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www.criticalcomms.com.au/magazine

ON THE COVER



DAMM Cellular Systems A/S has released a solution for users who need to enable GPS-triggered SDS messages or DGNA. The DAMM TetraFlex® Dispatcher includes a geofencing option that can be used to trigger SDS messages or dynamic group attachment based on the whereabouts of subscribers.

The SDS function is typically used to warn subscribers if they enter, for example, a mining blast zone, or to simply forward a request upon entering or leaving a defined area. It can also be used to trigger alerts to the Dispatcher, eg, to alert a supervisor when a subscriber enters or leaves a designated area.

The DGNA trigger function makes it possible to ensure that subscribers entering a specific work area communicate on the same group by forcing terminals onto a designated dynamic talk group upon entering the area. The function also enables quick set up of emergency communication, for instance in case of an accident, making the Dispatcher a versatile application.

Geofences are created by simply drawing the desired geofence on the map as circles, rectangles or polygons of up to eight points. The individual geofences can be colour-coded for ease of reference and can be enabled or disabled from a panel beside the map.

When used on a DAMM MultiTech Platform, the Dispatcher enables communication across TETRA, DMR and Analog technologies, eliminating the need for multiple dispatching applications for multiple technologies.

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There is a growing sense of frustration within Australia's critical communications sector, at the apparent lack of progress on providing a public safety mobile broadband capability (PSMB) for the nation's emergency services agencies and other potential users. Witness the number of authors who, unbidden, have submitted opinion pieces on this matter for publication

in this issue of **Critical Comms**... prompted by the summer bushfires and the completely unnecessary restrictions placed on first responders through lack of PSMB. Unnecessary, that is, because the communications sector has been calling for such a capability for around a decade, if not more — we could have had it by now. During that decade there have been several government investigations, all calling for better national communications infrastructure for the emergency services. Yet despite assurances we have all heard that 'Australia has caught up' with the rest of the world, not much progress seems to have been achieved.

As this issue was going to press, the wide-ranging Royal Commission into National Natural Disaster Arrangements was about to spend a day focusing on matters such as communications. Geoff Spring from the University of Melbourne Centre for Disaster Management and Public Safety had been personally invited to speak to the Commission, following publication of the joint submission (with ARCIA, ACCF, ACRNA and INCOSE) of which he was lead author. (It's available from the ARCIA website.) Let's hope they listened to what he had to tell them (see his article in this issue), as it is obvious that first responders and the public should not have to wait any longer to be supported by a fit-for-purpose, 21st-century broadband voice and data network. Everyone's safety and wellbeing depends upon it.

Jonathan Nally, Editor
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August

IWCE 2020
24–28 August
Online
iwceexpo.com

October

2nd Digital Mines 2020
12–14 October
Pan Pacific Perth
claridenglobal.com/conference/digitalmines

November

Comms Connect Melbourne 2020
17–19 November
MCEC, Melbourne
melbourne.comms-connect.com.au

May 2021

Comms Connect New Zealand 2021
May TBA
Venue TBA
comms-connect.co.nz

June 2021

Critical Communications World 2021
8–10 June 2021
IFEMA, Madrid
critical-communications-world.com

August 2021

AFAC21
17–20 August 2021
ICC Sydney
afaconference.com.au

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



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

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COMMUNICATIONS COMPLACENCY IN THE 'NEW NORMAL'

*Ian Miller**



Australia's public safety communications need to be treated as a single ecosystem, with full spectrum allocations and proper funding.

Australia is going through a time of significant change, brought on by the natural disasters of the past summer and the health crisis that has changed our world. The disruption is expected to remain significant for quite some time. On a personal level and as the Executive Officer for ARCIA, I can see some of the changes on multiple levels. However, when I look at the projections of what will supposedly come from the Royal Commission into National Natural Disaster Arrangements, I do have serious concerns.

Although much of the discussion has been around the extent of natural disaster preparation our agencies conduct each year, the overall impact has been that there has been too little done and it has been done too late. One cannot help but wonder what effects successive governments (both Commonwealth and state) have had with their continued press for 'productivity gains' being the underlying formula for wage increases. After all, 'productivity gain' is just another term for doing the same amount of work with fewer resources — how often can you continue to squeeze the lemon and expect to get more juice?

The end result of continual demands for productivity gains will mean that work is not completed properly. This is true across our forest management and public safety agencies, as well as within government agencies in general, including the ACMA.

From an ARCIA perspective, we worked with the University of Melbourne Centre for Disaster Management and Public Safety (CDMPS), the Australian Critical Communications Forum (ACCF) and the International Centre on Systems Engineering (INCOSE) on a detailed joint submission to the Royal Commission. Geoff Spring, ARCIA Projects Manager and Senior Adviser to CDMPS, was the lead author for the submission. He pointed out that multiple recommendations have been presented over recent years to parliamentary enquiries, ACMA discussion papers and other forums, highlighting the need for emergency communications to be considered as one complete ecosystem.

Geoff has been invited to present to the Royal Commission, so the submission may yet get serious consideration. When you read the submission you suddenly realise that many of the communications issues that are evident today have been discussed at length over many years.

In some cases, important recommendations from Commonwealth parliamentary committees have never even been considered due to disruption from frequent political upheavals.

Information presented to the Royal Commission has highlighted the issues that arise with cross-border cooperation — agencies use different radio equipment or frequencies on either side of the border, so working together under disaster conditions can be dangerous.

If we look back to the 9/11 tragedies in the US, they had similar interoperability problems. Introducing a national mobile broadband network was how they planned to overcome those issues, and so out of that disaster FirstNet was created — a mobile data system that is now operating across the nation. A very large number of individual public safety agencies are using it and gaining the dual benefits of better interoperability and increased efficiency through mobile data use. Maybe the Royal Commission can, to some extent, help send Australia along the same path as FirstNet — we certainly need some national leadership and direction to make it happen.

Learning from experience

Back around 2013, ARCIA was invited to attend some of the early meetings



WHEN I LOOK AT THE PROJECTIONS OF WHAT WILL SUPPOSEDLY COME FROM THE ROYAL COMMISSION INTO NATIONAL NATURAL DISASTER ARRANGEMENTS, I DO HAVE SERIOUS CONCERNS.

for discussions on setting up a public safety mobile broadband (PSMB) system for Australia. Present at those meetings were representatives from all states and territories, as well as representatives from the ACMA and Commonwealth agencies. That was a significant year — as well as having meetings to discuss their needs, the ACMA had surveyed the public safety agencies across all jurisdictions prior to that time to seek information on how they projected they would utilise mobile data, along with estimates of how much data traffic there might be.

In the seven years since then, I do not think that there have been any further surveys done on the amount of data that might be involved. But anecdotal indications from the USA indicate that agencies who first signed up to use FirstNet are now seeing data use significantly higher than expected, and they signed up within the past two years — so imagine the changes since 2013. More on that shortly.

Since 2013, ARCIA has been an active contributor to the information pool for the

PSMB working groups, and we believe very strongly that having international input and advice is essential. In 2017 the ARCIA committee was invited to send a representative to the inaugural FirstNet International Forum in Washington, DC. ARCIA was, in fact, the only non-government organisation initially invited to attend.

The decision was made to send a representative to the forum at the Association's expense, and I was fortunate enough to be selected. To achieve better outcomes, we were able to encourage some Australian Government staff to also attend, and the forum was an eye-opener for us all.

Since then Comms Connect and ARCIA have combined to foster international input from jurisdictions including the USA, Canada, South Korea, Finland, the United Kingdom and the European Commission. We believe that only by adopting recognised standards — or, where required, working with international bodies to help create public safety standards — can Australia get the real benefits of an integrated public safety ecosystem.

In conjunction with Comms Connect, ARCIA has worked to bring international speakers to the conferences in Melbourne and Sydney each year, to incorporate as much knowledge and international experience into the local discussions as possible. The Comms Connect organisers are to be commended for the efforts (and expense) involved in doing this on multiple occasions. We can only assume these efforts are having some effect on the discussions led by the local working groups — very little information is made available to industry in general, and we suspect that the information flow to our frontline first responders is probably also as scant.

Of course, there has been progress on the PSMB front — we just don't hear a lot about it. We have to have faith in those involved, even though we may be disappointed at the lack of feedback on our efforts.

Following on from the Productivity Commission enquiry in 2014, the recommendation was that the proposed PSMB system be operated over the top of the public carriers' mobile data networks — a reasonable suggestion given the size of our country and our sparse population. It should be kept in mind, though, that the





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THE COMMONWEALTH IS PUTTING THE FUTURE NEEDS OF OUR PUBLIC SAFETY AGENCIES BEHIND THE NEED TO GENERATE FUNDS FOR THE COMMONWEALTH TREASURY.

expected utilisation of the system was based on the ACMA data traffic forecast, already over two years old at that stage.

Spectrum problems

There are a couple of things about the whole PSMB process that are of concern. The first is that the process has, to a large extent, been run on a part-time basis — there has not been a dedicated team of personnel whose primary role is implementation of the planning and who can drive the process. This is almost shades of the ‘productivity gains’ concept again; trying to get more done without more resources.

The second concern is that back in late 2018, the NSW Telco Authority released a request for proposal (RFP) for a pilot system for PSMB evaluation. To date there has still been no public release of the results of that RFP, and more than 18 months later nothing seems to have happened — ‘secret bureaucrats’ business’ maybe?

As well as the recommendation from the Productivity Commission, the ACMA as part of its spectrum planning role had decided that the data survey done on the projected usage of mobile data would reflect a need for an allocation of only 3 MHz of spectrum for PSMB operation. However, they decided to set aside 5 MHz (in dual-mode format of 2 x 5 MHz segments) in the 800 MHz band. That allocation still exists in theory today, and is part of the 850 MHz band that is presently being reviewed prior to allocation by auction to the public carriers (supposedly later this year). Whenever the PSMB working group (which represents all public safety agencies around our nation) has suggested to the Commonwealth that it would perhaps be wise to reserve a full LTE segment of 2 x 10 MHz of spectrum

to cater for future usage, the response has been along the lines of ‘only if you are prepared to pay for it’.

Yes, you read that correctly. At a time when we are having a Royal Commission into what needs to be done to try to ensure that we don’t have any repeats of the disasters of this past year, the Commonwealth is putting the future needs of our public safety agencies behind the need to generate funds for the Commonwealth Treasury.

This is being done with little or no consideration of the changes in operating format or advances in technology that have occurred since 2013. Has there been any realistic recent review of the projected demand or usage of mobile data by our public safety agencies? Have the Commonwealth or the PSMB working group sought updated information from any of the many organisations now using FirstNet in the USA to validate future planning?

Protecting the ecosystem

Since 2013, ARCIA has been working to help develop the best possible PSMB service for Australia ... which has been our only reason for being involved to such an extent. When we talk with our international contacts, the general consensus is that having industry involved in the information loop has been an advantage; with FirstNet it was a very public process and conducted very much in the public domain. Yet for the past couple of years we have found that the information supply with governments in Australia has been a one-way street.

Alas, our various governments seem to think that by talking to industry they might give someone an advantage over others in the supply chain — they hide behind ‘probioty’ claims — and the process is basically being done in secret. Yet maybe the recent issues we have seen with politicians in

several layers of government might be an indication that having processes open to public scrutiny, and seeking information from every source, might be a better way to go about things?

As an association, and also as individual citizens of our lucky country, ARCIA hopes and expects that the findings of the Royal Commission will begin to address the existing shortcomings of the communications ecosystem — even to recognise that it is actually an ecosystem would be a start. We would then also sincerely hope that the Commonwealth would take a serious look at what the future might be for public safety communications in Australia and reserve a proper segment of spectrum for public safety use ... and that should be at least 2 x 10 MHz segments.

Our children, and the young adults of today, will expect our future public safety agencies and first responders to have equipment and facilities at least in line with what the general public uses every day. To do that they will need spectrum. If it isn’t reserved or allocated now it will be gone for at least 15 years, or probably more.

In summary, we expect — no, we actually need — to have our public safety communications (including two-way radio, mobile data, the Triple Zero service and the Internet of Life Saving Things) treated as a single ecosystem. And we also need as a matter of priority for the Commonwealth to reserve suitable spectrum for PSMB, at no cost to the user agencies.

If we don’t do these things now will we still be talking about them in another seven years, and possibly after many more lives are lost than has already happened this past summer? As the Nike catchphrase goes, let’s just do it.

**Ian Miller is Executive Officer of the Australian Radio Communications Industry Association.*



HUGE DYNAMIC SPECTRUM REFORMING PROJECT

Nokia and Vodafone Idea have completed the first phase of what they claim is the world's largest deployment of dynamic spectrum reforming (DSR), in India. The companies also say they have deployed the country's biggest massive multiple-input, multiple-output (mMIMO) installation. Nokia's solution includes its AirScale BaseBand module, which enables service providers to dynamically share spectrum across different technologies and to automatically change spectrum allocation in line with evolving spectrum usage. As part of the Single Radio Access Network (SRAN) contract, Nokia has also deployed more than 5500 TD-LTE mMIMO cells in the 2.5 GHz spectrum band in service areas in India.

More info: bit.ly/3ev3fdO



AUSTRALIA RANKS 12TH FOR 5G DEPLOYMENT

Australia has ranked 12th in the world for 5G technology deployment, behind global leaders South Korea, Kuwait and Switzerland, according to new research by OMDIA. The 5G Market Progress Assessment analysed 22 countries on their 5G operator launches, network coverage and subscriber take-up. Additionally, it looked at 5G spectrum availability and the regulatory ecosystem. OMDIA Principal Analyst Stephen Myers said uptake of the technology was influenced by a number of factors, but that the onus was now on operators to scale up 5G coverage across the country. "Limited coverage, device availability and cautious launches has limited take-up in other global markets," he said.

More info: bit.ly/2CHjZAN

Wireless I/O modules

The Acromag VWB2000 signal wire replacement system is a point-to-point wireless signal bridge that takes analog, discrete or Modbus signals at one location and reproduces them at a second location. The system comes in a rugged NEMA 4X/IP68 industrial housing and comprises two pre-paired transmitter/receiver units that have a range of 1.6 km outside or 152.4 m indoors in industrial environments. This range can be extended using wireless repeater units or high-gain directional antennas. An LCD display provides signal strength and other diagnostic information.



Each unit has one analog I/O channel, four discrete I/O and Modbus communications that are field-configurable in minutes using the push-button controls. Free Windows-compatible software simplifies configuration on a PC via USB and enables advanced features such as encryption and analog signal calibration. The weather-tight enclosure is cast aluminium with a glass window and a corrosion-resistant powder coating for field mounting. Units can mount directly to a supporting conduit or securely to pipes and walls.

Each unit has both inputs and outputs for bidirectional communication. Analog inputs accept 4–20 mA, 0–5 V, 0–10 V or 1–5 V signals. Analog output is 4–20 mA. Digital I/O channels support 0–5 V TTL logic levels. Modbus RTU serial communication is EIA-485 compatible.

Metromatics Pty Ltd

www.metromatics.com.au

Multi-mode rail communications

Teltronic has released the RTP-800, which integrates TETRA, LTE and Wi-Fi in a single rack for voice- and data-critical communications for rail systems.

The onboard equipment is configured as a single, standardised hardware platform that supports multiple configurations: TETRA (voice and data), TETRA (voice) + LTE (data), or LTE (MCPTT and VoIP services for voice and broadband data services).

The RTP-800's hardware can be fully dedicated to broadband communications, with an interface that enables transmission of data without interfering with mission-critical functionalities. It provides massive transmission of data for railway signalling applications and onboard video services, among others, while all voice services work correctly without any downtime.

The RTP-800 has Ethernet, serial ports and Wi-Fi, as well as a digital audio switching matrix that facilitates integration with train audio subsystems, such as intercom and public address systems. In addition, it comes standard with interfaces for connection to other subsystems, such as the Train Control Management System (TCMS), and its TETRA and LTE technologies have been validated to transmit ETCS (European Train Control System), CBTC (Communications-Based Train Control) and PTC (Positive Train Control).

The terminal has been designed to comply with the European FRMCS standard (Future Railway Mobile Communication System), which is being defined by the International Union of Railways to be used by high-speed trains. It is certified with the EN50155 (electronic equipment used on rolling stock for railway applications) and EN45545 (protection against fire incidents in railways) regulations. It also complies with the European cybersecurity standard for industrial environments EN62443.

Teltronic SA Unipersonal

www.teltronic.es





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AURIA WIRELESS TO SUPPLY P25 FOR MINE

Auria Wireless, a subsidiary of Etherstack, has entered a contract with Perth-based system integrator CSE Crosscom to provide Auria's P25 digital radio network technology for a CSE Crosscom mining company customer with activities in the Pilbara region of Western Australia. The delivery is the first stage of a multistage project to provide critical voice communications technology and equipment for the mining company. The initial contract is valued at \$400,000 and is expected to be delivered before 30 June 2020. "This is an important win for Etherstack as it is the first significant deployment of our technology into a major resources project in Western Australia," said Etherstack CEO David Deacon.

More info: bit.ly/2BajDSH



PSCR TO HOLD ONLINE CONFERENCE IN JULY

NIST's Public Safety Communications Research (PSCR) division holds an important annual conference covering the latest in communications technology and research. With the present COVID-19 situation, though, the face-to-face conference cannot go ahead. Instead, it has been replaced this year by PSCR 2020: The Digital Experience, a free online event beginning on 27 July. The event is aimed at public safety practitioners who need visibility into, and a say in, how their communications devices are developed. The online conference will give attendees the chance to learn about the latest in US federal research aimed at advancing first responder communications technologies.

More info: bit.ly/3fYpiKu

Industry Talking

This year is proving to be a challenging one to say the least. Global events have been moving quickly and most of the international news is awful. Yet as difficult as 2020 has been, we are very lucky to be living in a country that is relatively safe. At the time of writing Australia is slowly coming out of lockdown. While we know the long-term economic damage done by COVID-19 will be felt for years to come, there is hope that our lucky country will find new ways to recover, grow and deal with our 21st-century issues.

For the LMR industry, there have been many businesses badly affected in the events and hire sectors as the market flatlined. For others involved in mining or essential services, work has still been there, so the effects across our industry are varied. We hope that as the economy is unlocked and events start to pick up that hire firms can get moving again.

ARCIA has represented our industry by writing to the AMCA and the federal communications minister for action on licence fees during the pandemic. I am pleased to report that we have heard from some members who have sought ACMA licence fee relief, or at least deferral, and that the AMCA has responded well.

The national response to the pandemic has been exceptional for many reasons. We all watched our state and national governments actually come together, listen to science and act in the national interest. It looks like there may be long-term benefit in the national cabinet structure.

Which brings me to the national public safety communications debate. After the huge bushfires and the subsequent enquiries that are taking place, there are once again many calls for better communications during disasters. ARCIA has made a joint submission the Royal Commission and I would like to particularly thank Geoff Spring, an ARCIA member and Advisor for the Centre for Disaster Management & Public Safety. Geoff's dedication to this debate, over a number of years, is outstanding. This is a complicated area characterised by seemingly many technical obstacles and years of discussions by government.

However, I would argue this is not a technical problem. ARCIA and our associated partners simply ask state and federal governments to treat all public safety communications as a critical ecosystem. Australia needs government leadership to provide a governance and funding framework that enables public safety agencies to get on with the job. If government seeks shovel-ready projects that provide a public benefit, then investing in next-generation Triple Zero, public safety mobile broadband and LMR systems fits the bill.

ARCIA's Executive Officer, Ian Miller, has also penned an opinion piece hopefully prompting the federal government to use the Royal Commission findings to activate our public safety mobile broadband system, in much the same way that the 9/11 tragedy in the USA gave the impetus for FirstNet. It would be great to see a really significant and beneficial outcome from the disasters of this past summer.

In other areas, we have been active in continuing to lobby the ACMA for spectrum for private LTE systems. This is a topic being mentioned more and more over the past year and hardly an issue of *Critical Comms* passes without some mention of private LTE. This is a technology and an application that will be of real benefit to our existing communications users and we will need spectrum to continue to improve efficiency for our clients and Australia in general.

While all ARCIA events are currently on hold, we are hopeful that in November our annual gala dinner can still take place. It is important that the ARCIA and RFUENZ annual dinners take place with the Comms Connect Melbourne and Comms Connect New Zealand events, respectively, so that both associations can help bring our industry together. ARCIA is watching the situation closely and we will report as soon as practicable.



Hamish Duff, President
Australian Radio Communications
Industry Association



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WORKER SAFETY NEAR RADIO TRANSMITTERS

Tony Paul



An understanding of RF hazards and associated safe work practices is essential for anyone who works on or near radio transmitters.

The radio connections upon which we rely for safety and security, business and personal communications and entertainment, are most effectively delivered to devices from a significant height above the surrounding area. This means that towers and rooftops, power poles and other existing buildings and structures are the best locations for transmitters and antennas.

Radio waves used to carry digital information to and from a mobile device do so at low power levels that improve the efficiency of data transmission by reducing radio interference. Transmitters are located in the environment to provide the required communications to a specific coverage area. As a result, workers in many occupations may encounter radio transmission antennas in their work at heights, either at a transmitter site or adjacent to it, including:

- Building maintenance — window cleaning, signage, rigging
- Mechanical maintenance — heating, ventilation and air-conditioning systems
- Construction work — cranes, scaffolding and rigging
- Tree maintenance
- Energy network maintenance — eg, powerlines
- Street lighting and traffic sign maintenance
- Emergency services attending incidents such as fires and storm damage.

Safe work standards

Safe work near any hazard is typically defined by three key pillars of control:

- Safety standards set the limits for exposure
- Workplace legislation sets the management requirements



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- Employers ensure workers are aware and equipped to manage work near these hazards.

The International Commission for Non-Ionizing Radiation Protection (ICNIRP) has developed guidelines for protection of people from exposure to radio frequency (RF) radiation. The Australian regulator, ARPANSA, mirrors the ICNIRP guideline in its Radiation Protection Series Standard, RPS 3, which sets out safe exposure levels for all radio services in Australia. Generally, the levels of exposure on the ground from most radio services are many thousands of times below the human exposure limits set by the RPS 3 standard. However, these human exposure limits can be encountered by workers when they are close to the radiating antennas usually within 50 metres directly in front of the antenna.

ICNIRP has recently updated the guideline to provide clearer guidance on the practical application of exposure limits and the inclusion of 5G technology in higher frequency ranges. ARPANSA is undertaking a review of these changes and will include the ICNIRP improvements in its updated RPS 3 standard later in 2020.

Work health and safety legislation

The federal and state work health safety (WHS) Acts require an employer to actively manage all hazards in the employee's work spaces, and this includes RF radiation for workers at height. In order for this to be achieved, it is very important that there is a strong awareness of radio sources and how to work near them.

Employers are responsible for identifying all hazards that may affect a worker's

activity and for putting controls in place to eliminate or manage risks through the documentation and implementation of safe work methods.

How do I keep myself and my workers safe?

The typical WHS hierarchy of controls prioritises the elimination of hazards. This can be most effectively achieved by identifying the areas that should not be accessed, known as the 'RF Hazard boundary'. The common ways to achieve this are through awareness and familiarity with the types of radio antennas that are commonly used and the ways to identify the owner and operator of that service.

As with any workplace hazard, planning is key in defining hazards and developing Safe Work Methods Statements (SWMS) for workers to follow. The key elements of workplace hazard planning are:

- Risk assessment and awareness
- Training
- Resources
- Personal protection equipment

At the time of writing it is noted that a number of state-based safety agencies did not have specific statements on safe work with RF radiation. However, SafeWork NSW has recognised that the WHS Acts are silent on this specific hazard and is considering the addition of some information to its hazard library.

Training

Radiofrequency awareness training is available from a number of registered training organisations, and many of these courses are available online. The mobile telecommunications industry recognises courses that are accredited by the Australian Centre for Electromagnetic Bioeffects Research (ACEBR) to ensure that workers are equipped with sufficient knowledge to keep themselves safe. While this accreditation is not mandatory for all workers, it is advisable to seek some independent advice on the training available.

Identification of the antenna owner

WHS legislation requires that businesses must do everything that is reasonable and practical to ensure the health and safety of workers and others. Businesses and employers must prioritise the elimination of any health and safety risks in the workplace so far as is 'reasonably practicable'.

Key to this requirement is the identification of antennas in close proximity to a workplace.

Mobile base station sites

The Mobile Carriers Forum (MCF), a division of the Australian Mobile Telecommunications Association (AMTA), has developed the AMTA-branded 'RF Safety Program' to undertake compliance and safety assessments of all mobile phone base station installations nationally. The program uses a national database for site details, settings and site safety documentation. The AMTA RFNSA database is a great place to start if you need to determine whether there is a mobile base station near your work area. It is available via the MobileSiteSafety.com.au website and mobile app, and shows you on a map where the sites are and who to contact for assistance with access to or near the site.

The facility manager of the base station site should be able to provide you with a copy of the EME Guide, which includes Safe Work information and drawings showing the extent of the controlled hazard areas around the site. The carriers that use the site are also contactable for assistance.

Other radio transmitters

Many towers and buildings host a number of radio services along with mobile base stations and the carriers will include these services in the EME Guide where information is made available. If the antennas are not in an EME Guide for the site or are not shown in MobileSiteSafety app, then the ACMA Register of Radio Licences (RRL) can be used to assist in identifying the services present at a site. The ACMA RRL database can be searched by street address and all registered licences can be identified on an interactive map (see https://web.acma.gov.au/rri/register_search.main_page).

RadioWorkSafe app

The key to avoiding exposure when working near an RF hazard is an understanding of the steps involved for development of a Safe Work Method Statement. AMTA has recognised that this may be daunting to many employers and workers and has developed the RadioWorkSafe App to assist employers and workers.

RadioWorkSafe is AMTA's flagship RF safety educational initiative, providing the basic safety steps for working on base stations, buildings and other facilities with radio transmitting antennas. RadioWorkSafe also provides a simple approach to RF safety education.

The features available to all workers free of charge through RadioWorkSafe.com.au include:

- Basic safety steps
- A Safe Work checklist
- Training videos
- Fact sheets
- Information resources
- Site contacts
- Safety bookmark

Personal RF monitors

Personal RF monitors are available for workers who regularly need to need to approach RF exclusion zones. As these devices can cost up to \$3000 per unit and require calibration at two-year intervals, they are highly specialised equipment and not recommended for occasional work near RF sources.

What about 5G?

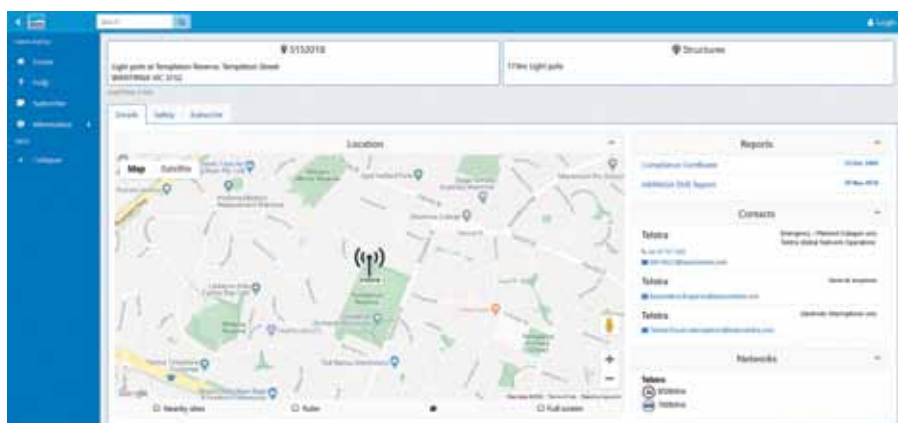
5G networks are designed to work in conjunction with 4G networks using a range of macro cells, small cells and dedicated in-building systems. Small cells will be a feature of 5G networks and will evolve to include the use of millimetre-wave frequencies. Small cells are mini base stations designed for very localised coverage, typically from 10 metres to a few hundred metres and providing in-fill for the larger macro network. Small cells will be essential for the 5G networks.

Is 5G safe? This is an important question. In January 2020, Australia's Chief Medical Officer, Professor Brendan Murphy, issued the following statement to reassure Australians:

I'd like to reassure the community that 5G technology is safe. There is no evidence telecommunication technologies, such as 5G, cause adverse health impacts. This position is supported by health authorities in Australia — such as the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) — and around the world, such as the World Health Organization (WHO).

Telstra conducted measurements on its 5G network in 2019 and concluded that "5G EME levels were found to be well below the safety limit, and in many cases over a thousand times lower". However, from a safe work perspective, 5G services should be treated the same as other radio services and the recommended safe work procedures for RF hazards are also applicable.

Tony Paul is Principal at PicoNet Consulting and fulfils the role of RF Safety Program Manager for AMTA.



The MobileSiteSafety.com.au website and mobile app shows you where transmitter sites are and who to contact for assistance.



The ACMA Register of Radio Licences map of Circular Quay in Sydney, showing transmitter sites.



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EE, NOKIA TO TRIAL 4G LTE AIR NETWORK

EE has signed an agreement with Nokia to build a nationwide 4G LTE air-to-ground network for the UK's Emergency Services Network. The network is expected to provide uninterrupted, high-speed broadband coverage for emergency service personnel working above ground from 500 feet up to 10,000 feet. It will provide connect people, sensors, aircraft and helicopters. As part of the agreement, EE will provide the active network equipment for a full reference facility and an initial seven-site trial network. Following the trial, EE will deploy the network equipment in more than 80 Home Office-acquired cell sites across the UK. Nokia will provide design support, network equipment, installation and commissioning services.

More info: bit.ly/2VbN7X2



NEW GRN SITE GOES LIVE ON CENTRAL COAST

The NSW Telco Authority continues to expand the government radio network (GRN), with a new site activated at Wyong Creek on the NSW Central Coast. The GRN is the narrowband public safety radio network used by the state's emergency services and other government agencies. "Radio sites, including this new site in Wyong Creek, provide emergency services organisations with a single, integrated network on which to communicate," said NSW Telco Authority Managing Director Kylie De Courteney. "By expanding the footprint of this critical infrastructure, we are ensuring that frontline responders have an enhanced and more reliable radio network to help keep people and places safe."

More info: bit.ly/3eBkrhS

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Helios Power Solutions

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Portable power solution

The Acumentrics Carry-On Power Case, available from Metromatics, is a rugged, ready-to-integrate portable system with built-in power and data communications capability. The large available volume

allows for storage and operation of critical equipment in the absence of grid or vehicle power.

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A CRITICAL TIME FOR AUSTRALIA'S COMMS ECOSYSTEM

Geoff Spring

Australia's public safety communications ecosystem urgently needs to be officially recognised as critical infrastructure in order to secure its future.

The sudden arrival of two first responders in your home late at night to assist with a health emergency tends to really focus your attention on what you do in your professional life related to promoting the importance of a mission-critical, public safety communications ecosystem.

It forces you to ask yourself what you can do to contribute to the enhancement of this ecosystem and the operational capability it provides to the public safety agencies (PSA) that protect the communities in which we live. Importantly, the ecosystem also supports the health and safety of our first responders themselves as they go about their jobs of saving lives and protecting property.

You only have to watch the nightly news broadcasts to see the environment in which first responders now have to perform the roles expected of them. Those first responders have an expectation — indeed, a right — to be able to perform their roles and (like all workers) go home to their families and loved ones in one piece. Unfortunately, more and more often that is not always the case.

Our first responders rely on the communications ecosystem to give them the capability to obtain and exchange information about the incidents they have to deal with, at any time and at any location. It is also their lifeline if they become victims at the incident to which they have been dispatched, if the nature of that incident suddenly changes from a passive to a reactive situation.

Readers of my articles will be aware that I strongly believe that, in the context of the above, the ecosystem needs to be recognised as part of Australia's critical infrastructure — and even more so as the ecosystem adjusts to the introduction of the enhanced operational data-carrying capability that will be provided by public safety mobile broadband (PSMB) in the coming years.

This new capability should be welcomed and will mean Australia will join the global community of those already possessing this capability (FirstNet in the USA), those rolling out the capability (the Emergency Services Network in the UK) or those procuring the capability (BroadWay in Europe), each of which involve partnerships with the private sector. But it also means that the sophistication and complexity of the ecosystem will rapidly increase as other initiatives such as the Internet of Public Safety Things (IoPSTs) emerge as another component of it.

As has been reported previously in *Critical Comms*, submissions have been made to various government committees — in particular, the House of Representatives Standing Committee on Infrastructure Transportation and Cities, and even the Joint Parliamentary Committee of Intelligence and Security — about the need to have the ecosystem recognised as being part of Australia's critical infrastructure, and to highlight the risks associated with public safety mobile broadband, eg, cybersecurity.

The point of these submissions is to have the communications ecosystem covered

and protected by the same legislation and regulation that applies to sectors already defined as being critical infrastructure, ie, energy (electricity and gas), telecommunications, transportation, water and marine.

Those submissions have been unsuccessful to date. Yet even as the sophistication and complexity of the ecosystem continues to grow in parallel with the consumer-driven need for 24/7 global connectivity — and as Australia comes out of COVID-19 and into a technical recession — you have to ask whether public safety is going to miss out again on a significant government policy initiative. That is, the





concept of replicating the success of the 'national cabinet' in planning Australia's response to COVID-19, by forming a group of state and federal ministers to focus on technological issues and the establishment of a Technology Senior Officers Group.

This Technology Senior Officers Group was announced in a communique released at the inaugural meeting of the respective State and Federal Ministers for Digital Economy and Technologies, held on 15 May 2020.

The question to be answered is, who is representing the ecosystem in this new policy initiative? Given that one of the

outcomes from the introduction of PSMB in other countries is to allow first responders to develop innovative technology solutions to the problems they encounter, you would think that initiatives associated with their health and safety, including mental health, would surely be a top priority.

In closing, my recent close encounter with those two first responders has increased my respect for the roles they perform in increasingly difficult and dangerous circumstances. And it has re-energised me to continue the fight to identify in the minds of our politicians and key decision-makers, the importance of the ecosystem

being recognised as critical infrastructure, and to actively engage with governments — as well as with industry, industry associations and standards organisations that support the ecosystem, the broader communications sector and the market in which the ecosystem functions — on the development of policies that will impact the ecosystem both now and in the future. But a little help would be much appreciated.

Geoff Spring is a Senior Advisor to the University of Melbourne's Centre for Disaster Management and Public Safety, and a member of the P25 Standards Steering Committee.

SPECTRUM REFORM IS COMING

Jonathan Nally

More spectrum flexibility, greater certainty and adaption in the face of new technologies are on the agenda.

The federal government has announced the reforms it plans to make to modernise Australia's spectrum management framework, specifically the *Radiocommunications Act 1992*, which is nearly 30 years old.

The reforms come as new communications technology and applications are being developed at an ever-increasing pace. The government hopes they will provide spectrum users with more certainty and enable them to plan further ahead.

"A more flexible framework that provides a longer-term investment horizon will allow industry to better adapt to future innovations and changing demand for spectrum, including the rollout of future generation mobile technology," said Minister for Communications, Cyber Safety and the Arts the Hon Paul Fletcher.

"The Morrison government has a clear reform pathway to modernise our spectrum management framework, which will deliver benefits to the telecommunications industry by cutting red tape," he added.

The amendments, which are laid out in an exposure draft of the legislation (available at <https://www.communications.gov.au/have-your-say/exposure-draft-radiocommunications-legislation-amendment-reform-and-modernisation-bill>), are intended to clarify the purpose and functions of the Act, and more importantly to streamline the allocation and reallocation of spectrum.

Included in the amendments are:

- A proposal to extend the maximum spectrum licence terms from 15 to 20

years and maximum apparatus licence terms from 5 to 20 years.

- Provisions intended to give greater flexibility in decision-making for allocating spectrum and apparatus licences.
- Measures that recognise the needs of supply chains.
- Mechanisms for modernising the compliance and enforcement regime through increased regulatory options.
- More information-gathering powers for the Australian Communications and Media Authority (ACMA).

In need of reform

According to research prepared for the Department of Communications by the Centre for International Economics in January 2015, the economic value of spectrum to the Australian economy was estimated to be \$177 billion over 15 years. But changing technologies and usage patterns mean that figure is almost certainly out of date.

Following a Spectrum Review in 2015, followed by reviews of spectrum pricing and Commonwealth-held spectrum (completed in 2018), the federal government opened a consultation process in May 2017 on a partial exposure draft called the Radiocommunications Bill 2017. But following feedback from the consultation, the government decided that — rather than rewrite the entire legislation — it would instead "pursue targeted amendments to address priority issues and deliver tangible benefits to industry and consumers, while

reducing the transitional costs and burden on spectrum users". It then committed in 2019 to amending the *Radiocommunications Act 1992* to bring it into line with 21st-century communications practice.

According to the current consultation paper, the ACMA will be given amended powers over direct spectrum allocations, allocation limits and re-allocation of encumbered spectrum.

Insofar as licensing is concerned, the amendments will provide longer licence terms, "greater clarity to licensees about the prospect and process for having a further licence issued at the expiry of an existing licence" and a "public interest test will now apply to the issuing of both further apparatus licences and further spectrum licences, where the further licence is for a period of 10 years or more. This means that ACMA cannot issue this further licence unless it is satisfied that it is in the public interest to do so. The public interest test is designed to ensure that spectrum is being used efficiently, by preventing it being locked up in uses that are no longer the highest-value use."

After the consultation period has ended, the draft amendments are expected to be finalised for consideration by the government and introduced into the federal parliament by the end of 2020.

The ACMA will then be responsible for developing and implementing new spectrum management arrangements in accordance with the amended legislative framework.

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A FIRMER FOOTING FOR MISSION-CRITICAL COMMS

Jonathan Nally

A consortium of Australian and international organisations involved in mission-critical communications and crisis management has made a joint submission to the Royal Commission into Australia's National Natural Disaster Arrangements, outlining steps that should be taken to improve disaster preparedness and resilience.

The Royal Commission, informally known as the 'Bushfires' Royal Commission, was established on 20 February 2020 in response to the extreme 2019–20 summer bushfire season and the resulting loss of life and property, and environmental devastation.

The joint submission was prepared by the following bodies:

- University of Melbourne Centre for Disaster Management & Public Safety (CDMPS)

- Australian Radio Communications Industry Association (ARCIA)
- Australasian Critical Communications Forum (ACCF)
- International Council on Systems Engineering (INCOSE)
- Australian Control Room Network Association (ACRNA)

The submission — the lead author of which is Geoff Spring from the CDMPS — is one of more than 1400 that were received by the Royal Commission by the closing date of 28 April.

The group outlines what it describes and defines as the mission-critical, public safety communications 'Ecosystem', which is comprised of a number of interlocking components:

- The Triple Zero service
- Public safety agency communication centres

- Radio networks
- Interfaces
- Spectrum
- Standards
- Human resources

Importantly, it makes the point that the Ecosystem is underpinned by a vigorous supply chain and firm international standards.

Recommendations

The joint submission points out that many matters of current concern are, in fact, nothing new, and that previous governmental reviews, studies and inquiries have touched upon them. Indeed, certain government committee recommendations from the not too distant past, concerning communications being treated as critical national infrastructure, appear to have gone nowhere.



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Responsibilities and policies

The submission goes on to outline some of the overlapping complexities of the national policy environment within Australia's federal system. State and territory departments and ministers are brought together within the Council of Australian Governments (COAG), and there are currently five federal ministers responsible for different aspects of the Ecosystem (eg, the Minister for Communication and the Arts, the Minister for Emergency Management and so on).

To those can be added five different permanent committees of federal parliament, three separate published official strategies concerning resilience and natural disasters and, finally, two federal departments (Infrastructure, Transport and Regional Development, and Home Affairs) with responsibility for various functions.

The submission then goes on to detail some of the many technological and policy matters of relevance to the Ecosystem, all of which have been investigated to one degree or another by governments over the past decade or so. Some of them remain either unfulfilled or are works in progress. They include:

- Next Generation Triple Zero
- Smart cities and ICT infrastructure
- Critical infrastructure protection
- Telecommunications sector reform
- PSMB for non-traditional users, such as Border Force
- Mobile network roaming (needed for a PSMB MVNO model)
- The NBN and backhaul capacity

Australia also has a National Disaster Risk Reduction Framework, designed to improve resilience across a range of critical sectors. COAG endorsed the Framework in March 2020 and agreed to take immediate action on several streams of work, one of them being telecommunications resilience.

On 12 May 2020, the federal government announced \$37.1 million in funding as part of its bushfire recovery efforts. The funding will be used to harden the mobile phone network through, for instance, better backup power. It will also provide for the purchase of cells on wheels, mobile exchanges on wheels, satellite communications trucks and the deployment of around 2000 NBN satellite services.

The submission recommends that the federal government:

1. Formally recognise in legislation that the mission-critical (public safety) communications Ecosystem is part of the nation's critical infrastructure, in the same sense as food production, water, health, energy, transport and banking.
2. Formally recognise in legislation the role of the Ecosystem in providing an essential service to the nation's public safety agencies, supported by specialist industries and supply chains functioning in an international standards-based market.
3. Provide a legislative, regulatory, governance and administrative framework within a federated national model to facilitate the seamless operation of the Ecosystem, enabling its effective contribution to the delivery of public safety outcomes for all Australians.
4. Initiate the development of a whole-of-Ecosystem 'road map' underpinned by a systems approach for use in consultative processes with key stakeholders, to facilitate the transparent monitoring and reporting of the evolution of the Ecosystem.
5. Initiate a national 'fit for purpose' assessment of existing public safety agency communications centres for both current and future connectivity with the Next Generation Triple Zero Call Service, existing and planned LMR networks and the proposed public safety mobile broadband (PSMB) capability, including both intra-state/territory and cross-border interoperability.

Public safety communications

As is the case in many other countries, Australia's public safety communications system has developed into an interlocking network of various capabilities, including LMR systems, the Triple Zero service, public safety agency communications centres, a range of communications devices and interfaces to tie them all together. The proposed PSMB system will need to knit itself into the present Ecosystem.

The overall system is heavily dependent upon access to spectrum, adherence to standards and maintenance of a highly trained workforce.

Technological change is driving innovation within the field and — as everyone in the sector knows — digital transformation, IP-based systems and the demand for video and data are changing the communications landscape and augmenting traditional voice-only services. Public safety and first responder organisations will need to be able to handle Next-Generation Triple Zero (where, for example, someone can send a text message to 000 instead of calling), social media inputs, video streams and so on.

The development of PSMB in Australia is a slow-moving thing, and it's fair to say there

is a measure of frustration within parts of the communications sector regarding how long it is taking... especially when we see systems such as FirstNet flourishing in the US. That nation's 'PSMB moment' came on 11 September 2001, when first responders in New York were unable to communicate effectively with each other as they tried to rescue people in the Twin Towers. Australia's PSMB moment may very well have been last summer's bushfires, when limited narrowband voice networks became overloaded under the immense strain of the response effort.

Spectrum

PSMB will need spectrum, a seemingly ever-shrinking resource. In 2012 the ACMA announced that it had reserved 10 MHz (5+5) spectrum in the 800 MHz band for public safety communications. More recently, in common with other countries it set aside a frequency block in the 4.9 GHz band for public protection and disaster relief requirements.

Interestingly, on 11 May 2020 the federal government released a set of policy objectives for the allocation of the 850 MHz and 900 MHz bands, which, it said, would "support the deployment of 4G and 5G technologies, promote competitive market outcomes for

the long-term benefit of consumers, encourage investment in telecommunications infrastructure and support a national Public Safety Mobile Broadband (PSMB) capability".

Conclusion

This has been a brief overview of the very comprehensive 40-page joint submission document. It encompasses many other topics not covered in this summary, and you are encouraged to read it in full — it can be found at <https://arcia.org.au/submission-to-bushfire-royal-commission/>.

The CDMPS, ARCIA, ACCF, INCOSE and ACRNA are to be commended for producing such a comprehensive submission, which will no doubt be of great value in enlightening the Royal Commission as to the complexities of the nation's mission-critical communications needs.

The Royal Commission began public hearings on Monday, 25 May, focusing on the 2019–20 bushfire season and Commonwealth responsibilities as they relate to natural disasters. The hearings are being live streamed, given the current COVID-19 restrictions on face-to-face meetings. You can follow its progress at <https://naturaldisaster.royalcommission.gov.au/>.



THE GROUP OUTLINES WHAT IT DESCRIBES AND DEFINES AS THE MISSION-CRITICAL, PUBLIC SAFETY COMMUNICATIONS 'ECOSYSTEM', WHICH IS COMPRISED OF A NUMBER OF INTERLOCKING COMPONENTS.



EKA CyberLock securing roads and traffic control boxes

Recently I noticed a traffic control box in a Sydney motorway tunnel and with cars in front of me and behind me travelling at 80 kilometres per hour. This box is as isolated as a lock on a mountaintop in outback Australia, even though it is in a tunnel directly under central Sydney. I thought to myself, “Who would need to access this box?” Answer: the tunnel owners, contractors, Transport for NSW (formerly RMS)

and, I would assume, many others such as Telstra (as I had a perfect mobile signal down there). Then I thought of the value of the equipment inside. These traffic control boxes house the vital components that not only keep us safe but also help deliver the smooth operations of our major roads, such as security and CCTV equipment, speed and red-light cameras, and traffic light controllers. So, we have various groups of people, all requiring access to a geographically spread set

of boxes that contain sensitive and expensive equipment that is vital to the smooth operation of our road network. This is a security nightmare, normally solved by running a cable to every door as you would in conventional access control. The solution is a system that delivers all the benefits of access control but requires no cables or wiring. EKA CyberLock is such a solution. EKA CyberLock is an electromechanical, key centric access control system. Key centric means the smarts of the systems are in the key, which makes it a portable access control solution and, with the CyberLink App, extremely easy to administer. This administration flexibility is why EKA CyberLock is the solution for securing remote sites, especially when network of sites are spread over a large geographical area such as the abovementioned traffic control boxes or even remote mobile phone towers in outback Australia.

EKA CyberLock makes a variety of electronic cylinders and padlocks that can be used to secure traffic control cabinets. They are designed to replace the existing mechanical lock cylinders. Access is managed on a centralised database called CyberAudit Web management software. Users are issued with a 100% electronic CyberKey that is loaded with their specific access profile and customised to their exact needs, thereby making various levels of access for different stakeholders simple to design and administer.

The battery in the CyberKey also powers the cylinders, meaning the cylinders are truly 100% cable free and require no battery replacement. Lost keys can be managed out of the system, meaning you will never need to rekey again because of a lost key.

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CROSS-TECHNOLOGY COMMS FOR THE IoT



Researchers have developed a framework that enables different wireless technologies to communicate directly with each other.

Together with colleague Rainer Hofmann, Carlo Alberto Boano and Hannah Brunner from the Institute of Technical Informatics at TU Graz have developed a framework that enables different wireless technologies to communicate directly with each other.

Image credit: Lunghammer/TU Graz.

Whether it is networked vehicles that warn of traffic jams in real time, household appliances that can be operated remotely, 'wearables' that monitor physical activity or industrial plants that detect possible production errors and notify technical support, the number of intelligent products that communicate wirelessly with other devices in the Internet of Things age has increased rapidly.

However, not all of these devices are compatible with each other as they use different technologies such as Wi-Fi, Bluetooth or ZigBee, depending on the requirements and application.

In addition to that, of course, many devices often use the same radio frequencies and interfere with each other. This delays data transmission, data can be lost, energy consumption increases and battery life decreases.

Researchers at TU Graz's Institute of Technical Informatics have now developed a system that enables direct information exchange between commercially available devices that use different radio technologies but the same frequencies.

This generic framework is called X-Burst, which companies will be able to integrate into the operating systems of their IoT products in the future.

The researchers make use of time-controlled energy pulses in the radio channel, which can be generated by any smart device and detected by most of them.

"We send standard-compliant data packets of varying lengths. These packets are encoded in their length, ie, the information is stored in the duration of the packets," said Rainer Hofmann and Hannah Brunner, who were in charge of the project together with colleague Carlo Alberto Boano.

"The receivers monitor the energy level in the radio channel and can thus detect

the packets, determine their duration and finally extract the information contained in them."

The researchers concentrated primarily on data exchange in the licence-free 2.4 GHz band. This frequency range is used by many radio standards, including Wi-Fi, Bluetooth and ZigBee, which were the focus of the investigations.

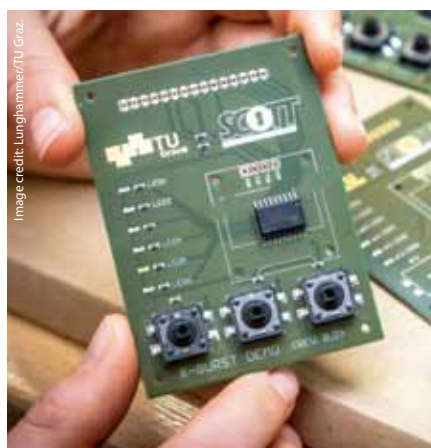
Using a prototype, the team was able to demonstrate that X-Burst enables successful communication between different wireless technologies without the need for expensive and inflexible gateways, as are currently required for devices with different wireless technologies.

The invention also enables the system clocks of the various devices to be synchronised, which enables them, for example, to perform certain actions simultaneously.

X-Burst also lays the foundation for the intelligent use of radio frequencies by enabling all devices to communicate with each other and adjust their frequencies accordingly.

This minimises cross-technology interference and improves the reliability and energy consumption of the devices.

The group is currently working on a new prototype that will demonstrate and illustrate the advantages of X-Burst in a smart home scenario.



The X-Burst framework developed at TU Graz can be integrated into the operating system of existing devices.

Radio Matters



We start this RFUANZ column with the following insights into critical communications and change management from Mike Head of Tait Communications:

Earthquakes, terrorist attacks and pandemics... and all that Cantabrians want is to watch the Crusaders play the Highlanders. Change is inevitable, so the way we manage that change becomes important to our professional and personal lives. The

forementioned events all share some common features that test the ways in which we respond and the systems that we rely upon. Those common features are:

- They have all happened in New Zealand
- They create sharp spikes in communication traffic
- They require emergency service responses
- They affect all of us to varying degrees

The large spike in load caused problems for cellular and landline voice calls as we all coordinated our pandemic response transition into Level 4. Then, once we adjusted to lockdown and working from home, we had a much greater reliance on electronic media for work, school, leisure and social engagement. This caused some problems with local traffic and the impact of a significant change in internet traffic profiles. At the same time some of our communications infrastructure had been further compromised by vandalism driven by misinformation and paranoia.

These situations tend to remind us of how our expectations of critical communications have also changed. Our tolerance to not having immediate access tends to decrease as we transition from personal to professional, and from professional to emergency services. As we rely more and more on common systems to support all of these, the impact of any interruption becomes greater. There is nothing like a crisis to remind us of what is important... that simple is effective and that it is good to have a back-up plan.

Traditional land mobile radio systems have proved time and time again to be ultra-reliable and dependable platforms for voice communications, which forms the bottom line for many business and critical communications organisations.

Workshops on how to become an approved radio engineer or certifier — which were to have been held the day prior to the Comms Connect New Zealand conference and exhibition — have been postponed. As yet we have not been advised of alternative dates. Should you have any questions or need to know more, please email RSM at info@rsm.govt.nz.

You can find the criteria for how to become an approved engineer or certifier on the RSM website at <https://www.rsm.govt.nz/engineers-and-examiners/how-to-become-an-approved-radio-engineer-or-certifier/>.

Finally, since my last article, it has been decided to postpone the next Comms Connect New Zealand event until May 2021. I'm sure you'll agree that the situation is very fluid, and we all must do whatever is necessary to ensure not only a successful event, but one that is safe considering the current and future COVID-19 situation as well. Stay tuned for more information as it comes to hand.

I wish to thank all our partners for continuing to support RFUANZ, especially at this time.

Corey Weir
Chairman, RFUANZ



Rechargeable smart key

The CyberKey Blue 2 is a rechargeable smart key that connects to the user's smartphone app and allows them to simultaneously download access permissions of which locks they can access while providing the latest audit trail reporting through the app and to the management software which can be hosted in the cloud or on premise, thus providing virtual real-time access control for the most remote sites.

CyberLock lock cylinders are IP68 rated and do not require a battery or network connection, which means they are suitable for back-of-house applications to padlocks in remote sites. For a major rollout with hundreds or thousands of cylinders, the annual cost savings to an organisation purely from not having to change batteries in the cylinder is substantial.

EKA Cyberlock

www.ekacyberlock.com.au



Cell site test tool

The VIAVI OneAdvisor-800 from Vicom is designed to meet the needs of service providers, field technicians and contractors as they scale 5G or LTE infrastructure. It enables cell site technicians to test fibre RF and CPRI/Ethernet from a single instrument, replacing multiple independent tools (OTDR, CAA, fibre scope). The unit covers all LTE and 5G and multiple topologies (Macro-cell, Small-cell, C-RAN and/or DAS).

The instrument's workflow user interface guides technicians through a preconfigured common test process, making sure they complete the job in the same way and to the same specifications. Tower hands get built-in guidance, automatic test configuration, pass/fail results and a single closeout report.

Vicom Australia Pty Ltd

www.vicom.com.au

BUILDING TRUST IN CRITICAL BROADBAND SERVICES

TCCA's webinar series is bringing users, developers and researchers together to set the pace for mission-critical communications innovation.



The single common thread that is woven throughout critical communications is trust — the end user must be able to have 100% confidence in the services provided. Trust in TETRA is underpinned by the robust specifications of the standard coupled with TCCA's Interoperability (IOP) Testing & Certification process, developed to enable a trusted, open, multi-vendor market for equipment.

In order to meet these objectives for critical communications broadband equipment and services, various initiatives are underway, and overviews of these form the basis of TCCA's new series of Critical Update webinars.

The first in the series was presented by ETSI. Available to view online (<https://tcca.info/tcca-webinar-series-2020/>), the webinar gives an overview of the ETSI MCX Plugtests. The goal of the upcoming 5th MCX Plugtests event in September is to validate the interoperability of a variety of implementations using different test scenarios based on 3GPP Mission Critical Services in Release-15.

The second webinar focused on the MCS-TaaSting (Mission Critical Testing as a Service) project, which is funded by NIST (the US National Institute of Stand-

ards and Technology). MCS-TaaSting aims to meet the needs of the mission-critical and public safety community in terms of conformance testing. It will enable the industry to prove the 3GPP standards-compliance of their implementations and will give the users and operators the confidence to buy compliant products.

The goal is to develop a 3GPP-based MCS testing engine that will be available via both a cloud service and over LTE hardware for the conformance testing of mission-critical applications. This will enable cost-efficient, regular and frequent testing, re-testing, certification and re-certification of the myriad and increasing combinations of devices, operating systems, middleware and applications that form part of the mission-critical broadband ecosystem.

The MCS-TaaSting webinar was presented by project coordinator Fidel Liberal from the University of the Basque Country. He is a recognised expert in the mission-critical communications environment and leads a number of mission-critical communications and 5G-related research and development projects. The co-presenter was Michael Proestler, founder and CEO of GridGears, one of the MCS-TaaSting project partners. GridGears was founded

in 2017 with the goal to contribute to the standards and enable better, more integrated and more efficient emergency services.

The webinar was intended for anyone looking for trustable 3GPP compliant solutions, including vendors developing products and solutions, operators looking to implement mission-critical broadband networks and services, test houses seeking a validated platform and of course end users who want to learn about some of the processes, systems and technologies that are combining to deliver trusted critical broadband.

While critical broadband systems are emerging, they will only provide a partial solution for many years to come, and TETRA will still be required to provide very high-resilience, secure voice and short data functionality. The third webinar in the series, entitled TETRA to 2035 and beyond, gave an overview of the continuing enhancement of the TETRA standard. This session looked at how ETSI's Technical Committee TETRA and Critical Communications Evolution (TC-TCCE) is developing key interworking standards to enable critical broadband and TETRA terminals to be used across both types of network.

Details of all webinars can be found online at <https://tcca.info/tcca-webinar-series-2020/>.



Wi-Fi 6 access point

The Cambium Networks XV3-8 Indoor Tri Radio Wi-Fi 6 Access Point with Software-Defined Radio uses 802.11ax technology that is more efficient than previous generations, providing enhancements for IoT network segmentation, improved battery life and better use of RF frequencies.

Its features include: software-defined 5 GHz radios (SDRs) that support dual 5 GHz 4x4 streams or single 5 GHz 8x8 streams; fixed-band 2.4 GHz radio supporting 802.11a/b/g/n/ax with 4x4 streams; 802.11ax MU-MIMO, MU-OFDMA, TWT; 1 GbE and 1 5GbE RJ45 interfaces; integrated BLE 4.1; and a 802.3bt or 802.3at PoE powered device.

The XV3-8 converged management access point is supported by Xirrus XMS-Cloud, cnMaestro Cloud, cnMaestro on-premises VM and cnMaestro c4000 Appliance. This enables the XV3-8 to deliver application policy controls, location services and BYOD security segmentation when managed by the XMS management system, or to support the wireless fabric architecture spanning outdoor broadband, Ethernet switching and enterprise Wi-Fi when managed by cnMaestro.

Cambium Networks Ltd

www.cambiumnetworks.com

Uninterruptible power supply

The Acumentrics Pack-Power System is a 0.9 kg, small-form-factor UPS that can be used standalone or integrated within a backpack. Its key features include full operation even when charging, 12/28 VDC output that powers and recharges radios and other electronics, and an integrated 5-port USB 3.0 SuperSpeed hub that provides device power as well as bidirectional communication with a laptop or tablet.

It is FAA compliant, water and dust resistant (IP54) for use in harsh environments and, for typical applications, runtime is in excess of 8 h.

Metromatics Pty Ltd

www.metromatics.com.au



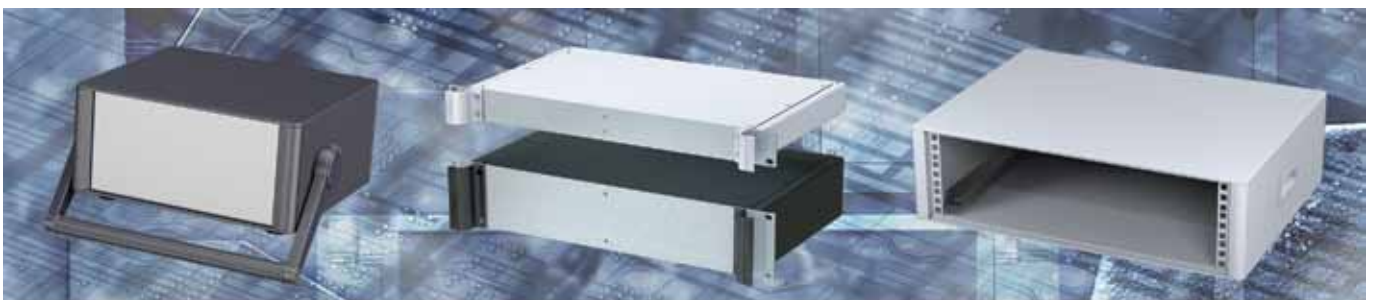
Oscilloscope

The Keysight Infiniium MXR-Series mixed-signal oscilloscope offers ASIC-driven processing resulting in eight instruments in one, including: a real-time spectrum analyser, oscilloscope, digital voltmeter, waveform generator, Bode plotter, counter, protocol analyser and logic analyser. It is complemented by a suite of software solutions focused on power integrity, high-speed digital test and verification. Built-in software includes a fault-hunter function that speeds root cause identification and resolution of rare or randomly occurring errors.

The instrument has eight analog channels at 6 GHz and 16 simultaneous digital channels, enabling users to reduce test bench and workflow complexity as well as to achieve accurate and repeatable multi-channel measurements in a single instrument.

Keysight Technologies Australia Pty Ltd

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Mobile PoC radio

The TooAir TA-991 slimline PTT fixed mobile radio has the same front-face style and dimensions as the TA-990; however, the depth of the unit is only 57 mm. Like the TA-990, the TA-991 mobile offers a large front-facing speaker and 3 W audio amplifier for noisy truck environments. It has a large LCD display with icon-based menu, with GPS and SOS included in the feature set. A 'Missed Call' function warns a returning driver that a call was received and went unanswered.

The product is supplied with an in-vehicle GPS and GSM antenna and mounting kit. The unit is designed to work from 12 to 28 V, negating the need for a voltage reducer. Built-in memory automatically records on the device any voice transmissions that are broadcast or received; the recordings can be accessed and played back through the GUI. An optional numerical keypad microphone provides 3-digit dialling and access to all menu functions.

Too Air Pty Ltd

www.tooair.com.au



CB radio

The Entel DX485U-CB from AceComms is an ultra-compact, IP68 submersible CB that deploys analog and DMR digital technology. It features Entel Sure Speech, high-contrast white-on-black OLED display, audio output rated at 2 W and 256 channels. Programming is via CPS and micro-USB cable. The End-User Programming App means there is no need for a dealer to visit onsite or have the radios returned to a service depot — anyone can simply transfer programming data, software updates or add new features to the radio.

The Navigation Keypad and Menu enables users to scroll to a Contact List for Users and Groups, and even multiple groups at once. The 450–520 MHz range gives users the access to typical analog CB channels as well as the flexibility to use commercial DMR and analog channels.

The DX485U-CB ships complete with a high-capacity Li-ion battery, wideband whip antenna, single-unit charger and a belt clip. Other accessories include a six-way charger, remote speaker mics, earpieces and heavy-duty headsets. The remote speaker microphone is submersible and usable even while wearing gloves.

The DX Series is tested to MIL-STD-810 C, D, E, F and G for temperatures, thermal shock, pressure, vibration, impact shock, solar radiation and rain and dust ingress, making it suitable for construction or recreation.

Ace Communication Distributors Pty Ltd

www.acecomms.com.au



10G Industrial Ethernet Switches

10G Ethernet switches are futureproof Ethernet devices consisting of both 1G and 10G ports. The 10G ports are backward compliant with 1G, 2.5G and 5G. Multiple transmission speeds provide each connected device with the most suitable network service. The 10G Ethernet switches provide users with high network deployment flexibility, making them suitable network devices for those expecting to upgrade their devices or undertake quantity expansion in the future.

For machine vision and video surveillance applications, transmission bandwidth requirements are higher than traditional 10/100/1000 Mbps can satisfy. The 10G uplink ports prevent users from experiencing data loss or latency — helping to guarantee network transmission quality.

Ranging from 8 to 54 ports, Advantech's 10G Ethernet switch product line includes six different models for all network deployment needs. The rackmount design enables the devices to be either installed in a rack or on a desk. Both managed and unmanaged SKUs are available for various applications. Optional PoE ports deliver both data and power on one wire to PD devices. The SFP ports can further extend the transmission distance from 100 m to 100+ km for widened geographical network coverage.

Advantech Australia Pty Ltd

www.advantech.net.au



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In-building, multi-frequency radio coverage mapping

In the past, radio coverage mapping requirements were driven by the need to verify a single transmitter channel to see where there was sufficient radio coverage and where coverage holes were located. However, today there are many applications where radio coverage must be verified for multiple channels across a very wide frequency range. With more than 80% of mobile traffic coming from indoor or in-building networks, it is now common to have multiple wireless networks on the same floor. While this helps with user experience, coverage testing of complex RF environments is a challenge. A good example is how various commercial cellular operators must verify reliable service and good throughput rates of indoor distributed antenna systems (DAS) found in many public spaces, such as shopping centres, airports, or sport stadiums. In many cases, multiple channels on multiple frequencies are used and they would ideally test all of these frequencies in parallel to maximize efficiency. Another example would be verifying the interaction of outdoor-to-indoor coverage for TETRA-based, in-building coverage systems and the resulting interferences. The ideal test system should be able to track multiple frequencies by either walking or driving a given area. It needs to have the ability to perform coverage mapping without the need for a GPS signal and be able to handle difficult areas such as stairwells and hallways. It should also be lightweight, portable and battery operated, with a wide frequency range and fast scanning.

Channel scanner functionality is needed in order to scan through a defined set of frequency channels. For coverage mapping applications, it is important that the scanning speed is fast enough to capture all of the desired channels while seamlessly following the movements of the person making the measurements.

The Anritsu Remote Spectrum Monitor MS27101A offers outstanding sweep speeds even for smaller resolution (RBW) or video bandwidths (VBW), which is important for narrowband communications standards such as analogue FM, P25, TETRA, DMR, and dPMR. For instance, dPMR uses 6.25 kHz channels, P25 and DMR use 12.5 kHz channels, and TETRA channels are usually separated into 25 kHz blocks within a 5 MHz frequency segment. The Anritsu TRX NEON Signal Mapper MA8100A is available for indoor/outdoor single- and multi-channel radio coverage mapping. This solution enables users to gather channel power and signal quality results by simply walking through an area of interest, as well as see coloured breadcrumb trails that indicate the power level and walking path. The TRX NEON Signal Mapper application allows for the definition of multiple frequency sets that are individually defined by centre frequency, SPAN, RBW, and desired reference level.

Five Easy Steps to Complete In-Building Coverage Mapping

1. Import building floorplan
2. Setup frequencies – up to 8 channels can be input at a time

3. Calibrate the system with your current position and orientation, then begin the walk-through
4. Upload results to cloud or store locally
5. View results through command software in 2D or 3D. Thresholds can be set to indicate pass/fail for any particular grid or area. Multiple floors can be viewed simultaneously.

With the increasing requirements by various government agencies to comply with local requirements, network crews must validate compliance by ensuring that radio coverage meets these specifications. The Remote Spectrum Monitor MS27101A can facilitate the identification and removal of illegal or unlicensed interference signals. By monitoring spectrum on a continual basis, problem signals can be identified as they occur in real time. With the additional SpectraVision MX28010A software, the Remote Spectrum Monitor solution can also serve as a signal analysis platform for communications systems like TETRA, including panorama measurements showing the incoming direction of a signal or as a SatCom monitoring platform. For further information please email au-sales@anritsu.com or visit www.anritsu.com.



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10 hours — 5 x 2 hour sessions

- Fundamentals of microwave
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- Link design and the elusive five-nines



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- Radio antenna systems
- Transmission lines and feeders
- Filters and multi-coupling
- Tower and site
- Power systems
- Radio communications testing and equipment maintenance
- Earthing
- Interference
- Data networks and linking
- Fibre-optic systems
- Satellite communications
- Standards and quality control



CHRIS STEVENS
MANAGING DIRECTOR
CARTGIS PTY LTD

PLANNING FOR AUSTRALIA'S CONNECTIVITY DURING NATURAL DISASTERS

Gavin Wilson*

ADF Image © Commonwealth of Australia 2020



Authorities must include network technology that can provide failover or fast pop-up options for connectivity during disasters.

Natural disasters are an inherent part of Australia's landscape, woven into our very culture. The threat is ever-present, although we cannot predict where or how hard they will strike. Sadly, what is certain is their continued presence in our future.

Natural disasters risk leaving vulnerable and remote communities unable to access vital information. The Royal Commission into the bushfires is an important first step towards factoring failsafe options into planning for future connectivity.

Vulnerable communities during the 2019–20 summer bushfires struggled from lack of connectivity in three main areas. Compromised mobile tower coverage meant people were unable to communicate during a very stressful time. Local authorities were hampered in communicating critical updates, which saw many affected towns having to resort to using whiteboards or loudspeakers as 'public square' advisories. Businesses were also affected by network and power outages, leaving them unable to sell vital goods such as fuel and food.

Alternative communication technologies

In previous decades, these challenges were simply par for the course, as the technology did not exist to provide alternative connectivity options. Today, mobile LTE networks

can provide almost instant connectivity in place of physical wired internet lines that are damaged or non-existent.

Delivering rapid response during emergencies depends on the ability to quickly set up a reliable network connection to immediately begin coordinating response and recovery operations. These environments rarely have IT expertise available and are typically located in remote areas.

For example, Cradlepoint supported a coastal Victorian council during the evacuation of approximately 900 Mallacoota residents during the bushfires. Cradlepoint supplied routers for a pop-up processing centre established to account for displaced people from Mallacoota when they arrived into port at Hastings by two naval ships. This enabled authorities to account for and process evacuees efficiently and with empathy during the stressful crisis. Evacuees also had access to Wi-Fi, meaning they could let family and friends know they were safe. The routers were sent within hours of the request and required a few hours to set up prior to dispatch, as there were no IT personnel on the ground.

Communications for first responders

Emergency services vehicles throughout Australia still rely on radio technologies to communicate with each other and back to base. However, there is an opportunity for

emergency vehicles to upgrade to always-on, cloud-managed technologies with wireless networks.

In environments where every decision and every second counts, we have seen success in other geographies where these technologies are deployed. Anne Arundel County Fire Department, in the US, is using 4G LTE solutions to deliver always-on connectivity and GPS location data to save lives by deploying the right resources to fire emergencies. The technology was selected for its reliability in delivering accurate, real-time GPS information that would let operators dispatch the closest vehicle with the shortest response time for each emergency. It was important to have an all-in-one solution that would provide always-on WAN access and security of sensitive information. Additionally, they wanted a solution that could easily be deployed, monitored and managed remotely through a single pane of glass.

Looking forward, it's imperative for Australian authorities to include network technology that can provide failover or fast pop-up options for connectivity that helps citizens stay in touch with loved ones, enables government and emergency agencies to provide timely information updates and enables essential businesses to continue to transact during disasters.

**Gavin Wilson is Managing Director of Cradlepoint Asia Pacific.*

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EMERGENCY COMMS RECEIVE A BOOST

Jonathan Nally

Four projects worth \$37.1 million will improve communications resilience during emergencies.

The federal government announced, 12 May, funding to the tune of \$37.1 million to improve communications resilience during times of natural disasters, particularly bushfires.

The allocation is part of an earlier-announced \$650 million bushfire recovery program, which itself is part of the government's \$2 billion National Bushfire Recovery Fund announced in January.

The new funding will be divided amongst four measures.

Connectivity

\$18 million (which includes \$10 million from the Mobile Black Spot Program) will be spent on providing backup power sources for mobile phone towers, to be called the Mobile Network Hardening Program. Loss of mains power was the primary cause of base station outages during the recent bushfires.

The money will provide for batteries and diesel generators for base stations built under Rounds 1 and 2 of the Mobile Black Spot Program, to increase backup power duration from between 3 and 8 to up to at least 12 hours where possible.

There will also be a competitive grants process that will fund up to 50% of the capital cost for upgrades for other, high-priority mobile phone base stations. These upgrades will include improving backup power, infrastructure hardening measures and providing backhaul redundancy.

Portable and temporary comms

\$10 will be allocated for the purchase of cells on wheels (COWs), mobile exchanges on wheels (MEOWs) and NBN Road Muster satellite trucks.

Of this, \$1.7 million will go to NBN Co for the Road Muster trucks and 12 portable satellite kits.

The remaining funding will be allocated via a competitive grants process. The facilities will be owned by telcos, on the basis of solid commitments for making them available for use during emergencies. Carriers and NBN Co will contribute up to 50% of the cost, with the government making up the rest. The companies will be responsible for operations, maintenance and any replacement costs.

Infrastructure hardening

\$7 million will be applied to the deployment of approximately 2000 NBN Co satellite services, spread across the nation, for use by rural and country fire services. They'll also be deployed at designated evacuation centres. Up to 100 especially critical sites will also have solar panels and batteries installed.

Community awareness

\$2.1 million will be spent on a pilot program during the next two bushfires seasons, aiming to improve the flow of information about communications access during

emergencies. A major aim of this program will be to reduce reliance on single forms of communications technology.

Taking action

The announcement of the funding allocation was made jointly by Paul Fletcher, the Minister for Communications, Cyber Safety and the Arts, and Mark Coulton, Minister for Regional Health, Regional Communications and Local Government.

"Access to telecommunications before, during and after a disaster is critical. We need to learn from what happened in the 2019–20 bushfires — and make our networks more resilient in the future," Minister Fletcher said.

"The measures we're announcing today will help Australians stay connected when it matters most, and maintain the ability to contact family, insurers, and emergency and support services."

"Supplementing today's announcement is the discussion paper we recently released on the design of Round 5A of the government's Mobile Black Spot Program, to ensure that regional communities are benefiting as much as possible from this successful program," Minister Coulton added.

"One of the objectives of Round 5A is to improve mobile connectivity for communities in disaster-prone regions, so in conjunction with this additional investment announced today, regional areas will be much better prepared during future emergencies."

SPECTRUM SHARING VIA MACHINE LEARNING

Assume indoor scenario
w/ channel propagation model

NIST engineer Jason Coder makes mathematical calculations for a machine learning formula that may help 5G and other wireless networks select and share communications frequencies efficiently.

Credit: NIST

A machine learning formula developed by NIST could help 5G wireless network operators efficiently share communications frequencies.

Researchers at the US National Institute of Standards and Technology (NIST) have developed a mathematical formula that, computer simulations suggest, could help 5G and other wireless networks select and share communications frequencies about 5000 times more efficiently than trial-and-error methods.

The novel formula is a form of machine learning that selects a channel based on prior experience in a specific network environment. Described at a virtual online conference in May, the formula could be programmed into software on transmitters in many types of real-world networks.

The NIST formula is a way to help meet growing demand for wireless systems, including 5G, through the sharing of unlicensed frequency ranges... such as that used by Wi-Fi. The NIST study focuses on a scenario in which Wi-Fi competes with cellular systems for specific subchannels. What makes this scenario challenging is that these cellular systems are raising their data-transmission rates by using a

method called License Assisted Access (LAA), which combines both unlicensed and licensed bands.

"This work explores the use of machine learning in making decisions about which frequency channel to transmit on," NIST engineer Jason Coder said. "This could potentially make communications in the unlicensed bands much more efficient."

The NIST formula enables transmitters to rapidly select the best subchannels for successful and simultaneous operation of Wi-Fi and LAA networks in unlicensed bands. The transmitters each learn to maximise the total network data rate without communicating with each other. The scheme rapidly achieves overall performance that is close to the result based on exhaustive trial-and-error channel searches.

The NIST research differs from previous studies of machine learning in communications by taking into account multiple network layers, the physical equipment and the channel access rules between base stations and receivers.

The formula is a 'Q-learning' technique, meaning it maps environmental conditions — such as the types of networks and numbers of transmitters and channels present — onto actions that maximise a value, known as Q, which returns the best reward.

By interacting with the environment and trying different actions, the algorithm

learns which channel provides the best outcome. Each transmitter learns to select the channel that yields the best data rate under specific environmental conditions.

If both networks select channels appropriately, the efficiency of the combined overall network environment improves.

The method boosts data rates in two ways. Specifically, if a transmitter selects a channel that is not occupied, then the probability of a successful transmission rises, leading to a higher data rate. And if a transmitter selects a channel such that interference is minimised, then the signal is stronger, leading to a higher received data rate.

In the computer simulations, the optimum allocation method assigns channels to transmitters by searching all possible combinations to find a way to maximise the total network data rate. The NIST formula produces results that are close to the optimum one but in a much simpler process.

The study found that an exhaustive effort to identify the best solution would require about 45,600 trials, whereas the formula could select a similar solution by trying only 10 channels, just 0.02% of the effort.

The study addressed indoor scenarios, such as a building with multiple Wi-Fi access points and cellphone operations in unlicensed bands. Researchers now plan to model the method in larger-scale outdoor scenarios and conduct physical experiments to demonstrate the effect.

ELECTRON EFFECT PRODUCED WITH PHOTONS

Researchers at the University of Illinois at Urbana-Champaign have replicated one of the most well-known electromagnetic effects in physics, the Hall effect, using radio waves instead of electric current.

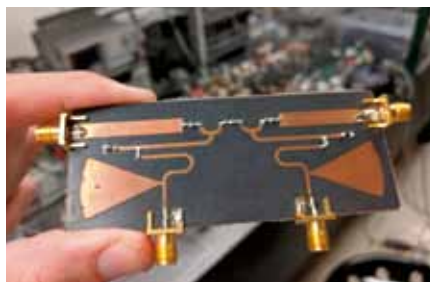
The technique could be used to develop advanced communication systems that boost signal transmission in one direction while simultaneously absorbing signals going in the opposite direction.

The Hall effect, discovered in 1879 by Edwin Hall, occurs because of the interaction between charged particles and electromagnetic fields. In an electric field, electrons experience a force opposite to the direction of the field. In a magnetic field, moving electrons experience a force in the direction perpendicular to both their motion and the magnetic field. These two forces combine in the Hall effect, where perpendicular electric and magnetic fields combine to generate an electric current.

Light isn't charged, so regular electric and magnetic fields can't be used to generate an

analogous 'current of light'. However, in a recent paper published in *Physical Review Letters*, researchers explain that they have done exactly this with the help of what they call "synthetic electric and magnetic fields".

Principal investigator Gaurav Bahl's research group has been working on several methods to improve radio and optical data transmission as well as fibre-optic communica-



A microstrip circuit used to demonstrate Hall effect for radio waves. Credit: University of Illinois at Urbana-Champaign Department of Mechanical Engineering

tion. Earlier this year, the group exploited an interaction between light and sound waves to suppress the scattering of light from material defects.

In 2018, team member Christopher Peterson was the lead author of a paper that described a technology that promises to halve the bandwidth needed for communications by enabling an antenna to send and receive signals on the same frequency simultaneously through a process called nonreciprocal coupling.

In the current study, Peterson has provided another promising method to directionally control data transmission using a principle similar to the Hall effect.

Instead of an electric current, the team generated a current of light by creating synthetic electric and magnetic fields, which affect light the same way the normal fields affect electrons.

Unlike conventional electric and magnetic fields, these synthetic fields are created by varying the structure that light propagates through in both space and time.

"Although radio waves do not carry charge and therefore do not experience forces from electric or magnetic fields, physicists have known for several years that equivalent forces can be produced by confining light in structures that vary in space or time," Peterson said.

"The rate of change of the structure in time is effectively proportional to the electric field, and the rate of change in space is proportional to the magnetic field. While these synthetic fields were previously considered separately, we showed that their combination affects photons in the same way that it affects electrons."

By creating a specially designed circuit to enhance the interaction between these synthetic fields and radio waves, the team leveraged the principle of the Hall effect to boost radio signals going in one direction, increasing their strength, while also stopping and absorbing signals going in the other direction.

Their experiments showed that with the right combination of synthetic fields, signals can be transmitted through the circuit more than 1000 times as effectively in one direction than in the opposite direction.

The research could be used to produce new devices that protect sources of radio waves from potentially harmful interference, or that help ensure sensitive quantum mechanical measurements are accurate.

The team is also working on experiments that extend the concept to other kinds of waves, including light and mechanical vibrations, as they look to establish a new class of devices based on applying the Hall effect outside of its original domain.



Router

Cradlepoint NetCloud is a service-based platform that spans from cloud to mobile edge to make deploying, managing and evolving an in-vehicle network easier and less resource-intensive. Users can centrally configure, monitor, visualise, control and troubleshoot networks — WAN to LAN and link to app — from a web console. Routing, security, LTE,

SD-WAN and Wi-Fi functionality can be configured at the network, rather than appliance level.

Cradlepoint's E300 series, 5G-ready router offers a combination of services and performance in a portable, compact form factor. Part of a NetCloud Enterprise Branch Package, which offers an all-inclusive networking service comprised of support, hardware and software services, the E300 series enables emergency services to open temporary locations, such as in disaster zones and where there's civil unrest or health crisis situations. Fire, ambulance and police services can gain fast day-1 connectivity with the integrated Cat 18 LTE Modem.

The COR IBR1700 LTE router is designed for the requirements of emergency services, mobile command centres, public and private transit and near-shore vessels. With the available Gigabit-Class LTE modem, higher processing power and broader extensibility options, the IBR1700 provides advanced communications both inside and outside of the vehicle. The offering features multi-zone firewalls, IDS/IPS, internet security and FIPS 140-2 certification.

COR IBR1700 mobile routers are sold as part of an all-inclusive mobile networking solution in a NetCloud Solution Package.

Cradlepoint Australia Pty Ltd

www.cradlepoint.com

IoT edge gateway

The UNO-247 is a fanless IoT edge gateway aimed at information technology applications. It is equipped with an Intel Celeron J3455 processor, comprehensive I/O ports and VGA and HDMI display interfaces for high-performance computing. To ensure flexible configuration and easy deployment for diverse applications, the system I/O includes 4 x USB, 2 x GigaLAN, 4 x RS-232 and 2 x RS-485 ports. The UNO-247 is a compact platform that ensures convenient installation with high applicability and integration potential.

The entire form factor has been optimised for internal space savings, an increased mean time before failure (MTBF), more reliable signal transmissions and higher shock and vibration tolerance. Moreover, to reduce system downtime and ensure convenient maintenance, the platform's mechanical design has been improved to enable memory installation/swapping without disassembling the entire chassis.

To prevent unexpected power disconnections or interruptions, the UNO-247 power adaptor is equipped with a threaded DC jack that allows the connector to be locked in place. The device supports the Windows 10 LTSC and Linux operating systems and can be equipped with Advantech's WISE-PaaS/DeviceOn software solution to enable remote monitoring and management. The system features and software-ready design make the UNO-247 a cost-efficient, intelligent edge gateway suitable for diverse IoT operations.

Advantech Australia Pty Ltd

www.advantech.net.au



Antenna alignment tool

The VIAVI 3Z RF Vision is an antenna alignment tool that helps users align panel and microwave point-to-point antennas. Once alignment is achieved, the tool provides reporting capabilities that enable users to retrieve and share automated line-of-sight reports before leaving the job site.

The product not only aligns the antenna, it also provides a visual guide to show where the antenna is pointing. The line-of-sight image is designed to give greater clarity and to simplify the alignment process. The unit enables the user to capture changes such as new building construction, growing tree lines, etc, which can degrade coverage objectives. Augmented reality displays a bullseye target in the 5" LCD touch screen display. A tower tech can align the antenna in one easy step by simply moving the crosshair over to align the bullseye.

The unit has a sunlight-readable screen, is protected with rubber guards and has a rugged weather- and impact-resistant design.

Vicom Australia Pty Ltd

www.vicom.com.au



COMMS CONNECT CONFERENCE UPDATE

Jonathan Nally

Whilst the New Zealand event has been postponed until 2021, Comms Connect's online events are booming.

The Comms Connect New Zealand 2020 conference and exhibition, which had been already postponed from May until October, has now had to be postponed further until May 2021, as the COVID-19 crisis and its attendant travel restrictions continue to wreak havoc on event plans worldwide.

Noting that the decision to reschedule the event from May until October 2020 had been "based on the best available information we had at that time", the organisers have now announced that "the situation is still fluid and it has become clear that we have little more certainty about the months ahead. This obviously makes planning for an event of this nature extremely difficult.

"Given this, and given that we must all do our best to ensure the safety of our teams, our colleagues and our extended contact groups, we have to take what seems to be the only sensible decision available to us in postponing Comms Connect New Zealand until May 2021," said Paul Davis, Director of WFEvents.

Meanwhile, the ongoing series of Comms Connect online webinars and training workshops has been a great success. The Microwave Radio Masterclass in June was fully booked out well before commencement. But if you missed it, don't despair — it will be repeated in August.

The Radio Communications 101 Workshop has proven very popular, so it will be run again in September. It comprises five, two-hour sessions run online over three weeks, and is designed for those who need to

grasp the basics of radio communications, such as IT Managers given responsibility for infrastructure and those who are new to the radio and critical communications industry.

A webinar titled 'Turning black spots into bright spots' will be held in July. Featuring multiple presenters representing various verticals and perspectives, including public safety, power utilities and mining, as well as vendors, this online event will cover complementary technologies and solutions (eg, 4G/5G) that provide the opportunity to augment terrestrial radio availability, coverage and capacity, when the critical communications community needs it most.

There are also three completely new online leadership courses designed specifically for technical managers, specialist engineers and project managers.

The first, 'Leading up and across: Influencing skills for technical leaders', to be held in September, will provide a deep understanding of the true role and expectations of line bosses, as well as virtual bosses. It will provide practical tools and strategies to reduce organisational conflict from competing priorities from multiple bosses, and give strategies to effectively communicate and escalate issues and ideas.

The second, 'Critical Conversations for technical people', to be held in November, will provide a practical framework to help to plan and have a potentially emotional conversation with brutal honesty while protecting personal relationships. The practical framework-based structure with conversational models will help delegates to initiate critical conversations safely and provides recovery strategies to get the conversation back on a good footing when things go awry.

The third course is still being finalised. It will run in February and will be complementary to the other two leadership courses;

keep an eye on the Comms Connect website for details.

Each weeklong leadership course will comprise 12 hours across four sessions, and will be led by Trevor Manning, Managing Director of TMC Global.

Full details of all Comms Connect events, live and virtual, can be found at www.comms-connect.com.au.

APCO 2020 cancelled, IWCE goes online

Most other communications industry events across the globe have also had to be postponed, cancelled or shifted to an online format.

In late June, the US-based Association of Public Communications Officers (APCO) announced that its annual conference — due to be held in Orlando, Florida in August — had been cancelled, citing government health requirements and an advisory against holding events with 50 or more attendees.

"With these new developments occurring... we decided that the prudent thing to do, to the disappointment of many, is to cancel our event," said APCO International Executive Director & CEO Derek K Poarch.

"APCO appreciates your devotion and support of the association and public safety communications community. We look forward to seeing you in San Antonio, Texas, August 15–18, 2021..."

Meanwhile, the organisers of the IWCE have chosen to shift their event to an online format.

"With the prospect of physical gatherings unlikely in the coming months, we are excited to announce the launch of IWCE Virtual, a multi-day virtual experience to be held on August 24–27, 2020, that will allow our entire global community to participate," the organisers said in statement posted on the event's website.

Whatever happened to the National Strategic Radio System?



The 2019–20 bushfire season had many casualties, including communications networks. However, the communications issues in the news of late have nothing to do with coverage, radio congestion, outages, burned-out radio or telco sites, battery capacity, lack of COWs or generators.

"In 1974, emergency services from all over Australia went to Darwin to provide assistance following Cyclone Tracy, just as they did in NSW in 1994, 1999 and 2001, Canberra in 2003 and Victoria in 2009. In each case, the same situation prevailed: the visiting units found it difficult, if not impossible, to interoperate with local units using radio."

Believe it or not, the above words are a direct quote from the National Framework for Improving Government Radiocommunications Interoperability, produced by the National Coordinating Committee for Government Radiocommunications (NCCGR) in 2010 and endorsed through the Council of Australian Governments.

Since then, we have seen interoperability issues cited in government reports and/or royal commissions on the Queensland floods in 2011, Tasmanian fires in 2013,

Queensland cyclones in 2013 and 2017 and the 2019–20 fires which raged across the country.

In 2003, the federal government commissioned a report in relation to inter-agency communications and rural fire brigade communications, including action taken by individual brigades in developing informal systems to overcome perceived problems with agency systems. The report covered communications in all states and territories.

The primary recommendation of that report was "That the Commonwealth, State and Territory Governments commit to the development, in conjunction with representative bodies of all emergency services, to a National Strategic Radio System as an essential element in the protection of Australia."

Some of the interoperability issues have been somewhat resolved by installation of and/or upgrades to state government radio networks. However, not all agencies use these networks, nor do these networks currently provide the level of interoperability needed between agencies, or even less across state borders.

Historically as well as recently, fire crews and other responders have had difficulty communicating with other agencies; in particular, across state borders. This is due to agencies having their own disparate radio networks, and, perhaps even more fatally, each state having its own disparate radio network.

This hinders efforts and endangers lives. Most agency networks are not currently interoperable, even though making them so would be an easier task than most people realise.

For years, the NSW Rural Fire Service has carried numerous radios in each vehicle, including a UHF CB radio, VHF mid-band, VHF high-band, UHF PMR and UHF GRN radio. This ensures that the vehicle can operate on an embarrassingly varied suite of networks, most of which achieve essentially the same thing. A firefighter advancing into a fire front, however, cannot carry such a smorgasbord on his or her belt.

Governments have known about the interoperability problems for decades. It is time for something to be done about it. But until then, UHF CB remains the only widely adopted, truly interoperable, nationally available and readily accessible form of two-way communications.

Is a nationwide P25 radio network the solution? Or is mission-critical push-to-talk (MCPTT) the golden bullet?

As the 2003 report points out, no radio system can guarantee 100% coverage (nor 100% uptime), hence the need for a back-up communication system at all times. Whether a P25, LTE-based and/or MCPTT or hybrid solution is chosen as a solution, there needs to be a robust, reliable and simple (ideally autonomous) back-up solution built-in which provides communications when the network is out of range, unavailable or otherwise impaired.

The time to act on a nationwide communications network for first responders and government agencies is now. "A lesson learned isn't a lesson until it brings about change."



Ben Cosier is Operations Manager at IMPULSE Wireless, where he is responsible for developing solutions including LMR and PTT over LTE. He has experience in technical and operational roles within the enterprise, government, military, radio dealer and manufacturing sectors.



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