollout, Sepura designed, built and tested, in a very short space of time, a number of software changes to their firmware which minimised our business change and training implementations," he said. "In particular, they developed functionality which enables us to dynamically spread load across our network during times of high demand, which is absolutely critical in London."

"At an operational support level, the option to have two different models which used common accessory connectors and common batteries was a really significant positive," he added.

Another welcome change is the ability to reprogram the handsets over Wi-Fi. "Having a handset that, when it's turned on, checks via corporate Wi-Fi to see if it's running the latest code plug and, if not, downloads it and installs the latest version, we hope will be an incredible time- and cost-saver for us, and ensures that updates can be made as soon as required," he said.

Another innovation is the AppSPACE applications environment. The Airwave TETRA system is subject to significant regulatory control and approval, not just by Airwave, but also by the UK's National Cyber Security Centre, and any changes to device firmware need to go through a number of checks and tests. This can be expensive and quite lengthy.

AppSPACE is innovative in that it partitions the TETRA engine from a second area which is capable of running applications. Although it's connected to the TETRA engine, it's separate from it. "Working with Sepura, we've been able to create apps that meet our business need but without going through that additional layer of regulatory framework, which saves time and costs for both parties," Fleckney said.

The rollout of the SC20s and SC21s is underway, and "I'm hoping for 95%-plus [completion] by mid-2020," he said.

Working with the ESN

The ESN will be a 4G LTE network using a commercial bearer with emergency services traffic having priority and pre-emption. All UK emergency services personnel will use it, which means they will need around 330,000 handheld and vehicle devices nationally.

"Along with FirstNet in the US, there is no doubt we are breaking new ground in the provision of critical communications to first responders and promising a high-speed data capability that will revolutionise our approach in many areas," Fleckney said. "However, it's not without its challenges, and what should have been delivered in 2019 is currently expected in 2022."

Even when the ESN is delivered, one of its drawbacks will be the lack of off-network device-to-device communications. There is a solution in that the SC20 and SC21 handsets can be repurposed. An app sits on the ESN device and connects using either Bluetooth or wired technology to the TETRA handset. The ESN device is held in a pocket inside the body armour etc, and the Sepura handset acts as a relay and officers can switch between the ESN equivalent of trunked mode and direct mode using TETRA.

The efforts being undertaken to ensure that all modes of voice communication are preserved and enhanced for the Met's communications, whether that's with TETRA, the ESN or both together, demonstrates yet again what every emergency services organisation around the world maintains — that voice comms are vital and are not going to go away.

"Maybe in some future that I can't quite foresee, voice will no longer be the most important thing," Fleckney said. "But I can't see that yet. Voice is, and will be for the whole of the foreseeable future, king."



Inspector Chris Fleckney, speaking at Comms Connect Melbourne in 2019.



Introducing the CM60 Series

Designed, engineered and manufactured in Australia for the toughest conditions, the CM60 Series provides a robust solution ideal for both the large systems integrator with an extensive network of mobiles, portables and repeaters, or the small operator with a single site.

The CM60 Series provides an analogue solution with optional licensing upgrades for P25 in Conventional, Trunk and AES 256-bit Encryption.

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All CM60 variants are compliant with AS/NZS 4295 (LMR). UHF variants are compliant with AS/NZS 4365 (CB) and all P25 variants are CAP (Compliance Assessment Program) compliant, conforms to TIA-102 Standards.



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Industry Talking

As I write this the rain is pouring down across much of eastern Australia. I have decided I will never complain about too much rain ever again. The unprecedented fire activity across Australia over summer has affected so many people, and the scale of the disaster will be felt for years. Of course the response from Australians has been fantastic, and as we turn to rebuilding, community spirit will hopefully ensure that people in affected areas get the support they need.

I would like to congratulate all the people in our industry, members and future members, for the massive effort to keep communication systems running, supply temporary sites and make urgent repairs, and for their endless support on the ground. There has been extensive damage to communications sites but as always the communications industry has risen to the challenge. Well done to everyone involved, including all the government agencies and support people who are invisible to the general public but are ever present. Ours is an industry that always works away quietly in the background but always makes things happen with little fuss.

Everyone in our industry understands that critical communication has an essential role to play and events such as the bushfires demonstrate for all to see just how important it is. I could not help thinking as video emerged of NSW Fire & Rescue trucks driving through a flame-over and putting up blankets to protect the crew, just how vital communications are. During the worst of the fires many radio sites and networks were destroyed, and crews were left with simplex communications — a vital lifeline on the fire ground.

So there will be many lessons learned from this event. I hope that key agencies and governments can use the experience to invest in critical communications technologies. There is enormous industry knowledge and experience that can be brought to the table, so I also hope that everyone in the industry can contribute to the critical communications environment.

I am also reminded that after all the discussions and effort around new LTE technology, it is still not really appropriate for many situations. Of course, getting data and situational awareness to public safety users is important; however, under firestorm conditions, PTT voice is king. If we could estimate the total number of PTTs on fire grounds, on networks, on simplex, I think the number would be staggering, and any one of those calls could have been lifesaving.

ARCIA has started planning for 2020 and we will have many events and activities in which you can participate. Make sure you look at the refreshed web page, www.arcia.org.au, for up-to-date information. At our committee planning days in February we had 30 industry representatives present, ranging from committee members through our promotional partners to other industry organisations, including our friends from across the Tasman, the Radio Frequency Users Association of New Zealand. A very broad range of topics was covered; as well as giving us an opportunity to discuss many industry opportunities and concerns, we were able to set ourselves some relevant action points for the coming year.

In particular, ARCIA will continue to offer training days on industry relevant topics. More than 200 people have attended these small courses over the last 18 months. Our aim is to expand, improve and deliver more content for the benefit of industry. If you have any content that you think will be helpful for your business, employees or contractors, please reach out to the committee and let us know. There are many topics to cover and your input will help us to set the priorities for the future.



Hamish Duff, President
Australian Radio Communications
Industry Association



5G antenna

The Panorama Antennas L[G]M[H] M-6-60 'Great White 5G' range has been designed to provide 2x2 4G/5G MIMO performance from 617–960/1710–6000 MHz in a robust low-profile package. The flexible platform enables the main elements to be combined with a number of the other functions including GPS/GNSS and up to 6x6 MIMO Wi-Fi 2.4/5.0 GHz.

The antenna is designed to be panel mounted and can be fitted on a conductive or non-conductive panel. Supplied with integrated flame-retardant RG174 cables (compliant to UNECE 118.01 and EN45545-2) and a halogen-free, flame-retardant radome, the Great White 5G is suitable for many environments and applications.

The LGM variants have an integrated GPS/GNSS module which features advanced filtering for LTE B13/14 to minimise potential in-band interference. The antenna is available with a black or white radome which meets IK10 for vandal resistance and IP69K for ingress protection.

Panorama Antennas Pty Ltd
www.panorama-antennas.com

COMMS CONNECT NEW ZEALAND — MAY 2020



Comms Connect New Zealand brings communications industry users, dealers, consultants, manufacturers and other stakeholders together to network, learn, share ideas and do business together. The conference will include technical presentations, case studies and workshops presented by a line-up of top local and international speakers and subject matter experts.

Sessions

The opening plenary address will be given by Len Starling, Manager of Policy & Planning at New Zealand's Radio Spectrum Management. This will be followed by the keynote address given by Carlos L' Abbate, Senior Director, Product Technology and Architecture for the US First Responder Network Authority, who will present an overview of the initial deployment of mission-critical push-to-talk by the FirstNet. The second day will feature two plenaries, by Andrew Christie (Business Change Manager for St John Ambulance) speaking on the topic of next-generation communications in New Zealand, and Andrew Miller (CEO, Vital), who will speak about transforming to digital communications and beyond.

The full speaker program can be found at comms-connect.co.nz, but here's a small selection of sessions:

- Protecting marine VHF repeater sites from lightning in Fiordland National Park
- A multi-site simulcast DMR network trial
- Migration of power utilities communications networks to IP/MPLS
- Investing in futureproofed TETRA solutions
- LTE public safety deployables
- Tracing interference into land mobile VHF repeaters

- Correctly project engineering a radio network
- Essential 5G field tests
- The next decade of satellite communication
- Securing NZ industrial environments

The final session on the second day will be a panel discussion that will focus on the capabilities frontline services in New Zealand can reasonably expect to have by 2030.

Workshops

There will be two workshops, each of which have run at the Australian Comms Connect events and have proven very popular. The first workshop will cover how mapping and GIS fit in with modern critical communications systems. The second will provide industry professionals with targeted industry-specific training as it relates to multi-coupling, to enhance their professional learning and development pathways.

Exhibition

The exhibition will showcase more than 30 exhibitors, including all the big names

in the Australasian comms market — led by gold sponsors Zetron and Collaborative Digital Networks, and Aviat Networks, the delegate lunch sponsor — with an emphasis on innovative New Zealand firms. You can see a full list of exhibitors and sponsors at comms-connect.co.nz/visit-exhibition.

RFUANZ Gala Dinner and Awards

The Radio Frequency Users Association of New Zealand's annual Industry Excellence Awards and Gala Dinner will be held at Te Papa – Te Marae, Wellington, on the evening of 6 May. For ticketing information, visit rfuanz.org.nz/gala-dinner-and-awards-night-registration-2020.

Essential event

It's vital that all users of radio and converged communications in business- and mission-critical working environments — as well as dealers, manufacturers or suppliers in this sector — seek out the very latest information, technologies and solutions, and build relationships. Comms Connect New Zealand will deliver that opportunity for you and your colleagues.

COMMS CONNECT NEW ZEALAND 2020

Conference: 6 May (8.50 am–5.00 pm), 7 May (9.00 am–4.30 pm)

Exhibition: 6 May (9.00 am–5.00 pm), 7 May (9.00 am–3.30 pm)

Networking drinks: 6 May (5.00 pm–6.00 pm) Open to all registered attendees

Where: Lower Hutt Events Centre, Wellington (lowerhutteventscentre.co.nz)

Who: More than 300 delegates and 30-plus exhibitors

Web: comms-connect.co.nz

CONFERENCE AGENDA

TUESDAY, 5 MAY 2020

PRE-CONFERENCE WORKSHOP (purchased separately or in addition to one or two-day conference packages)

1.30pm–5.00pm

PROFESSIONAL DEVELOPMENT TRAINING WORKSHOP: RF filtering and transmitter multi-coupling systems

Presented by **Mark Mezzapica** — Chief Technology Officer, RF Industries

WEDNESDAY, 6 MAY 2020

8.50am–9.00am

Welcome and opening remarks from the chair, **Chris Stevens**

9.00am–9.30am

Plenary: Spectrum management update

Len Starling — Manager RSM Policy & Planning, Radio Spectrum Management

9.30am–10.15am

Keynote: Overview of initial deployment of mission-critical push-to-talk by the U.S. First Responder Network Authority

Carlos L' Abbate — Senior Director, Product Technology and Architecture, First Responder Network Authority

10.15AM – 11.00AM MORNING BREAK

STREAM 1

11.00am–11.30am

How the 'mobile first' perspective is changing how we equip first responders

TJ Kennedy — Co-Founder, The Public Safety Network

11.30am–Noon

The impact of Industry 4.0 and 5G on mission-critical communication networks

Barbara Noonan — Head of Public Sector APAC, Nokia

Noon–12.30pm

Impact and readiness of critical communication services for New Zealand

Pete Bains — Technical Consulting, Bainz Consulting Ltd

STREAM 2

11.00am–11.30am

Case study: Protecting marine VHF repeater sites from lightning in Fiordland National Park

Allister Babington — Managing Director, Advanced Systems Integration

11.30am–Noon

Case study: Investing in future-proofed TETRA solutions

Colin Bresnahan — Business Manager, Oceania, Sepura

Noon–12.30pm

Case study: Will it work, won't it work? — A look at a multi-site simulcast DMR network trial

Andrew Mackintosh — Control Systems Engineer, Orion New Zealand
Neville Digby — Senior Systems Engineer, Orion New Zealand

12.30PM – 1.30PM LUNCH BREAK – Sponsored by Aviat Networks

STREAM 1

1.30pm–2.00pm

Case study: ACT emergency service agency high-bandwidth mobile radio network. Economic and independent augmentation of PSMB

Ross Caston — General Manager DLES, Amber Technology
Dale Stacey — Technical Director, SAT Pty Ltd

2.00pm–2.30pm

Bridging the digital divide with fixed wireless technologies. Impact of emerging wireless landscape — 5G and Wi-Fi 6
Roy Wittert — Regional Sales Director, Aus, NZ and Pacific Islands, Cambium Networks

2.30pm–3.00pm

LTE public safety deployables — standalone and coverage extension approaches

David Cooke — Regional Vice-President, Pacific, Parallel Wireless

WORKSHOP

1.30pm–5.00pm

WORKSHOP: Mapping and GIS fundamentals for critical communications

Presented by **Chris Stevens** — Managing Director, CartGIS Pty Ltd

3.00PM – 3.30PM AFTERNOON BREAK

STREAM 1

3.30pm–4.00pm

Network switching at the edge and voice interoperability
Sohan Domingo — Head of Product Management - Unified Solutions, Tait Radio

4.00pm–4.30pm

Digital land mobile radio and mobile broadband landscape — key information for evolving critical wireless communications
Anton Abrahams — Chairman, Australasian Critical Communications Forum

4.30pm–5.00pm

How will New Zealanders stay connected in the future
Richard Adams — Channel Delivery Unit Lead, Spark
Steven Lawrence — Tribe Lead, Infrastructure, Spark

WORKSHOP cont'd...

WORKSHOP: Mapping and GIS fundamentals for critical communications cont'd ...

5.00PM – 6.00PM NETWORKING DRINKS
6.45PM RFUANZ DINNER AND AWARDS NIGHT

www.comms-connect.co.nz

9.00am–9.45am

Plenary: What's driving the need to change? — A real perspective of New Zealand's current state from the end user

Andrew Christie — Business Change Manager - Next Generation Critical Communications, St John New Zealand

9.45am–10.15am

Plenary: Transforming to digital communications and beyond

Andrew Miller — CEO, Vital

10.15AM – 11.00AM MORNING BREAK**STREAM 1****11.00am–Noon**

Panel session: Narrowband data: does one solution fit all?

Moderator: **Chris Stevens** — Managing Director, CartGiS Pty Ltd

Panel members to be confirmed

STREAM 2**11.00am–11.30am**

Securing NZ industrial environments — an OT perspective

Peter Jackson — Director of Cyber Security, Ecl Cyber

11.30am–Noon

Seeing is believing: using edge computing and narrowband communications to enable advanced low-cost remote sensing

Dylan Jorgensen — CEO and Systems Engineer, Qamcom New Zealand

Noon–12.30pm

Correctly project engineering a radio network

Lawrence McKenna — Principal Engineer (Manager), Cumarsaid

Noon–12.30pm

Case study: Migration of power utilities communications networks to IP/MPLS: Chugach Electric

Cal Iaccarino — Senior Product Manager, Aviat Networks

12.30PM – 1.30PM LUNCH BREAK – Sponsored by Aviat Networks**STREAM 1****1.30pm–2.00pm**

The next decade of satellite communication

Peter Bolger — CEO, Pivotal Group

STREAM 2**1.30pm–2.00pm**

Has DMR killed the analog star?

Gary Ertel — Director, Data Over Radio Limited

2.00pm–2.30pm

Case study: Remote site coverage solutions for mission-critical operations

Mark Saloyedoff — Business Development Manager, CommTel Network Solutions

2.00pm–2.30pm

Tracing interference into land mobile VHF repeaters

David Walker — Communications Technician, Apex Communications

2.30pm–3.00pm

Case study: TVNZ's role in delivering critical communications

Wayne Huggard — Transmission Services Manager, TVNZ

2.30pm–3.00pm

Essential 5G Field Tests

Lex Grubner — Managing Director, RF Test Solutions

3.00PM – 3.30PM AFTERNOON BREAK – EXHIBITION CLOSE**CLOSING PANEL SESSION****3.30pm–4.30pm**

Looking to the future: what is possible with the available resources and funding?

We often discuss what 'we'd would like to see' or what 'is technically possible'. But are these 'Pie in the Sky ideas'? These outcomes often are out of reach due to resources and funding. So what is it that we can reasonably expect to have available for our front line services in New Zealand in 2030?

Moderator: **Chris Stevens** — Managing Director, CartGiS Pty Ltd

Panel members to be confirmed

4.30PM CONFERENCE CLOSE

CONTROL ROOM CONFERENCE — A VALUABLE LEARNING EXPERIENCE

Site visits and case studies were highlights of Australia's peak conference for control room operators, vendors and researchers.

The Australian Control Room Network Association's (ACRNA) most recent annual three-day conference, held in Melbourne from 29–31 October 2019, was attended by more than 60 delegates representing control room operations across Australia from a wide range of industry sectors including electricity, gas, transport, utilities and mining.

After a networking breakfast, the first day of the conference program focused on case studies presented by control room operators and control room industry specialists addressing change management and technology challenges. Those case studies included:

- Change resistance
- Employee health and wellbeing addressing circadian disruption with human-centric lighting in control rooms
- Improving usability
- Fatigue management — enhancing control room operators sleep through thermogenics
- Relocation of a control room
- Safer control rooms
- Merging new technologies and people
- Virtual reality as a design tool

That final case study came with an exciting hands-on opportunity for delegates to experi-

ence the virtual reality design system during conference breaks.

Day one concluded with a networking function and the annual conference dinner, with the very engaging guest speaker, Professor Mark Wiggins, speaking on 'Change, technology and learning'.

The second day of the conference began with a second networking breakfast followed by control room site visits to AGL Reewabnles, CitiPower/Powercor, Emergency Management Victoria, Jemena, Metro Trains, Department of Transport (VicRoads), Transurban (CityLink) and Yarra Trams. Site visits are a highlight of the ACRNA conference as they provide a valuable learning opportunity for operators to experience a wide variety of control rooms outside of their normal environment. They also provide the opportunity to develop valuable networks and relationships, enhancing cross-sharing of knowledge, experience and lessons learned.

Following the control room site visits, the afternoon program included a panel discussion and debrief by delegates, sharing what they learned and observed at the control rooms they visited.

Day two concluded with a networking function and an informal conference delegate dinner.

The third and final day began with the ACRNA AGM, which underlined the healthy growth of the association, with many new members nominating for committee posi-

tions and enthusiastic discussion on the direction of the association.

The afternoon program included a presentation by a representative of the International Critical Control Room Association (ICCRA) which is now an affiliate association of the ACRNA.

The association's main focus throughout 2020 will be establishing and enhancing member services such as industry newsletters, guidelines (eg, fatigue management), facilitating training opportunities via one-day regional workshops, and further developing relationships with other associations and organisations involved in the management of critical infrastructure and services.

The ACRNA 2020 annual conference will be held in Queensland — date to be announced — and details of one-day regional workshops will be published on the ACRNA website: <https://acrna.org>.

The association has been formally established for just over 18 months and in that time it has been well accepted by industry and supported by corporate members, without whose support the association would not be able to deliver its low-cost, high-value annual conference and future regional events.

The association's corporate members are: Jemena (platinum); Transurban, Viva Energy, AGL, PowerLink, Origin APLNG (all gold); and Control Centres Australia (silver).

Australian Control Room Network Association
<https://acrna.org>





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Pictured: Australian Army reservist Corporal Michael Abraham from the 10th/27th Royal South Australia Regiment is deployed to Kangaroo Island, South Australia, during Operation Bushfire Assist 2019–2020. He was able to use his experience and contacts from his day job as a Telstra employee to speed up the reconnection of phone services to the town of Parndana after a bushfire damaged the local telecommunications tower.

ADF image by LCPL Brodie Cross © Commonwealth of Australia

ROUNDTABLE EXAMINES BUSHFIRES' EFFECTS ON COMMUNICATIONS

Jonathan Nally

Government and industry have assessed the bushfires' effects on telecommunications, and agreed on measures to examine hardening networks.

A roundtable meeting comprising government, major telcos and industry groups was convened Wednesday, 23 January by the Minister for Communications, Cyber Safety and the Arts, Paul Fletcher, to tackle the question of network resilience during the recent severe bushfires.

Present at the meeting were Telstra Chief Executive Andy Penn, Optus Chief Executive Allen Lew, Vodafone Chief Executive Iñaki Berroeta, NBN Co Chief Executive Stephen Rue and TPG Chief Operating Officer Craig Levy.

Also present were senior representatives from other telecommunications organisations such as the Australian Communications and Media Authority (ACMA), Australian Mobile Telecommunications Association (AMTA), Communications Alliance, the NSW Telco Authority and the Australian Communications Consumer Action Network (ACCAN).

Emergency management bodies such as the Bushfire Recovery Agency and Emergency Management Australia also attended.

The meeting looked at both the short-term response to the effects the bushfires had on communications services, as well as longer-term ideas to improve network resilience.

The Minister commended the telcos for working to restore services, and for provid-

ing relief packages (such as Optus's Green Shoots program) to affected areas, with the NSW Telco Authority noting the telcos had been very responsive during the crisis.

The roundtable also recognised the role played by the Australian Defence Force in helping telcos gain access to critical infrastructure for repair and restoration of services.

Of particular note was the observation that most network outages had been due to loss of power, not due to fire damage to network facilities.

The telcos noted that the bushfires made it difficult to gain access to some sites to assess damage and install generators.

The participants discussed several initiatives to boost network resilience in the future, such as:

- Clearing of vegetation around base stations and other transmission facilities to produce larger firebreaks.
- Information sharing from energy companies on power availability to enable telcos to prioritise the deployment of generators.
- Giving operators access to emergency fuel stores for refuelling of mobile base stations' back-up generators.

The roundtable agreed to several initial primary actions:

- ACMA, together with Communications Alliance and AMTA, will conduct an industry-wide review into the effect of the bushfires on communications networks and how the operators responded.
- Communications Alliance, on behalf of industry, will lead the development of a national common operating model for telecommunications disaster management to strengthen interaction with lead state agencies.
- AMTA will work with industry to ensure emergency coordination agencies have better information about the locations of critical mobile infrastructure.

The industry also agreed to work with the federal government to examine options to increase network resilience and continuity of services during future natural disasters, by looking at the following:

- Industry coordination of advice to residents.
- Options for better network redundancy to support services such as banking and EFTPOS.
- Better use of Wi-Fi and satellite in areas where mobile networks are unserviceable.
- Whether additional temporary facilities such as COWs are needed.
- Whether network resilience could be further improved.

"While no telecommunications network is 100% impervious to damage from natural disasters, Australians naturally want to be confident our communications networks are as resilient as possible during times of emergency," Minister Fletcher said.

"We are better placed than 20 or 30 years ago; the combination of mobile, fixed line and satellite connectivity combined with mobile COWs and temporary satellites on the nbn that can be deployed ... means we now have greater back-ups and options to keep our vital communications networks up and running.

"This bushfire season is not over yet and may continue into 2020 — the telecommunications industry is working hard to help affected communities and is well positioned to react quickly to any future bushfires," the Minister added.

Laurie Patton, Vice President of Telsoc, said his organisation has encouraged the Minister to canvass a variety of input and opinions from a wide range of industry groups and experts. "Telsoc has written to the Minister offering to provide the advice of its many highly qualified members," Patton said.

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ORION EXPANDS INTO DARWIN

Jonathan Nally

Cyclones and tropical heat were two of the challenges that had to be met in the Orion Network's latest expansion.

The Orion Network has expanded into another Australian city, going live in Darwin in December. Based on Motorola Capacity Max technology, the DMR Tier III compliant network now serves the northern capital plus the Wollongong-Sydney-Newcastle-Blue Mountains region, Brisbane and the Sunshine Coast, Melbourne, Adelaide and its surrounds, and Perth.

"As Australia's largest commercial radio network operator, Orion is proud to be the first to include Darwin in a national network footprint," said James Holmes, the Orion Network's Darwin spokesperson.

The network supports a range of devices including handheld and mobile radios, telematics devices, desktop consoles with TRBOnet and smartphones with the Motorola WAVE PTT-over-cellular app.

"The devices enable a range of features such as critical PTT voice calls, messaging, man-down and emergency duress, GPS and indoor location tracking, voice recording, telemetry and event automation," Holmes said.

In addition to communications, the network provides almost-immediate data analysis and graphical dashboard display for management across a range of industries including aviation, construction, facilities management, security, utilities, transport and logistics.

The Orion Network currently supports 10 million calls per month across Australia.

To find out more about what was involved in expanding into Australia's northernmost capital city, we conducted the following Q&A with James Holmes.

How did the project begin?

The Orion group have been actively looking to expand into Darwin for a while now.

Recently we have secured two customer contracts in the transport industry which were key enablers, providing us with the number of network subscribers necessary to justify the investment.

Since the Orion Network was first launched nearly 10 years ago we have always planned to extend to Darwin. In recent years we have really ramped up activity since CSE acquired the Darwin-based Comm8 business in 2017.

Who was involved?

Growing the Orion Network requires a coordinated effort with a number of stakeholders. Involved has been all the Orion partners including CSE Crosscom, Mastercom and Gencom, as well as customer partners, vendor partners, government regulators and communication site owners.

What sort of preparations did you have to do?

Our initial planning is always focused on the customer requirements — coverage is king. We invest heavily in our RF projection and validation tools to design and implement network sites which will meet and exceed our customer needs. Once we understand the geographical area and topology, we look to engage our network of communication site owners (both nationally and localised) to identify the most appropriate site for the project. Some of the factors we need to consider include:

- tower location and height
- site availability, including access restrictions
- structural integrity, environmental considerations and wind-load ratings





- linking technologies and availability
- power systems
- civil engineering requirements
- financial and contractual commitments.

Can you describe the equipment involved?

When building a radio network, it always makes sense to utilise existing infrastructure wherever possible. Typically an Orion site consists of:

- Motorola DMR Tier III repeater infrastructure
- ACMA frequency assignments
- RF combining equipment
- antenna systems and rigging
- IP linking to provide a minimum two redundant carriers
- power systems with AC and DC backup
- remote monitoring and management of power, Ethernet and RF systems

- physical rack-mount hardware
- lightning protection.

Which sort of clients are you aiming for?

Orion currently caters to a wide range of customers and industries, including aviation, construction, facility management and security, government, industrial and utilities, and transport and logistics.

Did Darwin pose any special challenges?

Specific to Darwin there were some key environmental factors we needed to consider, including high-wind/cyclone region C ratings and high-temperature ratings. We invested in specific equipment and engineering services to ensure the Orion Network could cope with these conditions.

How far does the coverage extend?

The Orion Network in Darwin covers the major metropolitan area and extends into

the outer suburbs. The coverage map is available at orionet.com.au/coverage-maps/. We are always looking for opportunities to partner with our customers and expand the network coverage as needed.

Was government supportive of the project?

The Orion Network has grown in partnership with our key commercial and government customers throughout Australia, and Darwin was no different. We worked with our customers to identify the need and deployed the solution quickly, working with the local government and site owners as required.

Any final points?

The Orion Group is very keen to meet with other commercial, government and enterprise clients who are interested in building a DMR Tier III radio network in their region.

Radio Matters

I am pleased to advise that the annual Gala Dinner for the RFUANZ will once again be held at Te Papa in Wellington, on Wednesday, 6 May, in conjunction with the Comms Connect conference and exhibition to be held at the Lower Hutt Events Centre on 6–7 May.



We will soon be calling for nominations for our annual industry awards. Each year the high calibre of these nominees makes it more and more difficult for the judges, which of course is a good thing. To ensure that your nomination or nominee is well represented, it's important you are aware of the criteria for each award when submitting nominations.

You can find information about the awards, including categories and nomination procedures, at rfuanz.org.nz/2020-rfuanz-industry-excellence-awards.

RFUANZ is working with the Australian Radio Communications Industry Association (ARCI) to provide two half-day training courses, which are part of ARCI's accredited training program. The workshops will include theory and practical components and cover the following topics:

GIS mapping and fundamentals — an overview of the fundamental principles of geographic information systems, including data representation, standards, systems, software and applications.

Antenna and multi-coupling designs — giving industry professionals targeted, industry-specific training as it relates to multicoupling, to enhance their professional learning and development pathways.

RFUANZ is also very pleased to advise that Radio Spectrum Management (RSM) will be hosting a workshop on 5 May, at the Lower Hutt Convention Centre, coinciding with Comms Connect.

The workshop is designed to encourage RFUANZ members and newcomers into becoming approved radio certifiers. The duration will be approximately six hours. Should you have any questions or want to know more, please contact info@rsm.govt.nz.

Criteria on how to become an approved radio engineer or certifier can be found on the RSM website at rsm.govt.nz/engineers-and-examiners/how-to-become-an-approved-radio-engineer-or-certifier/.

Corey Weir
Chairman, RFUANZ



Industrial DC power system

The Eaton Industrial DC Power System is a low-cost package designed for industrial applications that require an efficient, reliable and flexible 125, 110, 48, 24 and 12 VDC power back-up solution; or a combination thereof. The system is typically provided with an industrial-grade 2.2 m 45 U cabinet and can be fitted with the necessary infrastructure to grow from <1 kW/55 Ah to 12 kW/450 Ah. Options are available for higher capacity, dual A+B infrastructure and battery expansion. Varying heights of cabinets are also available on request.

As load requirements grow, users can add plug-in rectifiers and/or converters, ensuring power requirements are met. Each system can be engineered to user specification, otherwise standardised predesigned options are available.

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Cable drum trolley

The Adept Cable Drum Trolley has pneumatic tyres, durable powder-coated 'safety' yellow support frames and a galvanised steel axle. The A frames can be locked into position on the axle thumb-screws once the cable reels are in position, enabling quick dismantling for transporting or storage when the job is done.

The unit has capacity for multiple rolls of wire and cable to be paid out at the same time. The maximum wire roll size is 1000 mm (40") wide with a safe working load of 120 kg.

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Cabinets and venting systems

Ventech Systems designs and manufactures enclosures suited to outdoors for standalone installations. These cabinets are designed to house electronics and heat-sensitive equipment such as communication electronics and batteries. When used in conjunction with the company's patented venting systems, they have the ability to operate in extreme weather conditions.

The company produces two circulation and external venting systems. They are designed to withstand extreme weather and can be useful when the protection of electronics, batteries and communications equipment is required. This patented technology is designed to optimise the performance of housed electronics and batteries in a variety of locations and conditions, including extreme cold. The company's ventilation systems are designed to be versatile, economical and energy efficient.

Ventech Systems

www.ventechsystems.co.nz

Optical time-domain reflectometer



The Viavi MTS-4000 Single-Mode OTDR is an integrated optical test platform with module bays that have been designed for the installation, turn-up and maintenance of fibre-optic networks. It is available to rent from TechRentals.

It has a 9" multi-touch screen which is designed to be intuitive and easy to use, allowing faster testing. This device is designed to require minimal training for engineers, technicians, installers and

contractors. It aims to certify the fibre physical layer of FTTx/PON, access, metro and enterprise networks.

The Viavi MTS-4000 Single-Mode Optical Test Platform supports improved operation within the platform or through the cloud with its VIAVI StrataSync (a centralised, cloud-based asset, configuration, test data and workflow management platform). The unit also has tools such as an optical microscope.

TechRentals

www.techrentals.com.au

Terminal server

The Cambium cnReach Terminal Server delivers serial-to-Ethernet conversion, enabling the addition or integration of serial connectivity to any wired or wireless TCP/IP network.

In addition to serial connectivity, the terminal server supports MODBUS polling at the edge that can be published via MQTT. The cnReach Terminal Server is managed with cnMaestro, providing a single pane of glass management across the network. Flexible configuration enables integration with most serial-based devices in the field today.

Other features include: integrated MODBUS TCP to MODBUS RTU conversion; TCP or UDP traffic and server or client modes; the ability to daisy-chain multiple units to add more serial ports; data concentrator applications to reduce polling; and PLC Local Logic to add intelligence at the edge.

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FREQUENCY PLANNING FOR MICROWAVE COMMUNICATIONS

Trevor Manning

In this extract from his new microwave handbook, Trevor Manning explains some of the intricacies of planning radio networks.

Most people have experienced a crackle on their radio or TV sound during an electrical storm. The crackle is caused by stray signals from the increased white noise of the lightning strike breaking through to the receiver. Telecoms receiver equipment will demodulate any signal within its passband, and all signals that do not originate from the original source are considered to be interference.

Interference analysis is a specialist field, but the basic issues should be understood to ensure a quality design as, in digital systems, interference can be a hidden gremlin. People may think their network is interference-free, but in fact, the interference may be present and only become an issue as the link fades.

For example, a light rain storm that should have no impact on system performance could result in excessive errors and poor performance due to the latent interference, rather than the rain itself.

In analog radio networks, interference was a primary contributor to network performance even in unfaded conditions. Any signal degradation had an immediate effect on the system. In digital systems, the equipment is far more robust, and much less sensitive to interference issues. It is usually only in a faded condition that interference is noticed. Many designers only consider threshold (T) to interference (I) conditions, as the analysis of the unfaded carrier (C) is not of concern.

Ironically, the robustness of digital systems has often resulted in worse-performing,



IN DIGITAL SYSTEMS, VERY HIGH LEVELS OF INTERFERENCE MAY BE PRESENT BUT UNTIL THE SYSTEM FADES THERE IS NO NOTICEABLE DEGRADATION IN LINK PERFORMANCE.

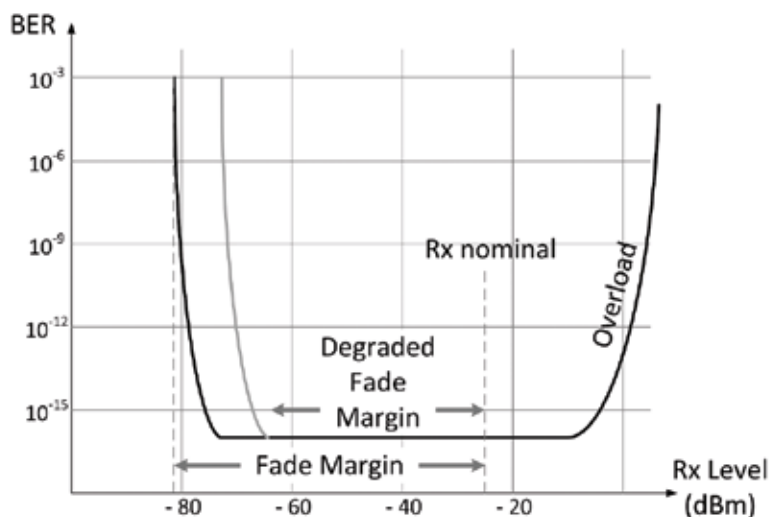


Figure 1. Threshold degradation

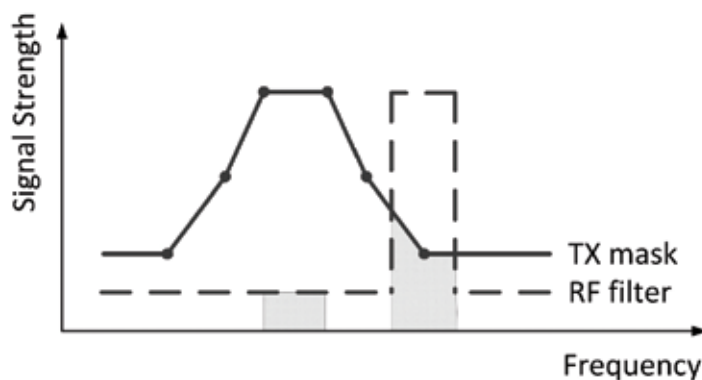


Figure 2. Net filter discrimination

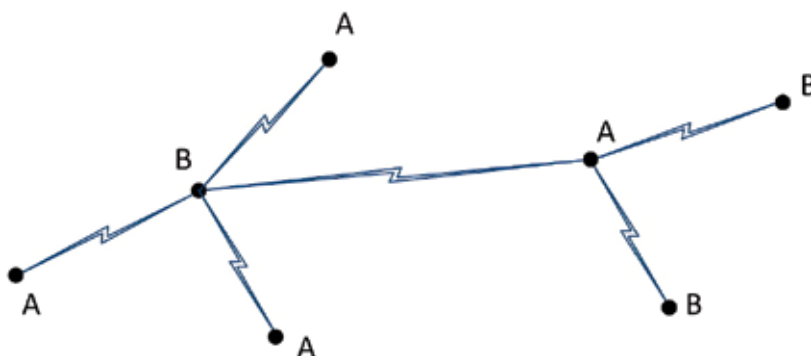


Figure 3. Site sense (bucking) planning

rather than better-performing networks. The reason for this is that with analog radio any performance issues were noticed at the time of commissioning in unfaded conditions. It was imperative to resolve them as everyone was aware there was an issue. In digital systems, very high levels of interference may be present but until the system fades there is no noticeable degradation in link performance, and so nothing is done to address the issue. Often, network operators are not even aware that they have this hidden performance issue.

The fundamental design issue is that the demodulator requires a minimum signal-to-noise ratio (SNR) to operate error free. This SNR value varies depending on the modulation scheme. With complex modulation schemes, the value may be very high, so even a very low-level unwanted signal may degrade the demodulator performance by adding to the noise floor. When the threshold is degraded, the link may not have an adequate effective fade margin (EFM), despite having a good flat fade margin (FFM). The degraded threshold is illustrated in Figure 1.

Spectrum allocation

The body that coordinates the international allocation of frequencies to ensure interference-free operation, is the International Telecommunications Union (ITU), an agency of the United Nations (UN). Frequency plans are created in the ITU-R F series, and any changes to global frequency allocations are decided at the World Radio Conference, which is held every three to four years.

It is up to the government of each country to appoint a frequency regulator who then uses the ITU standards to regulate spectrum use. Two ITU-approved plans may interfere with one another, which can create cross-border complications. It is also the reason that two plans cannot be used simultaneously within an individual country. It is the job of the regulator to pick one plan per frequency band, which all operators must use in that country.

Two main types of licensing exist: individual licences and general use licences.

With individual licensing, where spectrum is usually controlled and allocated by the country's telecoms regulator, the specific apparatus is registered and approved for a specific effective isotropic radiated power (EIRP) output at a specific location. Individual licensing is sometimes referred to as apparatus licensing. In apparatus licensing, each end of a radio link is registered, and detailed interference calculations are done to guarantee the link will be interference free. A fee is paid to the regulator for this privilege, but in return, if any interference does occur, the regulator is obliged to resolve such potential interference events.

With general use licensing the equipment apparatus is licence-exempt when deployed, and the regulations for use are covered under regulations for short-range devices. The equipment is licensed for the entire class of equipment, but an individual licence is not required for each deployment. Broad technical parameters of the equipment are defined, but the equipment may be deployed in any geographic location. In the case of licence-exempt equipment, the usage of the same spectrum by others is not controlled, leading to an interference risk, and it is the operator's responsibility to resolve it.

General or licence-exempt licensing is sometimes called unlicensed, although I prefer the term class licence, as used by some regulators, as even though the entire class of equipment is approved for generic use in any geography, the equipment is still licensed.

A new variant called light licensing refers to self-co-ordinating bands, such as E-band, where the user defines the channel to be used, and it is registered by the regulator. There is work being done for a more advanced approach to licensing in future, such as Dynamic Spectrum Allocation and Licensed Shared Access. Under this model,

spectrum would be freed up when it was not being used to increase spectrum efficiencies.

Frequency planning

Spectrum is extremely valuable as it is a scarce resource. Operators can pay hundreds of millions of dollars to secure spectrum and with the massive capacity demands from 4G and 5G cellular networks, more and more fixed microwave link bands are being repurposed for mobile use. Spectrum planning is thus essential.

When interference calculations are done, all analysis is assumed to be co-channel. The way adjacent channels are dealt with is to convert them to co-channel via their filter roll-off characteristics called the Net Filter Discrimination (NFD), as shown in Figure 2.

Hence:

$$C/I \text{ (co)} = C/I \text{ (adj)} + \text{NFD}$$

where

$C/I \text{ (co)}$ = Carrier-to-Interference ratio of the co-channel signal

$C/I \text{ (adj)}$ = Carrier-to-Interference ratio of the adjacent channel signal

NFD = Net Filter Discrimination

As discussed earlier, in digital systems it is the relative interference level between the faded carrier and the unwanted interferer

that is of interest. If the fading event affects the carrier equally to the interferer, then the interference is considered correlated, and the C/I is unaffected by fading, and so the fade margin can be ignored in the calculation.

There are three main interference considerations: bucking interference, nodal interference and overshoot interference.

Bucking interference, also called site sense interference, refers to the interference experienced by a receiver that is operating in the same portion of the frequency band as another transmitter at the local site. The rule is that all transmit signals at the entire site should be tuned to either the high or low end for a particular frequency band. Transmit low sites are called A-ends and transmit high sites are called B-ends, so site sense planning is also sometimes called A-B planning, as illustrated in Figure 3.

All transmitters at an A site transmit low, and so it is not possible for another operator to break through the antenna discrimination and duplexer isolation and cause interference. You may be forgiven for thinking that because you are on a different frequency channel in the band, and the interference is coming out the side of the unwanted transmit antenna into the side of the unwanted transmit antenna into the side of your receive antenna, it will

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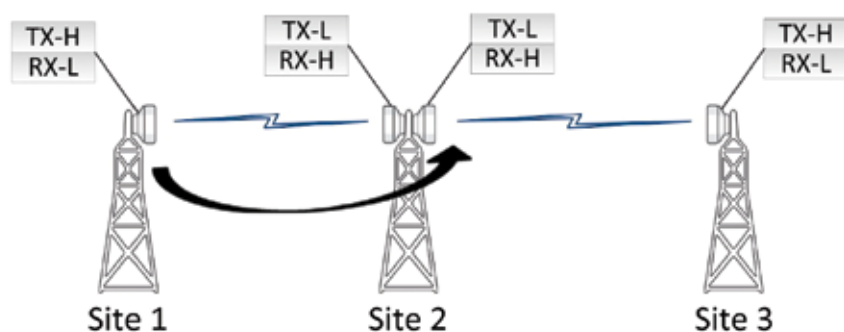


Figure 4. Nodal interference

not cause problems. The issue is the dynamic range involved when a transmit signal could be as high as 20–30 dBm, and a faded receive level could be as low as -90 dBm, which is over 100 dB dynamic range!

The only way to reduce the transmit signal down to an acceptable level is to use site sense planning and use the filtering inherent in the T-R spacing of the channel plan.

In the past, the spectrum regulator would specify the site sense, so it was not as essential for the operator to check this, but today in many frequency bands such as E-band, it is assumed that the operator is aware of this problem and has planned accordingly. Site sense is also something to be aware of in license-exempt bands as there is no guarantee that there are no high-low site conflicts.

Site sense is also critical with any ring topology as you cannot have an uneven number of links in a loop. Referring to Figure 3, it can be seen that the two sites on the right could not be connected with a microwave link in the same frequency band as you would be attempting to connect two B-ends creating a Hi-Lo clash. An additional site would have to be added so that an even number of links were used to complete the ring. Alternatively, a different frequency band could be used, if allowed, where a different site sense could be allocated to the new frequency band.

The second type of interference, nodal interference, occurs when we reuse the same frequency channel at a node. The practice of reusing channels as many times as possible before moving to a different channel is good frequency planning. Frequency channels are an expensive and scarce resource and so should be preserved as much as possible. By reusing channels in a planned manner, much greater spectrum efficiencies can be gained. Nodal interference occurs into the antenna of the adjacent link, at the same site, as shown in Figure 4.

Choosing a high-performance antenna with low side lobes, and excellent front-back (F/B) ratio enables a planner to reuse a channel multiple times at a node. Bands like E-band with their very small antenna apertures enable

a significant number of links to be packed into a node. Referring to an earlier discussion on pencil-thin beams, it is often this insight about the efficiency of frequency reuse at a node that makes planners erroneously think that they can, therefore, reuse the frequency at multiple sites.

In terms of nodal interference, changing polarisation only helps to reduce the interference when the interfering link is directed into the front half of the antenna. The cross-polar discrimination improvement can be determined by referencing the supplier's Radiation Pattern Envelope (RPE) diagrams.

The final type of interference covered here is overshoot interference. This type of interference occurs at the subsequent site in a radio route, where the receiver is tuned to the transmitter site two links away, as shown in Figure 5. For each site, the transmit high (TX-H), transmit low (TX-L), receive high (RX-H) or receive low (RX-L) are specified.

Despite the interferer being a long way away, distance itself has limited impact on the interference considerations. We have discussed how much discrimination is required between the wanted Carrier to unwanted Interferer signals, and it typically exceeds 40 or 50 dB. Distance helps indirectly through Earth bulge, and physical blocking of the line-of-sight, but the interfering signal from a 50 km hop is only reduced by 6 dB, 100 km away, and 12 dB, 200 km away from pure signal degradation.

Considering that most long hops over 30 km would have a fade margin in the order of 40 dB and that the minimum SNR would probably be around 30 dB, a reduction of 70 dB in signal strength would be required before the interference could be ignored.

Even at 13,000 km away, the signal would only have reduced by 50 dB, based on distance alone. This is why a microwave signal can happily reach a geostationary satellite 36,000 km away. It is also why more attention should be paid by planners to reduce the antenna height placement and rely on diffraction to protect against interference.

In this case, the interference is into the front of the antenna, and so alternating polarisation is a good strategy.

From the analysis above, it can be seen that an entire radio chain could be designed on a single frequency pair by using the following planning guide:

Channel 1 (H) – Channel 1 (H) – Channel 1 (V) – Channel 1 (V) – etc.

It should be noted that if polarisation alternation is already being exploited for network capacity reasons, for example in a Co-Channel Dual Polarisation (CCDP) mode, then it cannot be used again for interference reduction.

In conclusion, spectrum planning is critical to preserve scarce and valuable spectrum success as well as eliminating the hidden gremlin of interference in order to guarantee a well performing network.

This is an edited extract from Trevor Manning's book, Microwave Radio: Handy Reference Guide, which is available on Amazon.com. Manning runs an international business (TMC Global) that specialises in training and development of technical people who have transitioned into management, and is actively involved in microwave radio system design and planning through his advisory board position with Vertel. He has also presented microwave training workshops for ARCIA at Comms Connect conferences.

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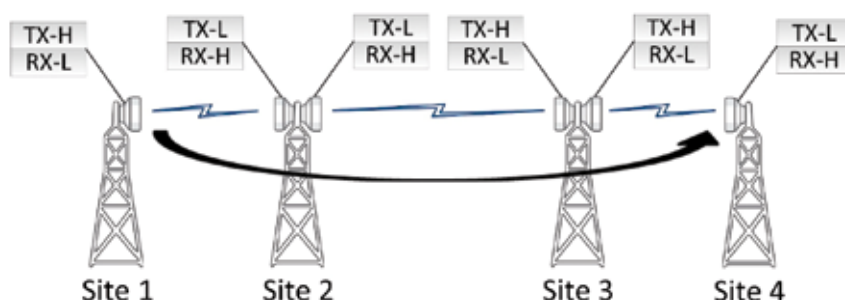


Figure 5. Overshoot interference

Mobile satellite service

Intelsat's FlexMove end-terminal managed service is designed to help users connect to the internet, private data networks and cloud services from almost anywhere in the world, including while on the move or stopped at a temporary site.

Suitable for first responders, defence and other organisations, the high-throughput satellite fleet and IntelsatOne ground network-powered service aims to be secure and always on. It is designed to work in remote and challenging locations and to transmit data 20 times faster than traditional mobile satellite services.

Services for communications-on-the-move applications use a flat-panel, vehicle-mounted satellite terminal that is designed to automatically acquire a connection and maintain communication while the vehicle is moving. Communications-on-the-pause services use a portable satellite terminal with automatic or assisted pointing functions to connect to a satellite. Users can access a network via public internet connection or private IP solution.

The services can be used on qualified terminals, available through the company's partners.

Intelsat Australia Pty Ltd
www.intelsat.com



Power system

The HELSYSN1540180R48 system is a compact and intelligent power system that can house up to three 1 kW rectifiers and one SC501 controller. The micro-compact design enables easy installation, and it is compatible with rectifiers of the same size. There are two levels of Low Voltage Disconnect protection, and MCBs or fuses as output components can be supported depending on customer requirements.

Other features include advanced batteries monitoring and management, ECO mode, intelligent fan-cooling and high power density. Applications include fibre-optic networks, access networks, satellite communication ground stations, transmission equipment, mobile communications, ESS and 5G base stations/micro base stations.

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LTE-M locator tag

The Cat-M1 Tag is designed to track items via Telstra's LTE-M network, Bluetooth and GPS, and is suitable for tracking electrical equipment, toolboxes, trailers and vehicles. Tag users can visualise an item's whereabouts, as well as its 30-day location history via the Telstra Locator app. The app enables users to set up zones and notifications so that when the tag is detected inside or outside a zone, an in-app notification can be sent advising that the tag — and associated item — has entered or left the zone.

The tag has IP67-rated water and dust resistance and shock tolerance and features an accelerometer, a multi-colour status LED, a buzzer and 1000 mAh rechargeable lithium-ion battery.

Telstra Strategic Marketing Group

www.telstraenterprise.com

Handheld PoC radio

The TooAir TA-682 3G/4G LTE (Band 28) handheld PoC radio uses the Telstra 3G and 4G/4GX LTE bands. Features include an icon-based menu, along with the ability for the radio to belong to a group and monitor multiple other groups in a fleet and also to select an individual radio or the dispatcher and perform a one-on-one private call outside the group.

The unit has a 4K/8K voice codec, up-graded amplifier and several user-enabled sound adjustments such as speaker and microphone settings, enhancing the overall volume and audio quality. Built-in memory automatically records voice transmissions that are broadcast or received by the TA-682 and stores them on the device; the recordings can be easily accessed and played back through the GUI.

The TA-682 is supplied standard with a 5000 mAh battery for extended talk time and a fast-charge, drop-in charging cradle.

Too Air Pty Ltd

www.tooair.com.au



Surge protection device

Novaris's DRJ45-8CAT6 surge protection device is designed to provide a low impedance path that reacts at a lower voltage than the equipment's insulation breakdown voltage.

It can be installed at both ends of a signal cable run to give surge currents a clear path to ground at both ends and allow the shield wire to act as a temporary equipotential bond.

It is available in industrial DIN rail, single and 19" rack formats.

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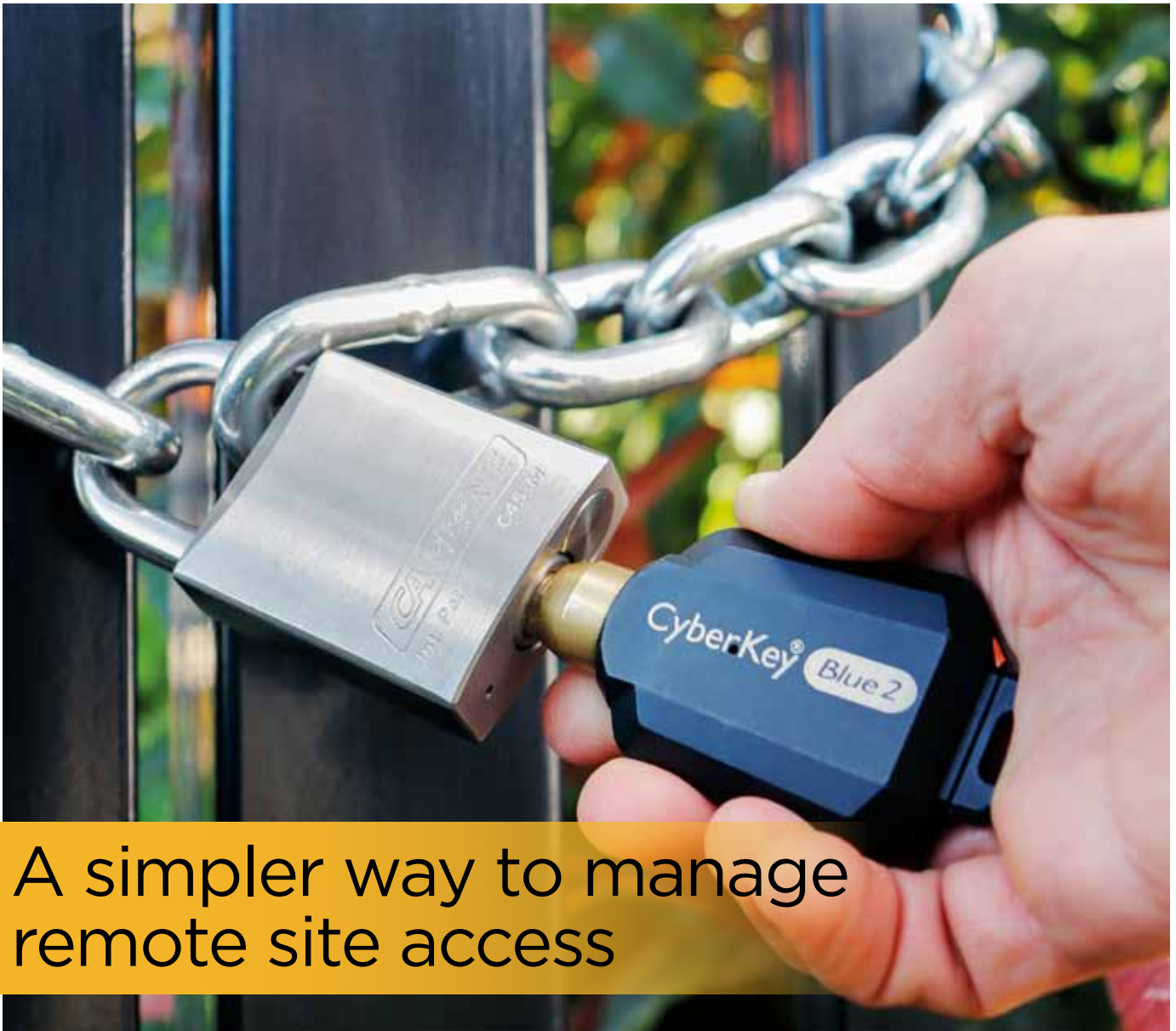
E-band radio

Cambium Networks' PTP 850E E-band radio is a high-capacity, outdoor Ethernet backhaul unit that operates over the 70–80 GHz band. It is designed to support 250, 500, 1000 and 2000 MHz channels with BPSK to 512 QAM and can deliver up to 10 Gbps capacity in 1+0 configuration.

The radio can also be used in multiband configuration with PTP 820C, PTP 820S or third-party microwave radios to provide links of up to 10 Gbps. Key features include: QSFP (40 GE) interface support, multiple SFP+ (10GE) interfaces and layer one link aggregation.

Cambium Networks Ltd

www.cambiumnetworks.com



A simpler way to manage remote site access

Many utility companies have remote sites geographically spread throughout Australia. Permanent staff and contractors require access to these sites. Permanent staff can be issued conventional keys as their compliance, safety and training is managed in house.

Contractors present many more challenges:

1. Are their insurance and trade licence current?
2. Have they completed site induction?
3. Are they qualified to access the site?
4. Do they have reason to be at that specific site?
5. Did they actually go to the site?
6. Are there lost keys and have they been returned?

One solution would be to hard wire the sites with conventional access control. This in itself presents implementation challenges such as getting data to the site, the cost to cable and the fact that many of these sites are secured by padlocks. This exact challenge has been presented to EKA

CyberLock on many occasions. EKA CyberLock is an electronic master key system where keys and cylinders are managed by a centralised administration software (CyberAudit-Web management software). The power is supplied by the CyberKey powering the locks, padlocks and cylinders in the field, meaning no batteries need replacing in the locks themselves.

Access rights are allocated to each individual user and uploaded to the CyberKeys, granting access that is customised to each user's requirements. Most importantly, lost keys can be deactivated, the access rights of rogue users can be removed and to keep things simple, users can update their CyberKeys on the fly with an app on their smartphone.

To further aid management and compliance there are two main functions.

1. When a user does update their CyberKey, a two-way communication is initiated so the CyberKey is not only updated, but an audit trail of where

they have used their CyberKey is relayed back to the CyberAudit-Web management software.

2. The CyberAudit-Web management software can be integrated with the compliance management software to ensure access is only granted to those contractors and staff who meet the company's access policies.

This exact solution is of interest to many EKA CyberLock customers and has been implemented by BAI Communications Australia, securing and controlling access to more than 395 sites that are scattered throughout Australia including many remote sites. To find out more about this application go to www.ekacyberlock.com.au or contact us on sales@ekacyberlock.com.au or 1300 722 311.



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FIGHTING FIRE WITH COMMS FIREPOWER

Jonathan Nally



The NSW Telco Authority found itself in the thick of battle during the recent bushfires.

During this summer's awful bushfires, firefighters — both volunteer and professional — along with numerous other emergency personnel, utilities crews, council employees and many others, have worked tirelessly over many months to tackle the crisis. And many of those personnel have worked almost continuously during that period.

Unseen in the background, others too have been working to provide and maintain essential services to those frontline crews and, by extension, the wider public.

That dedication is exemplified by the NSW Telco Authority, whose Network Operations team and Telecommunications Emergency Management Unit had provided 150 continuous days (as of early February)

of 24-hour emergency coordination of telecommunications support for the bushfire operations, including having liaison officers based at Rural Fire Service headquarters when required.

The support has been vital in assisting the NSW Rural Fire Service, Fire and Rescue NSW, NSW Ambulance, NSW Police and the State Emergency Service perform their roles.

The Authority is responsible for managing the Government Radio Network (GRN), the primary network for NSW government agencies and emergency services organisations that use mobile radio communications.

The GRN provides the essential link between headquarters and firefighters on the ground, in all corners of NSW, supporting everything from firefighting to air operations,

EMERGENCY

ambulance response and other emergency services tasking.

Almost 10 million calls were made across the GRN between 1 November 2019 and 1 February 2020.

"Next to Triple Zero, this is the most important emergency communications network in NSW," said the Authority's Managing Director, Kylie De Courteney.

The Authority has worked closely with agencies to protect radio communications towers throughout the crisis, some of which were damaged by the fires.

"Bushfires put a huge strain on our telecommunications infrastructure, limiting radio coverage and mobile phone coverage," said De Courteney.

"It was vital to get the Government Radio Network communications back up for fire-fighters so fleets on the ground and in the air can continue to coordinate operations, response and recovery," she said.

Where network infrastructure was damaged by the fires, the Authority rapidly deployed a series of 'cell on wheels' (COWs) portable base stations.

"After two Government Radio Network sites at Mt Wanderer and Batemans Bay were destroyed in the fires, we immediately deployed COWs to provide temporary radio communications at these sites, including working with the Australian Defence Force to airlift equipment from Coffs Harbour to Cooma," De Courteney said.

The Authority's bushfire support efforts also included restoring or expanded critical communications where existing infrastructure had been destroyed or where mains power supply was not available.

More than 20 portable generators were pressed into service to ensure electricity could be maintained where mains power had been affected, and many were put on standby for deployment into areas identified as being at risk from the fires.



The tower at Mt Wandera. Burnt cables can be seen running all the way up the tower.

As well as restoring communications, the Authority proactively put portable generators on standby, readied capacity expansion kits to manage radio congestion, and stationed four COWs at sites identified as being at risk of being affected by the fires.

New and enhanced sites brought on early

"More than 20 new and enhanced GRN sites being delivered under the Critical Communications Enhancement Program were fast-tracked and brought online early to support firefighting efforts," De Courteney said.

"The sites were made operational using temporary satellite infrastructure, to provide essential and enhanced radio communications coverage for emergency services."



ICS fixed cabinet with VSAT installed at Mt Budawang.

During the firefighting operations, more than 10 Optus Satellite Services very-small-aperture terminals (VSATs) were used in affected areas to supplement radio communications.

NSW Telco backhaul architects also designed a satellite solution and installed it into portable pelican-style cases. The system used Kymeta satellite panels, which — unlike a typical dish that must be physically aligned to a satellite — are electronically steered and enable rapid deployments.

The Authority also worked with carriers to fix damaged infrastructure to restore essential services such as internet access, mobile phone coverage and electricity for hospitals, businesses, volunteer organisations and other services.



The Mt Budawang repeater site was burned, so a COW was deployed to provide coverage. Then for a longer term solution, an ICS outdoor P25 cabinet was installed.



The CCEP site at Mt Ganghat on the NSW north coast. A satellite solution was installed to enhance communications.



A cell on wheels staged, ready for action.

Radio test sets

VIAVI has expanded the functionality of its 3920B Radio Test Platform and 8800SX Digital Radio Test Set with the release of automated test and alignment (Auto-Test) software applications to support Hytera DMR radios and repeaters.

The expanded functionality adds support for the Hytera DMR series Auto-Test applications for Hytera MD65x, MD8xx, PD5xx UHF3 and PD9xx series radios. In addition, the Hytera DMR Repeater Auto-Test application supports Hytera RD62x, RD96x and RD98x repeaters on both radio test sets.

VIAVI Solutions Inc

www.viavisolutions.com.au



Mixed-signal oscilloscope

Keysight's MSOX40224 mixed-signal oscilloscope is designed to offer next-generation performance, a 12" touch screen and an intuitive interface to provide results quickly. It is available to rent from Tech-Rentals. The unit gives users a high probability of capturing random and infrequent events and signal behaviour with its update rate of one million waveforms per second. It is designed to elevate users' debugging experience with MegaZoom IV smart memory technology, which is said to display more waveforms as well as to find the most difficult problems in the design. The mixed-signal oscilloscope further enables waveform analysis by integrating seven instruments in one: oscilloscope channels, logic channels, digital voltmeter (DVM), dual-channel WaveGen function/arbitrary waveform generator, frequency response analyser (Bode plots), 8-digit hardware counter and serial protocol analyser including USB.

Keysight Technologies Australia Pty Ltd

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Ventech Systems design and manufacture enclosures suited to outdoors for standalone installations.



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INNOVATION

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MILITARY SATELLITES SUPPORT BUSHFIRES COMMS

Jason Cutshaw (USASMDC)

A communications team based in Hawaii was tasked with enhancing satellite communications for Australian military personnel assisting with firefighting efforts.

US Army Space and Missile Defense Command soldiers and civilians have been supporting Australian firefighters defend lives and property during the summer bushfire crisis. Answering the call to assist in recovery, the Regional Satellite Communications Support Center-Pacific, or RSSC-PAC, has been providing planning support to Australian and New Zealand Defence forces for Operation Bushfire Assist.

Responsible for planning Wideband Global Satellite System, or WGS, satcom missions, RSSC-PAC supports all Australian and New Zealand Defence forces operating in the Pacific area of responsibility on a daily basis.

Originally planned as a five-satellite constellation, Australia agreed in 2007 to fund a sixth WGS satellite, giving it access to the whole constellation. The system has since been enlarged, with 10 satellites having been launched and an 11th funded.

During the bushfires, Australia made the first request by submitting an immediate Satellite Access Request, or SAR, to support units participating in the firefighting effort.

"In response to the wildfire crisis in Australia we ensured rapid response and quick turnaround of satellite resource requests ensuring that Australian military elements were able to communicate and coordinate response efforts on the ground," said Robert Driskell, Wideband Cell chief at RSSC-PAC supporting operations over Military Satellite Communications in the Indo-Pacific area of operation.

"We started to receive requests for satellite resources supporting this effort 5 January and our support is expected to last until early February.



An artist's impression of two generations of Wideband Global Satellite System satellites.

Courtesy USAF.

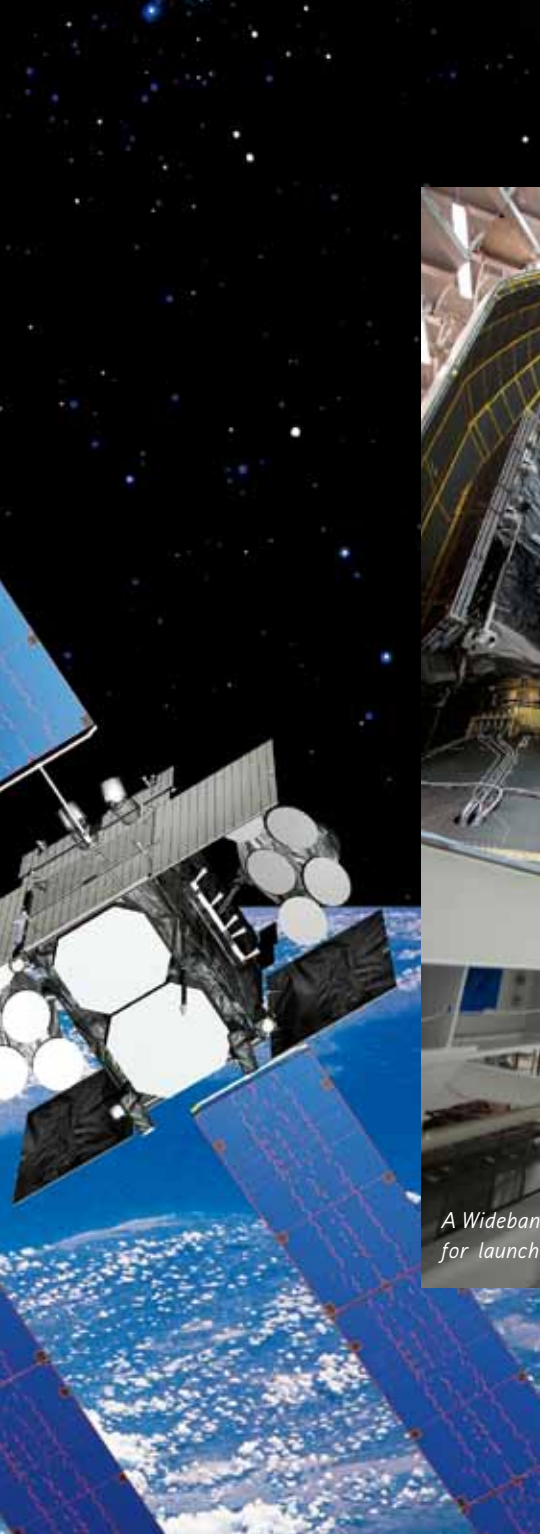
"All support efforts undertaken by RSSC-PAC have occurred remotely from our home station at Wheeler Army Airfield in Hawaii," Driskell added. "We do not have any members currently deployed supporting the effort. Americans can be proud of the support that their armed forces provide to humanitarian relief efforts, which are numerous and varied. These efforts toward international cooperation embody the American desire to use our immense resources to aid our allies and promote peaceful collaboration globally."

Driskell said RSSC-PAC supports Australian requests for satcom services over the WGS as part of a joint memorandum of understanding, or MOU, between the US and Australia. He added that the Australian Defence Force (ADF) is the single largest international partner

signatory for the WGS program. Driskell said two Australian Cooperative Program Partners are working alongside USASMDC civilians and soldiers to support international partner military requirements in the region.

"As a part of the MOU, RSSC-PAC's role is to respond to resource requests from partner nations including Australia and New Zealand," Driskell said.

"We received SATCOM requests from both the Australian and New Zealand Defence forces supporting missions in Australia aiding in bushfire response efforts. Once we received these requests for support we were able to allocate resources over the WGS Communication's Satellite constellation in less than 24 hours, ensuring rapid response for units on the ground.



A Wideband Global Satellite System satellite being prepared for launch. Courtesy USAF.



An antenna located at the Regional Satellite Communications Support Center-Pacific, or RSSC-PAC, in Hawaii. The US military unit is responsible for planning Wideband Global Satellite System satcom missions, including those for Australian and New Zealand defence forces operating in the Pacific.

US Army photo by Carrie Campbell.



WE RECEIVED SATCOM REQUESTS FROM BOTH THE AUSTRALIAN AND NEW ZEALAND DEFENCE FORCES SUPPORTING MISSIONS IN AUSTRALIA AIDING IN BUSHFIRE RESPONSE EFFORTS.

"To date we have planned 10 missions for both Australian and New Zealand Defence forces providing direct support to this effort."

The ADF established JTF 646, 1110 and 1111 to combat the bushfires, mobilising several thousand full-time and reserve personnel providing direct land, sea and air support.

"In response to the wildfire crisis in Australia we ensured rapid response and quick turnaround of satellite resource requests ensuring that Australian military elements were able to communicate and coordinate response efforts on the ground and at sea," said Oliver Uson, a wideband planner.

"We have received multiple satellite access requests over the last couple weeks.

As soon as we got the satellite access request from the Australians we started the planning process with a 24-hour or less turnaround."

In addition to Army support, firefighters from the US Department of the Interior were deployed to Australia to help combat the fires as well as other firefighters from different parts of the US.

"The country is in a state of emergency and there are a lot of people, fauna and flora in need of assistance," said Staff Sgt Felix Loperena, a wideband planner at RSSC-PAC. "Our support for those helping control the situation will not stop until they have completed their task.

"In the end, we are all one world and we should support each other. No matter what

type of assistance you are to provide, in a situation as crucial and damaging as the bushfires, every little help and those who lend the helping hand should be proud for it.

"I work directly with Australian personnel that are stationed here in Hawaii," he added. "They still have family and friends residing in Australia. For some, the support that is being offered is not just a sense of duty and work obligation, but also a personal connection to those who we work with, for their friends and family.

"The mission is not just to help the fires to stop, but to let Australians know that we care and that we are here for them in times of need."

This is an edited version of a US Army article, republished with permission.



IIoT communication server

The UA-2241M is an Industrial IoT communication server developed by ICP DAS. The built-in OPC UA Server, MQTT broker and Client functions meet the requirements of connecting with MES, ERP and SCADA.

The UA series can access I/O modules and controllers in the field via communication interface such as Ethernet, RS-232 and RS-485 or through protocols like Modbus TCP/RTU/ASCII, MQTT and EtherNet/IP. It can connect IT to OT and integrate all devices information into the cloud. This should allow managers to improve production performance and enhance their factory competitiveness for Industrial IoT.

Compared with the UA-52xx series, UA-2241M has one more Ethernet port and one more USB 2.0 (Host) communication interface. In addition, both RS-485 ports feature isolation protection to put users at ease.

ICP Electronics Australia Pty Ltd

www.icp-australia.com.au

RF signal generators

Aim-TTI has released the TGR2050 series of next-generation radio frequency (RF) signal generators, featuring a small footprint and lightweight design that should benefit electronic design and test engineers. The TGR2051 and TGR2053 RF signal generators provide good performance with high signal purity, high-frequency accuracy and stability, a large signal amplitude range, output power levels of -127 to +13 dBm, low phase noise, and fast amplitude and/or frequency sweeps. Extensive and flexible analog and digital modulation capabilities make the signal generators suitable for research and development, test and service work. A sweep function enables signals of varying frequency and/or amplitude to test a full range of input conditions quickly and efficiently. Sweeps can be set to run in either direction, with linear or logarithmic spacing. Alternatively, list mode (accessible within the instrument or from remote interfaces) can be used to analyse the response at set frequencies and amplitude.

A TGR-U01 option adds an extensive range of digital modulations: FSK, GFSK, MSK, GMSK, HMSK, 3FSK, 4FSK, PSK, ASK and OOK. Built-in NRZ patterns include Square wave, 7, 9, 11 and 15-bit PRBS. Digital modulation capabilities also include advanced filtering. External digital modulation signals can be applied to the carrier waveform via the MOD in/out on the rear panel. Both models offer good functionality with intuitive touch screen operation. Advanced remote-control connectivity accommodates sophisticated automated systems and compatibility with Aim-TTI's previous RF instruments, ensuring simple integration with existing systems.

element14

au.element14.com



Yagi antennas

RFI's YB6 and YB9 low passive intermodulation (PIM) series yagi antennas are designed for highly directional, point-to-point communications across RF control and short- or long-haul link applications in the 330–600 MHz band.

They can provide narrow beam widths and high front-to-back ratios to minimise interference to and from other systems.

The antennas' low PIM characteristics make them suitable for digital communication and allow them to help lower the noise floor, improve performance and increase sensitivity. This means they can be used with TETRA and DMR technologies in tunnels or in other areas where directional digital coverage is required, including in diversity systems.

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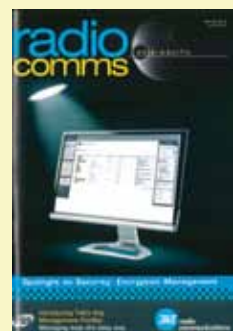
Backhaul

Take a trip down memory lane as we look at what was happening in the comms sector of yesteryear.

25 YEARS AGO. The cover of the April/May 1995 issue of *What's New in Radio Communications* featured the Transcom Communications Systems MD 3000 mobile data terminal, which had a four-line, 40-character, backlit LCD display and backlit QWERTY keyboard plus eight function keys. Inside the magazine we reported on the then Spectrum Management Agency (now ACMA) replacing 124 different licence categories with a simpler arrangement of 19 licence types. We also reported on Communication Site Rentals, in conjunction with Tait Electronics, forming a joint venture and launching a wide-area trunked radio network called Biscom, providing continuous VHF coverage from Wollongong to Newcastle, NSW. In addition, Impulse Engineering began offering two advanced training courses in RF and microwave technology, and Standards Australia published the AS/NZS standard for 406 MHz satellite locator beacons. And Paul Ostergaard of Stanilite Electronics contributed a feature article entitled 'How will the market come to grips with trunked radio?', opining that it was unlikely the advent of digital systems would stimulate a major replacement boom for existing MPT 1327 users.



10 YEARS AGO. The cover of the March/April 2010 issue of *Radio Comms Asia-Pacific* featured Tait's Key Management Facility, an encryption management system for P25 users. Inside, we reported on the ACMA reviewing



regulation of mobile phone jammers, C4i commissioning the first of 20 Switchplus systems for the Aviation Rescue & Fire Fighting branch of Airservices Australia, and Telstra upgrading its Fleetcoms MPT 1327 trunked radio network using Tait equipment. John Swanstrom, Say Phommakesone and Jim Puri of (then) Agilent Technologies described ways in which to reduce test times for antenna and RCS applications. And Paul Isaacs of Airwave Solutions Australia sang the praises of the UK's TETRA network, saying that "The experience gained and lessons learned by Airwave in Britain could facilitate the timely and efficient development of quality public safety communication ... in Australia".

Spectrum

The evolving synergy of comms and dispatch solutions

Dispatch solutions have evolved considerably since the early days of desk clutter, when control room operators relied on a range of technologies such as radios, telephones, pagers and intercom systems to do their job. In the days of hardware-driven manufacturing, console vendors came up with button-based consoles which essentially today have been largely replaced by fully integrated intelligent software consoles. Running on commercial off-the-shelf servers and Ethernet switches, they are deployed on secure IP networks and are fully capable of intelligently aggregating disparate voice and data platforms.



So what does this evolution mean for control room managers looking to ensure that core operations run efficiently at all times?

To answer this, let's start by taking a look at global and local trends. As national public safety mobile broadband (PSMB) networks roll out in the US, Korea and UK — with others such as Australia and New Zealand in the planning stages — there are valuable lessons being learned. Dedicated PSMB networks provide higher availability data and enable better group situational awareness using image and video sharing, location tracking, secure messaging and so on. There are plans also to provide mission-critical voice on these systems, but as yet there has been no widescale rollout of open standards-based, mission-critical PTT solutions.

Additionally, in the US the FCC is receiving requests for FirstNet to be interoperable with LMR and commercial LTE networks. But officials representing the FirstNet Authority and its contractor are pushing back, questioning whether the FCC has jurisdiction in the matter. Further, it typically takes three years from 3GPP standard release to commercial availability, which is giving rise to PTT-over-cellular that is generally unproven as mission-critical voice technology in public safety scenarios.

There are other issues. For example, many mission-critical services' (mission-critical PTT, data and video, collectively known as MCX) capabilities were optimised for multicast networks but currently only FirstNet's Band 14 (part of the 700 MHz spectrum licensed for the network) core will be multicast in the US. Additionally, lack of proximity services chipsets from more than one vendor currently affects direct-mode communication.

While many of these challenges will likely be addressed in due course, it is evident that PSMB is not a 'one size fits all' situation. In a vast country such as ours, supplementary coverage will be needed and interoperability will be key to ensuring operation in a hybrid environment. Our ongoing experience with the bushfire disasters has forcefully driven this point home. But feedback received from some of Zetron's customers has only strengthened my opinion that fully interoperable and always available integrated dispatch systems will continue to be of key importance. As control rooms gradually become broadband hubs and distillers of data (including from IoT and social media), voice and LMR will remain relevant in the near future.

For those looking at transition, listen to your end users to clearly identify core requirements and choose to partner with vendors truly embracing open standards-based solutions to not only increase your buying options and interoperability, but also decrease your total cost of ownership.

Finally, the rollout of a coordinated Australian PSMB and NG000 strategy will ensure delivery of robust, synergistic, long-term solutions for public safety officials servicing the needs of their local communities. I'm honestly looking forward to the future, and I have no doubt the best is yet to come.

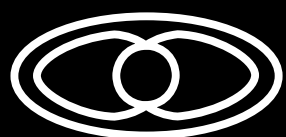


Ranjan Bhagat is Vice President and General Manager at Zetron Australasia. He has more than 20 years' senior executive experience in the mission-critical communications industry focused on providing wireless communications, mobile broadband and secure information technology solutions.

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