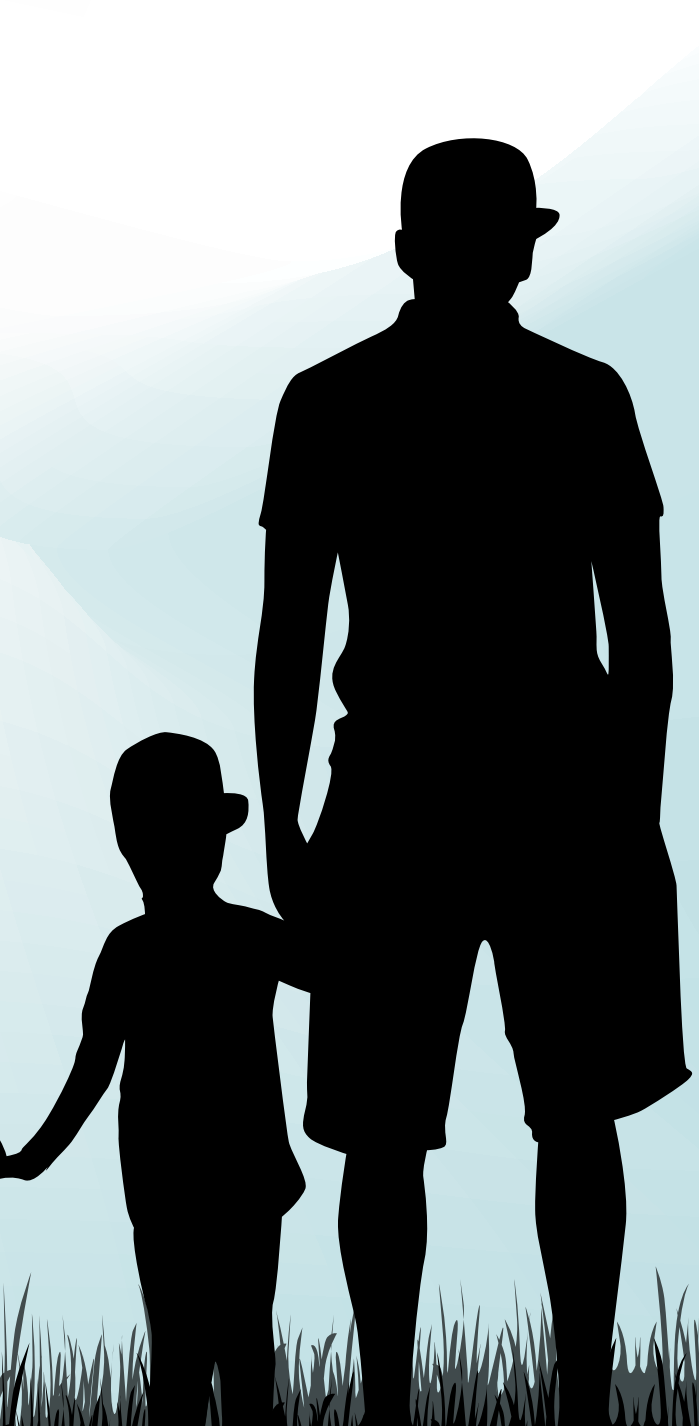
NOVEMBER/DECEMBER 2020 Vol.8 No.1

critical comms

PUBLIC SAFETY | UTILITIES | MINING | TRANSPORT | DEFENCE



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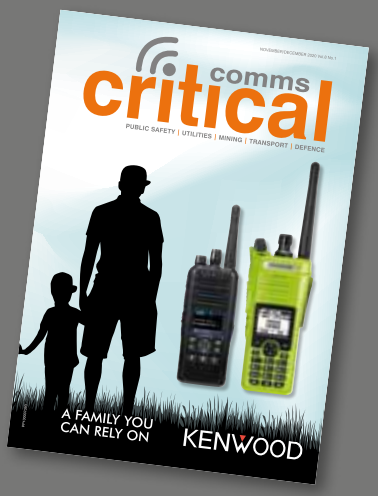
www.criticalcomms.com.au/magazine

ON THE COVER



Kenwood's family of communications products includes everything from a basic analog CB radio to advanced P25 radios with high-level encryption.

From humble beginnings as Kasuga Radio founded in Japan in 1946 to rebranding as Kenwood in 1981, the company now has offices in 13 different countries while still carrying out its manufacturing in Japan.

Although Kenwood has diversified over the years into areas such as medical equipment, pro cameras and projectors, its main focus continues to be in providing clear audio in both car audio and two-way radio products.

Kenwood is known for its noise cancellation technology and audio clarity. Its car audio products uses the company's HD equipment to provide crisp sound for those who want to feel the music they listen to, while its two-way radios provide end users with levels of noise cancellation that enables them to communicate even under the most extreme of environmental conditions.

Kenwood can provide radios to suit user needs across many different protocols and price points, from P25 Phase 1/2 to DMR Tier 2/3, NEXEDGE to analog, from the compact PKT 23X all the way through to the flagship VP 6000. On-board voice recording, GPS and Bluetooth capabilities and IP67/68 ratings provide a suite of capabilities for a range of use cases.

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Transmit

What an "annus horribilis" (as Her Maj. might say) Australia and the rest of the world have experienced this year during the COVID pandemic. Coming on top of the floods and bushfires, the entire community has rarely seen such rapid and widespread disruption and dislocation. Thankfully, Australian governments, communities and business sectors have managed the responses to these disasters in a professional and mostly successful manner.

But when will the next disaster strike? The fear is that in this coming summer we will see a repeat of last summer's awful bushfires. And given the ongoing absence of full interoperability within and between emergency services agencies, it is likely we will see the same kinds of communications difficulties that we saw last year… and the year before… and the year before that… and so on.

As Hamish Duff points out in this issue, the problem is not one of technology, and nor is technology the solution. The solution is for our governments to finally take responsibility, resolve their jurisdictional issues and start rolling out the robust, broadband capabilities that our emergency services organisations desperately need.

Fortunately, even despite progress from government, some concrete steps are being taken, as described by John Stanton of the Communications Alliance in the Spectrum column in this issue. With this as a little ray of sunshine, let's hope that more progress can be made soon.

Please don't forget to register for the Comms Connect Virtual Conference Series taking place throughout November. Emergency communications and many other important topics will be front and centre in the presentations and discussions. This is your chance to hear from local and international experts, and stay abreast of all the latest developments in business- and mission-critical communications.

Jonathan Nally, Editor
jnally@wfmedia.com.au

Calendar

November

Critical Communications Week 2020
2–6 November
Online sessions
criticalcommunicationsweek.com

Comms Connect Virtual Conference Series
5–26 November
Online sessions
comms-connect.com.au

Leading up and across — influencing skills for technical leaders
23–27 November
Online sessions
comms-connect.com.au

Digital PMRExpo 2021
24–26 November 2021
Online sessions
pmrexpo.de/en/pmr20/

December

Radio Communications 101
2–14 December
Online sessions
comms-connect.com.au

February

Managing technical teams
8–12 February 2021
Online sessions
comms-connect.com.au

Critical Conversations for technical people
9–12 February 2021
Online sessions
comms-connect.com.au

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

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UPDATE ON MISSION-CRITICAL TECHNOLOGY DEVELOPMENTS

Jonathan Nally

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Work is proceeding on the steps needed to move the mission-critical sector into a mobile broadband future.

Even as the COVID-19 pandemic has wrought disruption to societies and industry sectors across the globe in 2020, work has nonetheless proceeded on a range of technological and organisational developments in the mission-critical communications sphere... particularly for that of the public safety mobile broadband (PSMB) sector.

More countries are deploying or moving closer to deploying PSMB networks, and new technologies such as 5G are promising to make their way into the mix of solutions that will become available.

To get an update on progress in various mission-critical communications matters that have been ongoing throughout the year, we conducted the following Q&A with Tony Gray, CEO of The Critical Communications Association (TCCA), and Anton Abrahams, Chairman of the Australasian Critical Communications Forum (ACCF).

What has been the impact of the pandemic on ACCF/TCCA activities?

As with all organisations, with the cancellation and postponement of in-person events, the pandemic has significantly altered the way TCCA and the ACCF work. However, with the vast majority of the work taking place online, projects have continued largely uninterrupted and we continue to provide a platform for the exchange of information and experience between members globally, to work with global standardisation organisation such as ETSI and 3GPP, and to drive the evolution of critical communications worldwide.

We postponed our major Critical Communications World Conference and Exhibition live event to June 2021 in Madrid and replaced it with an online virtual conference and exhibition Critical Communications Week 2020 in the first week of November. TCCA has also been hosting a number of webinars, supported by ETSI, ETSI TC-TCCE, MCS-TaaSting, the Global Certification Forum, Leeds University Business School, BAPCO, Omdia and a number of European government operators.

After Comms Connect cancelled its face-to-face conferences and exhibitions for 2020, ACCF was invited to use the Comms Connect online platform for an August webinar where it provided an update on ETSI and 3GPP activities and on 'Unifying MC communications — how and what's next'.

ACCF will further support the Comms Connect Virtual Series in November with a keynote presentation on 'Digital LMR powering ahead — how and why'.

What's the latest in standardisation news within the different comms technologies?

TCCA continues to work with global standardisation bodies ETSI and 3GPP to drive the evolution of critical communications worldwide and stay across the rollout of various national mission-critical (MC) broadband networks such as FirstNet (USA), SafeNet (S-Korea), ESN (UK), Virve 2.0 (Finland) and others.

The migration to MC broadband and the concept of broadband interworking with current narrowband systems such as TETRA and P25 is of importance to public safety and other vertical markets moving towards either hybrid networks or migrating over time entirely to MC broadband.

With TCCA's continuous support and involvement as the 3GPP Market Representation Partner (MRP) for critical communications, the 3GPP standards developments are ongoing. Currently work is focused on 3GPP Release 17. Support has been provided to the utilities sector — mainly via E-UTC — as well as railways via the UIC for Release 18 initial content.

3GPP LTE Release 16 has been completed, including MC work items such as Enhanced MC Communication Interworking with LMR Systems. However, since all work in working groups since March has been virtual, a delay of at least a quarter can be expected leading the completion towards the end of 2021.

3GPP Release 16 includes:

- Mission-critical services over 5G
- Enhancements for railway communication
- Content and media servers, file distribution
- IOPS – Isolated E-UTRAN for public safety
- Common features with other 5G services
- Satellite 5G access
- Drones
- Multicast, unicast, broadcast
- Device2Device/Sidelink
- Open Service APIs
- Generic API platform for all services

How is the certification process responding to user needs?

The public safety and mission-critical user community has a strong requirement for interoperability certification and multi-vendor supply of MC broadband solutions that are capable of very high degrees of availability, priority, pre-emption, trusted security and extensive coverage.

The Global Certification Forum (GCF) and TCCA initially combined their expertise to establish a Joint Task Force for mission-critical product certification. The task force worked from January until June 2020 and assessed the possibilities for a certification scheme, conducting a gap analysis in terms of frequency bands and MC functionalities compared with current available processes in GCF. Subsequently, a jointly run Mission Critical Agreement Group (MCAG) has been established under GCF auspices to progress testing and certification for mission-critical products.

As a working example, the TETRA world has a very successful and established interoperability process (IOP) managed by TCCA in which all major TETRA manufacturers participate. This is what many future MC broadband users are also expecting and require for 3GPP standardised MC Broadband solutions — notwithstanding that the IOP environment for MC broadband will be quite different as, unlike TETRA IOP, hardware and software are separated both on the infrastructure and on devices, resulting in different business models.

From the TETRA IOP experience, a multi-vendor market gives benefits both to the users in terms of the broadest product portfolio of compatible equipment and interoperability, competitive pricing and rapid entry of new product models; and to the industry in terms of a wider accessible market, faster market take-up and better directed investment in new product developments.

In order to meet the MC broadband interoperability objectives, similarly as was done for TETRA IOP, various testing initiatives such as the ETSI MCX Plugtests, conformance testing and software and product interoperability testing were needed to ensure that products conform to the standard, and to procure functions and features in a multi-vendor business environment where products are interoperable.

The ETSI MCX Plugtests supported by TCCA were implemented in 2017, where vendors test their 3GPP MCPTT/MCX implementations with each other. These Plugtests have continued successfully with more and more participants.

The fifth MCX Plugtests (MCX#5) took place remotely at the end of September and beginning of October 2020. The ACCF participated in the MCX#5 Plugtests observer program, providing an overview on the ANZ critical broadband landscape.

When do you think 5G will be able to fit in with mission-critical users?

5G only started commercially during the first half of 2019, by providing enhanced mobile broadband services with higher data rates and more capacity compared to those offered by LTE networks. The next phases will include enhancements in network reliability and latency suitable for critical industry applications.

5G will also bring network slicing capability so that different end-to-end, separate virtual networks with their own individual requirements can be provided and operated independently for each customer.

As critical broadband matures — with first deployments already in place around the world to enhance first responders' situational awareness and operations — it's not too early for mission-critical operators and public safety agencies to start considering when and how they will take advantage of 5G capabilities. In Release 16 (this year) 3GPP has been working on 'Mission Critical services over 5G'.

5G will enable rapid deployment of new supply chains and logistic modes, connecting manufacturers with their suppliers faster and more directly, and help to aggregate vast amounts of data from multiple, dispersed sources for better insight into operational status.

It will also enable new levels of supply chain visibility and transparency — an attribute that could prove highly valuable, for example in pandemic track and trace. Urban areas, with their high population densities, have proven to be the epicentre of COVID-19 outbreaks and 5G could bring new ways to inform citizens, connect services and therefore enhance public safety.

5G-enabled data transfer and analytics can be applied to information about transport and public services in a dynamic way in real time.

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The industrial-grade Tropos portfolio is specifically designed for mission-critical applications in harsh environments such as mining, oil & gas, utilities and smart cities. Products supported include Tropos 6420-XA for extreme outdoor environments including salt fog resistance and ATEX Zone 2 for explosive atmospheres, Tropos 6420 and 1420 for external mounting, and Tropos 2420 for mounting inside a vehicle. All are dualband routers operating at 2.4 and 5GHz, providing an extremely reliable and secure self-healing broadband mesh network.

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> IT'S NOT TOO EARLY FOR MISSION-CRITICAL OPERATORS AND PUBLIC SAFETY AGENCIES TO START CONSIDERING WHEN AND HOW THEY WILL TAKE ADVANTAGE OF 5G CAPABILITIES.

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Much is already predicted for 5G's impact on healthcare, with HD-quality telemedicine and mobile health destined for major advances. But there are technologies currently in use that could potentially transform with 5G such as thermal cameras already in use at airports as a preliminary diagnostic tool.

Do you think enough is being done to address the problem of cybersecurity?

Moving from the traditional LMR systems to MC broadband will increase efficiency and capability, but the transition also sees the end of the highly secure and controllable ecosystems of the past, posing cybersecurity challenges.

One of the greatest issues is that public safety, emergency and essential services network operators may not own or control the entire system. And some assets may be shared with or even owned by others such as telecom operators/mobile network operators (MNO).

The cyber-attack surface is rapidly expanding in the move to IP networks. The simpler legacy LMR voice systems were designed without IP data protocols —the 'attack surface', therefore, was a much narrower interface. But when we move to heterogeneous IP-based networks, there are many paths through which data can travel, so the perimeter needs to be secure.

A number of MC Broadband vendors are developing products with cybersecurity in mind and/or working with organisations to overcome certain threats. As mobile devices perform everyday public safety and enterprise tasks, they regularly process, modify and store sensitive data.

While the diversity and complexity of the mobile ecosystem and the rapid pace of change offer challenges to selection, integration, and management of mobile technologies into a public safety enterprise IT environment, there will be a need that — before designing and deploying mobile device solutions — organisations conduct a threat assessment for managing and using mobile devices and mobile apps to access and process sensitive data.

For example, in the USA general security recommendations for any IT technology are provided by NIST in Special Publication (SP) 800-53, Security and Privacy Controls for U.S. Federal Information Systems and Organizations.

And in Europe, the European Union Agency for Network and Information Security (ENISA) issued the report Protecting Industrial Control System Recommendations for Europe and Member States, which contains practical recommendations to enhance cooperation and information sharing, and developing new measures and good practices.

Are your members concerned by technology tensions between the US and China?

All our members work to the common goal of enhancing critical communications. TCCA member organisations which would elsewhere be considered competitors collaborate successfully in several of TCCA's Working Groups to achieve advancements that benefit the sector as a whole.

Has COVID-19 has caused any problems with the fulfilment of comms contracts?

As far as Australia is concerned, our members have seen delays in shipment and deliveries because of international flight restrictions during the COVID-19 pandemic, whilst the shipping costs almost doubled.

This also restricted the support of factory specialists needed for certain projects. Due to internal Australian border closures, it has been difficult for installation crews to attend to the implementation of LMR systems in various states.

However, there was some ongoing run rate in the resources sector with new mines being rolled out, along with local government and utilities developments in some states. We expect market improvements once COVID-19 restrictions ease.

Ongoing refresh of subscriber products is expected and there are opportunities from private rail and mining projects planned in various parts of Australia. While interest in and demand for private LTE is growing in the resources sector, there seems to be acceptance now that LMR/PMR for critical communications — operating in tandem with broadband for data — is a way forward.

What developments do you expect to see in 2021? What would you like to see?

During the pandemic, telemedicine, videoconferencing and cloud-based solutions are demonstrating their value, with all levels of the public safety community benefiting from that broadband capability.

So, MC broadband is no longer just an option. We believe that public safety agencies and mission-critical users are undergoing a process of reinvention due to COVID-19. They need the ability to send and receive mission-critical information securely and reliably in emergency situations, be it voice or data or video.

MC broadband transforms traditional mission-critical (first responder) communications and digitisation of communication and collaboration platforms. High-quality and reliable data transfers improve operational workflows and break down data silos, enabling informed real-time decisions to be made for public safety and mission-critical operations.

TCCA's main goal globally is unchanged: to drive the development and operation of common mobile and broadband standards and solutions for public safety and all the other critical communications groups, while ensuring the enhancement of the TETRA standard to safeguard users through to 2035 and beyond.

The ACCF will continue to focus on critical broadband and our region's transition from critical narrowband technologies into one common 3GPP standard for mission-critical broadband.

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UPGRADE FOR VANUATU'S EMERGENCY RADIO NETWORK

Vanuatu's national government will get an upgraded emergency radio network under a joint project with Australia.

The governments of the Republic of Vanuatu and Australia are joining forces to repair and upgrade the Vanuatu government's inter-island emergency radio network.

The three-year project will be undertaken under the auspices of the Vanuatu-Australia Defence Cooperation Program and will substantially boost the archipelago's disaster preparedness and response capability. It will also support the Vanuatu Police Force.

Australian Minister for Defence Senator Linda Reynolds said Tropical Cyclone Harold, as well as the challenges of COVID-19, have highlighted the need for communications to support policing and disaster resilience.

"Australia is proud to partner with the Vanuatu Police Force to design and deliver an enduring solution that meets Vanuatu's needs," Minister Reynolds said.

"The project provides an invaluable avenue for enhanced collaboration, training and interoperability between our nations — including during humanitarian assistance and disaster relief operations."

The project will establish a unified emergency call and dispatch system to connect police outposts to support local communities.

Initially focusing on delivering communications infrastructure and training to Port Vila, Luganville, Aneityum, Sola, Loh, Ambae and Epi, the effort will be expanded over the next three years to support 15 police outposts in total, including mobile two-way radio in five locations.

Vanuatu's Deputy Prime Minister and Minister of Internal Affairs, Alatoi Ishmael Kalsakau, said the project will have a far-reaching impact.

"The project supports Vanuatu's National Security Strategy and decentralisation efforts, connecting communities and delivering security services to rural areas," Minister Kalsakau said.

"It also supports our border security efforts, particularly important in the current COVID-19 environment.

"We know that good communication in the minutes and hours following a disaster is critical to an effective and speedy response," Minister Kalsakau added.

"This is yet another example of how Vanuatu and Australia can work together as security partners to deliver practical benefits for both nations."

Radios

The Motorola WAVE Series combines the broad coverage of a nationwide broadband network with the ease of push-to-talk radio communications, including features such as GPS location tracking and over-the-air device management, and makes it easy to get teams up and running without costly radio infrastructure.

The TLK100 from Ace Communications provides a powerful and slim design, making it simple to move from the field to the office with a streamlined device that supports one-handed use. The TLK100's long-life battery is designed to last 18 h.

The TLK150 has a compact design, making it small enough to mount over, in or under the dashboard, and includes features such as Private and Group PTT, and loud and clear audio. With the use of the one-button PTT microphone or a variety of hands-free accessories also available, the TLK150 enables safe operation in vehicles within the legal regulations for driver distraction on the roads.

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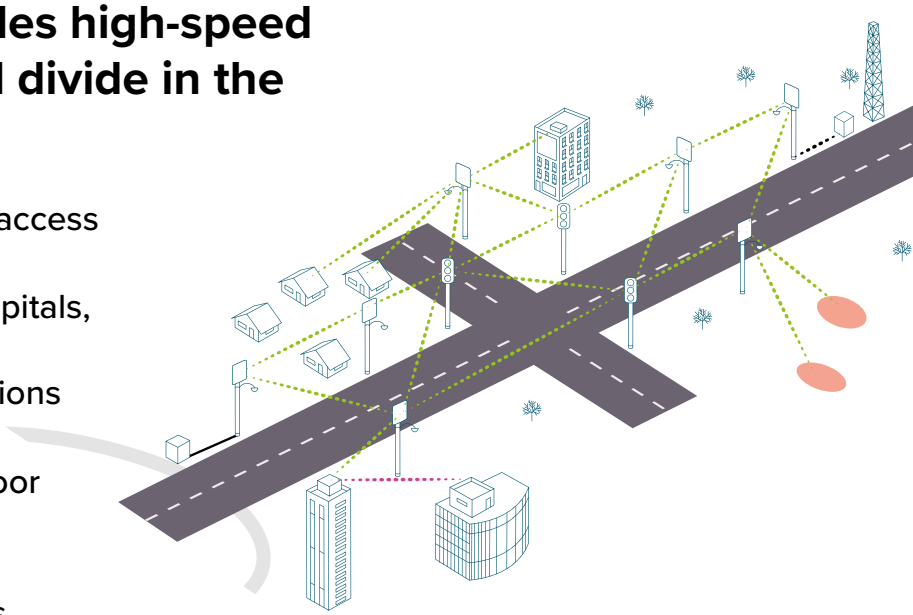

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COMMS CONNECT
VIRTUAL CONFERENCE SERIES

Jonathan Nally

Private LTE, cybersecurity, location-bases services and the future of LMR will headline this important online conference series.

The Comms Connect Virtual Conference Series will deliver a tightly packed program of leading experts and topical subjects across four Thursdays in November.

Brought to you by the team that has led the industry in live event experiences and content for more than 14 years, the new online format has been carefully crafted to suit audiences in this COVID-affected year.

It also makes for easy participation for those who would not normally have been able to attend the traditional face-to-face conference in Melbourne.

The line-up of local and international speakers will cover a wide variety of subjects of direct interest to the business- and mission-critical communications field, with a focus on presenting practical and application-focused material on the hot topics driving the sector across Australia, New Zealand and the wider region.

The event will comprise four, two-hour sessions (10:00 am to midday) spread across the four Thursdays in November.

5 November: Cybersecurity and critical communications

Ensuring the cybersecurity of mission-critical communications and industrial systems will be top of the agenda on the first day of the virtual conference series. Spearheading the discussion will be:

- Dr Ian Oppermann, Chief Data Scientist with the NSW Department of Customer Service, and Industry Professor at University of Technology Sydney
- Bill Fisher, Security Engineer with the US National Cybersecurity Center of Excellence (NCCoE), part of the US National Institute of Standards & Technology (NIST)
- John Beltz, Cybersecurity Lead with the Public Safety Communications Research (PSCR) Division of NIST
- Peter Jackson, Director of Cyber Security with ECL Cyber

Dr Oppermann will tackle of the question of whether the mission-critical communications sector is lagging behind other tech sectors in preparing for and dealing with cybersecurity challenges.

Fisher and Beltz will outline how federated identity systems are the key to secure information sharing when users from multiple organisations need to access services from multiple providers — in particular, the problem of interoperability and information sharing between agencies and among first responders on the scene of a disaster.

Jackson's presentation will outline the work he and his colleagues have been doing to improve cybersecurity for industrial organisations, with a focus on operational technology (OT) security rather than IT security. He will cover best-practice OT security and give real-world examples of the good, the bad and the ugly, along with some insights into the New Zealand ICS Cyber Technical Network.

12 November: Private LTE

Ensuring there is coverage, capacity and control for the private LTE network of the future will the theme of the second week's session. The speakers will be:

- Simon Lardner, Co-founder and Managing Director of Challenge Networks
- Randy Richmond, Product Manager, Zetron
- Rui Chen, Senior Lead Architect, Commtel Network Solutions
- Rodney Nebe, Superintendent: IT Networks, Gold Fields

Lardner will outline his experiences of deploying more than 15 networks within Australia and internationally, and what he sees as being the next phases of development in the sector.

Richmond's presentation will focus on how critical infrastructure control rooms integrate with LTE networks (private, commercial or national) and how to make use of LTE MCPTT in the broadband migration from narrowband LMR.

Chen will present a case study of a private LTE deployment in the Australian gas fields and how the system was designed and deployed to have high availability and low latency.

Nebe will describe the private LTE networks deployed at three of Gold Fields' mines, and how the first five years of operation have proceeded.

19 November: Location-based services

Although location-based services applications are now part of everyday life — running

across LTE (public and private), LMR, IoT and Wi-Fi networks — it is imperative that they are properly integrated into operational and analytical systems.

This session will feature three speakers:

- Station Officer Graham Tait, Systems Officer, Operations Communications, Fire & Rescue NSW
- Hamish Duff, GM/Director, The Orion Network ANZ
- Chris Stevens, Managing Director, CartGIS Pty Ltd

Tait's presentation will look at how Fire & Rescue NSW has integrated location-based services into all aspects of its incident management, from call taking and dispatch to firefighter safety at the incident, as well as the new and emerging technologies being investigated to take this capability into its next phase.

Duff's presentation is intended for both technical and non-technical participants and will highlight the value of LMR for short data services such as GPS, indoor tracking and messaging.

Stevens' presentation will investigate the use of ESRI and other GIS platforms as a data processing and integration tool, and highlight the use of operational dashboards and web apps as tools for displaying and analysing disparate data sources.

26 November: Next-generation Land Mobile Radio

While global LMR systems sales are expected to grow over the next few years, the challenge for the traditional radiocommunications industry is how to remain relevant into the future. This session will look at the strategies being used by the sector to ensure that happens. The speakers will be:

- Kevin Graham, Founding Director, ACCG and Managing Director, Global Digital Solutions
- Simon Riesen, Senior Solutions Manager, DAMM Cellular Systems
- Neal Richardson, Technical Director, Public Safety Network NZ
- Lawrence McKenna, Principal Engineer (Manager), Cumarsaid

Graham will examine the reasons why demand for digital, open standards-based LMR remains strong alongside its convergence with broadband. He'll also outline progress on MCX functionalities.

Riesen will use four TETRA use cases to show how to build coverage with a minimal number of frequencies in low-density networks, such as railways.

Richardson will outline how New Zealand is developing a new critical communications capability for its emergency services sector, explaining who and what is involved and how the challenge of delivering a solution to enable the right care at the right place will be met.

McKenna's presentation will show how the breakdown of relationships between parties is the greatest risk for any project. He'll outline the key stakeholder roles required for success and the balance of responsibilities and relationships between project engineer, installation contractor and maintenance technician.

Panel discussions

Each of the four sessions will be MCed by Chris Stevens, who will also lead the short panel discussions to be held at the end of each session. The panels will give the speakers a chance to flesh out their ideas with each other, and there'll be ample opportunity for registered participants to submit questions.

The easy online format and breadth of speaker talent makes the Comms Connect Virtual Conference Series an event that is not to be missed. Registration is only $75 per person per session, or you can book four sessions for the price of three.

Full session details and registration information are available at https://www.comms-connect.com.au/event/comms-connect-virtual-conference/.

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News

CONNECTIVITY FOR ENERGY, UTILITIES, MINING

Inmarsat, AST and Harvest Technology Group have signed an agreement that will give the latter's customers the ability to remotely monitor assets, coordinate site surveys and conduct maintenance operations using real-time video and audio transmitted via ultra-low-bandwidth satellite communications. Harvest's Wearwolf wearable headset and 'data-anywhere' solutions can transmit high-quality synchronised video and audio between technicians, engineers and site managers who may be in widely separated locations via Inmarsat's Explorer 710 BGAN terminal. "This alliance will not only allow for the implementation of existing technology, but will further fuel the innovation for future cutting-edge communication initiatives," said Harvest's Managing Director, Paul Guilfoyle.
More info: bit.ly/33Z1tyX

P25 COMMITTEE, CISA RELEASE P25 RESOURCE

The P25 Steering Committee, with support from the US Government's Cybersecurity and Infrastructure Security Agency (CISA), has developed the Statement of Project 25 User Needs (SPUN) to help users better understand P25 technologies and identify their communications needs. According to Jim Downes, CISA Branch Chief, "Most LMR users lack both access to the P25 Standards and the time to read through volumes of technical documentation to fully grasp all the features and capabilities that P25 systems can provide or to engage in the standards development process." The SPUN provides high-level explanations of P25 system architecture, features and functions as defined in the Telecommunications Industry Association 102 Suite of Standards (P25 Standards).
More info: bit.ly/33WrRJK

Router

The TRO620 DIN rail-mounted cellular router provides secure connection over public and private cellular infrastructures, combining cellular communication technology with Hitachi-ABB Power Grid's patented Broadband Mesh functionality with an Edge Compute capability for field area networks and distribution automation.

The TRO620's selection of connectivity includes: 3x3 MIMO broadband mesh based on the 802.11ac standard, which can be used for mesh backhaul or connectivity for wireless clients Gigabit fibre backhaul interface; 4 Gigabit Ethernet interfaces for connecting wired clients; and 2x2 cellular antennas, providing cellular service through a selection of technologies (2G, 3G, 4G, P-LTE) across a large selection of bands globally. Serial interfaces provide connectivity to legacy devices already deployed in the field.

The TRO620 is galvanically isolated, with an industry-grade grounding pin, and it has an optimised DC power supply and efficient power consumption for long lifecycle deployments.

Wireless Tech (Australia) Pty Ltd
www.wirelesstech.com.au

Power system

Eaton's 3G wall mount power system is designed to enable users in the industrial control, electrical switching and telecommunications industries to access and monitor reliable, battery-backed DC power.

Developed in Australia, the system requires minimal space and has a form factor that better suits industrial control and electrical switching boards, as well as small service closets. It also has monitoring and control capabilities.

The system can be configured for either AC mains or solar PV power, providing the convenience of a single power system type and making it a suitable solution for process control systems in remote locations with limited access to convenient mains AC power, and where PV solar power may be the only cost-effective power source.

The system's battery backup and redundancy can support most process controls systems which use PLCs, valves, solenoids, switches and sensors that are powered from 24 or 48 VDC.

The in-built SC200/SC300 advanced system controller delivers full remote monitoring and control, including Ethernet, RS232 (TCP/IP or Modbus) and voltage-free relay contacts. It is an N+1 redundant design, supporting up to 1.4 kW (24 VDC) or 2.0 kW (48 VDC) secure power, making it suitable for the oil and gas, mining and industrial power industries.

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Industry Talking

As we head into the last stage of 2020 we are now beginning to see some encouraging progress on the COVID-19 pandemic. Australia is indeed a lucky country and, despite the unfortunate circumstances in Victoria, as a country, we have done very well. ARCIA wishes all our members and families the best as we navigate our way into 2021. I sincerely hope that we continue to stay relatively virus-free and can begin to rebuild our economy.

Along with all our industry partners, we submitted substantial information to the Royal Commission into National Natural Disaster Arrangements earlier in 2020. The Royal Commission has provided a set of preliminary recommendations; public safety communications was included along with commentary on both LMR and public safety mobile broadband.

What stands out here is the driving need for public safety to have new investment in unified standards, networks, equipment and all the things that go into mission-critical networks. This investment needs to enable the agencies to do their jobs, anytime, anywhere, including near or across state borders.

This is not a technology problem; technology has had the solutions for many years. Rather, it is the will for government agencies to work together that is holding the solutions back.

ARCIA really hopes that state and federal governments can find a way to move forward on this. In NSW, the Government Radio Network started in the late 1980s with the promise of a state-wide network following in the 1990s.

When will NSW have a true state-wide network for public safety? Empty words and submissions to enquiries don't help. Maybe Australia needs to treat the natural disasters of 2020–21 like the USA used the September 11 tragedies as the catalyst to develop FirstNet. Let this past summer be the catalyst to get everyone thinking and working together to solve the public safety communications problems.

Maybe it needs to be a staged approach to fit within the financial limits of a smaller population in a big country, but at least let's set out a logical program and work towards it... beginning now!

On this matter I think another point needs to be made. What is becoming clearer every day is that LMR technology will be part of the communications landscape for a long time to come. When you look at other markets such as the UK and USA, you can see that while LTE is proving to be a game changer for critical data, there are just too many circumstances where LTE does not fully replace LMR.

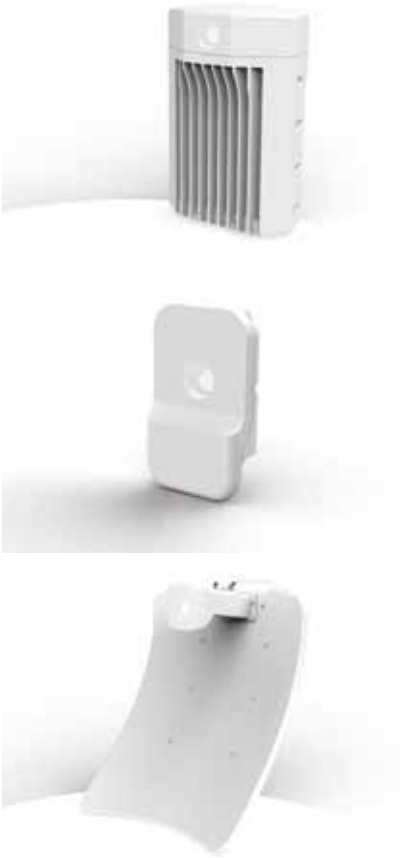
Despite the predictions of some pundits that LMR will be replaced, global markets for LMR are still growing. There are now many suppliers (including my own business) offering radio-like functions on mobile devices; they are very useful but they don't come close the performance of dedicated LMR devices and systems. For many consumers their needs are perfectly meet by PoC devices; equally, however, for many users they are just not up to standard.

So it seems clear that a wide range of systems, devices, standards and suppliers will continue to provide services to the market, and from ARCIA's point of view this is a good thing. With this in mind we believe that members of our trade will continue to be needed whatever the underlying technology. Remember, all of these technologies rely on radio, and as we have outlined for several years, it is our industry that understands radio best. ARCIA is working on how we can provide direct training to our members on subjects that will provide benefits to our members across all sectors.

ARCIA is pleased to announce that we will hold a virtual annual event on the afternoon of 27 November. The intention is to bring our members together in workplaces all over Australia to recognise our industry, with that day therefore also featuring our regular annual award presentations. The event will run over a shorter-than-usual format. We encourage workplaces to get teams together to recognise our industry achievers and to also realise that we are a critical part of the Australian economy. We hope this will enable many more members who might not normally be able to attend the Melbourne dinner, to get involved.

Keep safe everyone.

Hamish Duff, President
Australian Radio Communications Industry Association



Wireless system

Cambium Networks has introduced the 60 GHz cnWave multi-gigabit wireless connectivity solution, based on the 802.11ay standard with mesh support and Facebook Terragraph certified. The solution can be used for fixed wireless access, backhaul for small cell or Wi-Fi access, video surveillance and smart city initiatives.

The 60 GHz cnWave solution includes a V5000 Distribution Node, V3000 High Gain and V1000 Mid Gain Client Node, supporting point-to-point, point-to-multipoint and mesh configurations. It is an integral part of the Cambium Networks Wireless Fabric solution (eg, Wi-Fi 6 backhaul with cnMaestro single pane of glass management) and is also supported by LinkPlanner for planning.

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DAMM Cellular Systems

STEVE HWANG
Business development manager,
Nokia
Committee member of
Safe-Net Forum

THURSDAY 5 NOVEMBER 2020 Cybersecurity and our industry — lagging behind others?	**10.00AM – 12.00PM (AEDT)**
10.00am	**Welcome and opening remarks from the moderator, Chris Stevens** — Managing Director, CartGIS Pty Ltd
10.10am	**Cybersecurity vulnerabilities — increasing dependence on increasingly complex systems** **Dr Ian Oppermann** — Chief Data Scientist, NSW Department of Customer Service
10.35am	**Federated identity is the key to secure information sharing** **John Beltz** — Cybersecurity Lead, Public Safety Communications Research Division, National Institute of Standards & Technology **Bill Fisher** — Security Engineer, National Cybersecurity Center of Excellence, National Institute of Standards & Technology
11.00am	**Why network security is even more important today** **Steve Hwang** — Business Development Manager, Nokia/Committee member of Safe-Net Forum
11.20am	**Securing NZ industrial environments — an OT perspective** **Peter Jackson** — Director of Cyber Security, ECL Cyber
11.40am	**Panel Q&A** **Panel: Dr Ian Oppermann** — NSW Data Analytics Centre, **John Beltz** — Public Safety Communications Research Division, National Institute of Standards & Technology, **Bill Fisher** — National Cybersecurity Center of Excellence, National Institute of Standards & Technology, **Peter Jackson** — ECL Cyber **Moderated by Chris Stevens**
12.00pm	**Session close**

THURSDAY 12 NOVEMBER 2020 Private LTE — ensuring there is coverage, capacity and control for the private LTE network of the future	10.00AM – 12.00PM (AEDT)
10.00am	**Welcome and opening remarks from the Chair, Chris Stevens** — Managing Director, CartGIS Pty Ltd
10.10am	**So what is next with private LTE?** **Simon Lardner** — Managing Director, Challenge Networks
10.35am	**Answering 5 important questions about integrating mission-critical PTT with control rooms** **Randy Richmond** — Product Manager, Product Management, Zetron
10.50am	**LTE case study in the gas fields** **Rui Chen** — Senior Lead Architect, CommTel Network Solutions
11.10am	**Coverage — a different perspective** **Roger Kane** — Managing Director, Vicom Australia
11.25am	**Practical advice from one of Australia's first private LTE networks** **Rodney Nebe** — Superintendent: IT Networks, Gold Fields
11.45am	**Panel Q&A** **Panel: Simon Lardner** — Challenge Networks, **Rui Chen** —,CommTel Network Solutions, **Randy Richmond** — Zetron, **Rodney Nebe** — Gold Fields **Moderated by Chris Stevens**
12.00pm	**Session close**

THURSDAY 19 NOVEMBER 2020 Location-based services — practical integration tips	10.00AM – 12.00PM (AEDT)
10.00am	**Welcome and opening remarks from the Chair, Chris Stevens** — Managing Director, CartGIS Pty Ltd
10.10am	**How location-based services assist with emergency response and incident management** **Station Officer Graham Tait** — Systems Officer, Operations Communications, Fire and Rescue NSW
10.35am	**Sponsor presentation**
10.50am	**Location services and digital LMR — critical data over LMR** **Hamish Duff** — GM/Director, The Orion Network ANZ
11.10am	**Big data integration. Using the power of GIS as an integration tool for spatial and non-spatial data** **Chris Stevens** — Managing Director, CartGIS Pty Ltd
11.30am	**Panel Q&A** **Panel: Hamish Duff** — The Orion Network ANZ, **Station Officer Graham Tait** — Fire and Rescue NSW **Chris Stevens** — CartGIS Pty Ltd
12.00pm	**Session close**

THURSDAY 26 NOVEMBER 2020 Next-generation land mobile radio systems — how does the industry keep radio relevant?	10.00AM – 12.00PM (AEDT)
10.00am	**Welcome and opening remarks from the Chair, Chris Stevens** — Managing Director, CartGIS Pty LtdP
10.10am	**Digital LMR powering ahead — how & why?** **Kevin Graham** — Founding Director, Australasian Critical Communications Forum & Managing Director, Global Digital Solutions
10.35am	**Frequency sharing in TETRA** **Simon Riesen** — Senior Solutions Manager, DAMM Cellular Systems
10.50am	**Public Safety Network New Zealand** **Neal Richardson** — Technical Director, Public Safety Network NZ
11.10am	**Sponsor presentation**
11.25am	**Project engineering a new radio network – tips and pitfalls** **Lawrence McKenna** — Principal Engineer (Manager), Cumarsaid
11.45am	**Panel Q&A** **Panel: Kevin Graham** —ACCF/Global Digital Solutions, **Lawrence McKenna** — Cumarsaid, **Neal Richardson** — Public Safety Network **Moderated by Chris Stevens**
12.00pm	**Session close**

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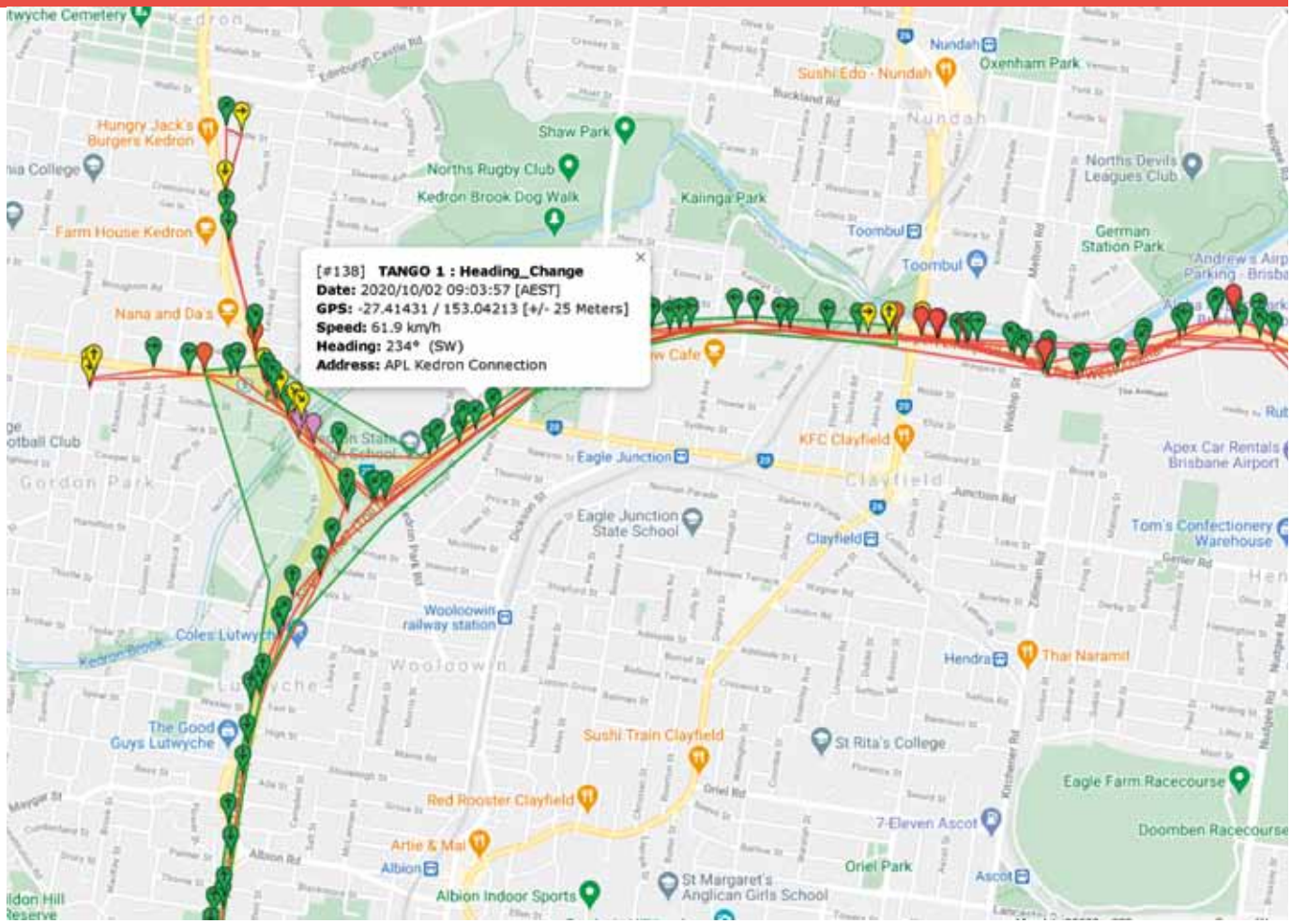
DRIVING LOCATION SERVICES UNDERGROUND



Tunnel Network Services (TNS) provides incident response and maintenance for Transurban Queensland's (TQ) network of tolled roads and tunnels in Brisbane. TNS has been using push-to-talk over LTE (4G) for its operational communications on the road for more than three years.

Recently, TNS upgraded its tracking system — at no cost, by leveraging existing infrastructure — to provide accurate underground tracking.

The organisation's Android-based PTT devices used for two-way communications and GPS tracking could only track staff when they were above ground. This meant that to pinpoint a worker's location while in a tunnel required either a report from the worker or a search of up to hundreds of live CCTV camera feeds. This was the only remote way to find a worker who could not state their precise location, or who perhaps was in distress.

In 2019, TQ installed road navigation beacons in more 18 kilometres of road tunnels as a service to motorists. The beacons enable underground navigation via the Waze app or Google Maps.

IMPULSE Wireless worked with Waze to gain access to the beacons, and integrated the functionality into the IMPULSE Wireless worker safety and tracking application, which was already being used on the PTT devices by TNS.

The technology has also been implemented in Sydney's WestConnex M4 East tunnel.

The benefits

Control room operators can now view the live and historical locations and status of field staff, whether above or below the ground. All this was achieved at zero cost to TNS, as the infrastructure required (road navigation beacons) had already been rolled out for motorists by TQ.

The user devices feature an SOS button which triggers audible and visual alerts in the control room. Automated alarms and worker protection, such as lone worker and man-down, are also supported.

"Prior to leveraging the technology, tracking was based on GPS locations which cut out as units entered the tunnels and did not come back online until they exited," said Lucas Anderson, Safe Lane Availability Manager.

"Now our incident response teams can be tracked within 25 metres of their location in-tunnel.

"The location of incident response teams is shown on a display in the tunnel control room, which assists with resource selection for individual incidents, based on the closest unit, which helps to reduce response and rectification times," Anderson added. "This increases safety for both workers and motorists.

"It's great use of equipment available."

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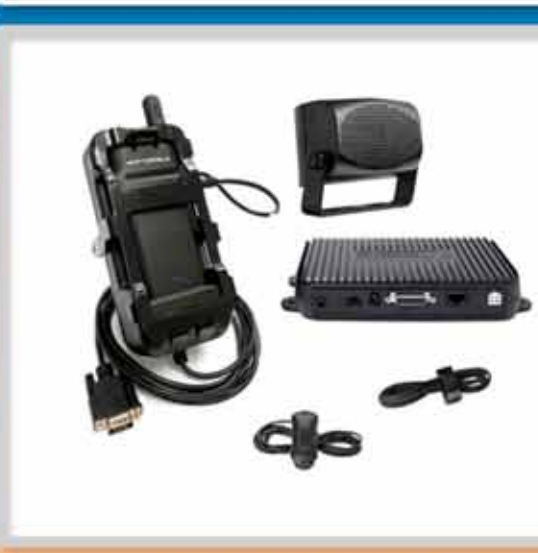

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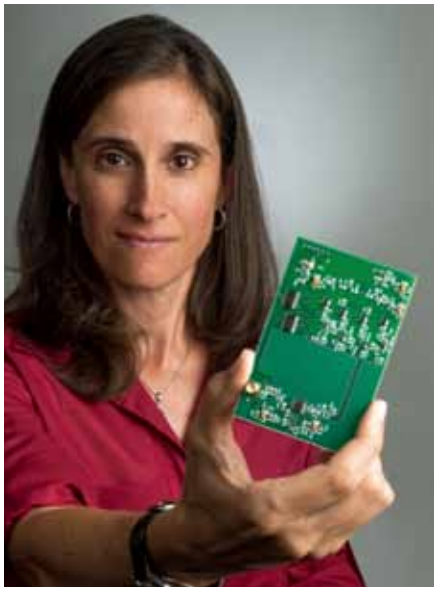
NEXT-GENERATION DISTRESS BEACON RESEARCH

NASA has partnered with Australia's SmartSatCRC to advance distress-related communications and navigation technology.



NASA's Search and Rescue mission manager Lisa Mazzuca holds hardware from the beacon development effort. Credit: NASA

In a boost for developing Australia's space economy, NASA Goddard Space Flight Centre (GSFC) has announced a collaboration with SmartSatCRC to advance distress-related communications and navigation technology benefiting the US and Australia.

The cooperation with NASA, announced by GSFC Deputy Director for Research and Technology Investments Christyl Johnson, will help to build Australia's space industry by developing leading-edge technology and expertise with the partners involved in the SmartSat project.

These include University of South Australia, Safety from Space, Myriota, Black Art Technologies, Flinders University and the Australian Maritime Safety Authority.

Emergency beacons

NASA's Search and Rescue office is led by mission manager Lisa Mazzuca, who attended the Australian Space Forum in Adelaide with Christyl Johnson in February this year, when initial concepts of the projects were discussed.

"This collaboration is part of a more systematic and broader activity between NASA GSFC and SmartSat CRC and opens the door to a lot of possibilities for the Australian space community," said SmartSat CEO and Managing Director, Professor Andy Koronios.

"We are delighted to be partnering with Goddard's Search and Rescue office, joining their push towards the Moon and beyond."

Specifically, the SmartSat research team, led by Safety from Space's Co-Founder Dr Mark Rice, will propose new designs for the waveform of the 406 MHz signal sent by beacons through the Cospas-Sarsat network.

"These new designs will further modernise second-generation beacons, taking advantage of encoding techniques not available when the Cospas-Sarsat network was developed in the 1970s," Dr Rice said.

"This will enable possibilities for new initiatives for users, emergency management professionals and first responders."

Greater confidence

"Myriota is excited to be part of the collaboration between South Australia's SmartSat CRC and NASA's Search and Rescue office. We anticipate that this research project will have countless benefits for Australia and the growth of our space industry," said Myriota's CEO and co-founder, Dr Alex Grant.

"The current technology behind search and rescue distress-related emergency beacons can be unreliable in certain instances due to a lack of messaging integration and a high rate of false alarms," Dr Grant added.

"We anticipate that the research collaboration between the SmartSat CRC, NASA and Myriota will lead to the development of technology that will provide a much more targeted service than what is currently available and give first responders greater confidence and access to crucial information in emergency situations."

All the way to the Moon

Future phases of the SmartSat collaboration could support exploration initiatives like the Artemis missions, which will return humans to the Moon for the first time since Apollo. NASA will equip Artemis astronauts with second-generation beacons for use in the event of egress from spacecraft after splashdown or following a launch abort scenario.

The Search and Rescue team is working to extend beacon services to the lunar surface with the LunaNet communications and navigation architecture.

DAMM frequency sharing functionality

The official launch of the frequency sharing functionality in the DAMM Outdoor Base Station BS422 is here! With this functionality it becomes possible to…

Improve spectrum efficiency

Frequency sharing allows adjacent BS422s to use the same frequencies. This is a significant benefit in low density networks and gives the possibility to cover for example a railway line with just two frequency pairs.

Simplify repeater systems

With frequency sharing an indoor repeater system can be built without optical fibres. The same hardware can be used as base station and repeater unit, increasing redundancy and simplifying the network architecture by having one unified network management system and reduced spare part stock.

Obtain base station geo-redundancy

With the BS422, network availability can be brought to a new level. Two BS422s located at two sites can act as one fully redundant base station, sharing the same frequencies. This will add redundancy not only to the base station, but also to the whole antenna system.

Learn more at the Comms Connect Series or go to **dammcellular.com**

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LIGHTNING PROTECTION FOR RADIOCOMMUNICATION SITES

Phillip R. Tompson

A total system approach can protect radiocommunication sites from even direct lightning strikes to towers, antennas and powerlines.

It is not difficult to understand why radiocommunication stations are so prone to lightning strikes. Sites are generally located on elevated ground and mountain tops and have an antenna tower or mast prominently located to optimise radio coverage for the surrounding areas. The tower and its antennas are therefore highly susceptible to receiving direct lightning strikes.

In addition to direct strikes to transmitting structures, direct and induced lightning strikes to powerlines feeding equipment buildings must also be considered.

Strike incidence

There are two common statistics used to measure the incidence of lightning strikes. The first is the term 'thunderday'. This term is defined as a calendar day during which thunder is heard at a given location. The international definition of lightning activity is given as the number of thunderdays per year. This is also called the 'isokeraunic level'.

Thunderday maps are published by meteorological organisations worldwide. As may be expected the number of thunderdays is generally greatest in tropical regions around the equator and falls off as one progresses north and south towards the poles.

Another commonly used statistic to record lightning activity is the 'lightning flash density'. This is defined as the number of lightning flashes to ground occurring on or over unit area in unit time. This is commonly expressed as per square kilometre per year (km^{-2} $year^{-1}$).

As may be expected there is a relationship between thunderdays and ground flash density.

To assess the susceptibility of the antenna structure to lightning, the number of likely strikes per annum can be readily calculated. The attractive radius of tall, slender structures typical of antenna towers can be found by use of an equation for Ra:

$R_a = I^{0.64} \times h^{(0.66 + 2 \times I \times 0.0001)}$

where

R_a = the attractive radius for the structure, in metres

I = the prospective lightning stroke current amplitude, in kiloamperes

h = the structure height, in metres

Using the above equation, a structure with a height of 30 m and a prospective lightning stroke current of 130 kA, which accounts for 99% of all lightning strikes has an attractive radius of 309 m.

The collection area is then given by:

$A_c = \pi \times R_a^2 \times 10^{-6}$

where

A_c = the collection area for the structure, in square kilometres.

A 30 m-high transmitting mast will have a collection area of 0.300 km^2.

Finally, the prospective number of strikes per annum can be calculated from:

$P = A_c \times N_g$

where

P = the prospective number of strikes per annum

N_g = the ground flash density km^{-2} $year^{-1}$

In an area with 150 thunderdays, which is typical of Malaysia, the mean ground flash density is 15. So a 30 m-high antenna tower will receive on average 4.5 direct strikes every year.

This is a statistical calculation but provides ample evidence of the need for effective lightning protection at these sites.

The lightning strike

The transient discharge of electric current that occurs between a negative charge centre and a positively charged region is a lightning flash. A typical flash is made up of one or more discharge components or pulses, with each pulse consisting of a negative leader stroke and a positive return stroke.

On a normal fine, sunny day the earth has a slight negative polarity, and the electric field so created is about 300 V per metre. As a thunder cloud forms, separation of electric charge in the cloud creates a surplus of negative charge in the base of the cloud and over a period of many minutes this will build up to create an electric field

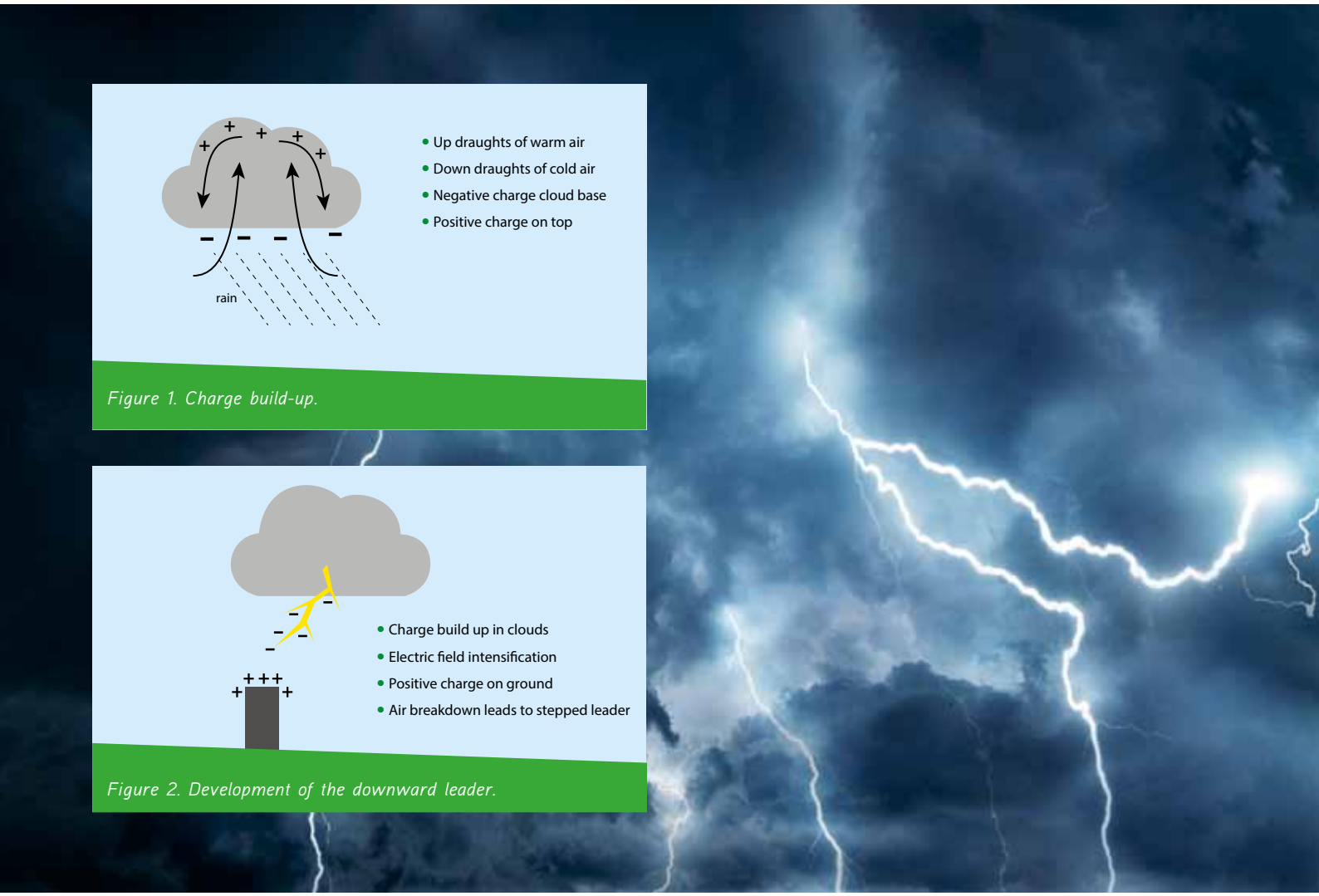

Figure 1. Charge build-up.

Figure 2. Development of the downward leader.

in the order of 10 kV per metre. Imagine the electric field as essentially horizontal lines, as per Figure 1.

Charge build-up continues until the electric field is so great that ionisation of the air occurs. As ionisation occurs, the stepped leader extends from the cloud towards ground bringing electric charge with it.

Figure 2 shows a building or other structure. The effect of this structure is to distort the electric field as its top is at earth potential. The field lines now must curl around the building, creating field intensification at the top and corners.

As the leader approaches ground, the electric field builds up further and field intensification occurs around those objects above ground level. The degree of field intensification depends upon the height of the structure or object.

At some point the breakdown electric strength of air will be reached and ionisation will occur. This gives rise to an 'upward streamer' which heads up to meet the downward leader.

For tall structures streamer creation is most likely around points of high field intensification, ie, at the tops of antenna towers and masts and the corners and other extremities of buildings.

One of the upward streamers will meet the downward leader and complete the ionisation path. The electric charge is then discharged via this path and the so called 'return stroke' current flows. The return stroke current flow collapses the electric field and it is this collapse in electric field that is responsible for induced voltages in power conductors and other metallic conductors.

Thus, the structure must be protected against direct strikes plus the indirect effects of a nearby strike creating induction due to the collapsing electric field after the lightning flash.

Protection principles

When lightning strikes a tower that is grounded the current pulse, which typically may have a rise time of 1 microsecond and a decay to half amplitude of 50 microseconds, will flow down the tower to ground.

It is important to be aware that no matter what form the lightning protection takes there will be a potential gradient developed up the tower. This potential is essentially caused by the self-inductance of the tower. The self-inductance of a 30 m-high tower is 25 microhenries.

The potential at the top of the tower may be calculated from the following formula:

$V = L \times dI/dt$

where

L = Self-inductance in microhenries

dI/dt = Rate of rise of current in amps per microsecond

For a 50 kA current rising in 1 microsecond, the potential at the top of the tower will be approximately 1.25 MV.

It is not possible to reduce this voltage build-up. Any protection system must take this into account.

As the current pulse flows to ground a rise in ground potential will also occur. By ignoring the effects of inductance and considering resistance of the earthing system alone, this earth potential rise can be easily calculated.

For example, a 50 kA impulse flowing to ground with a 10-ohm earth resistance will raise the earth potential by 500 kV.

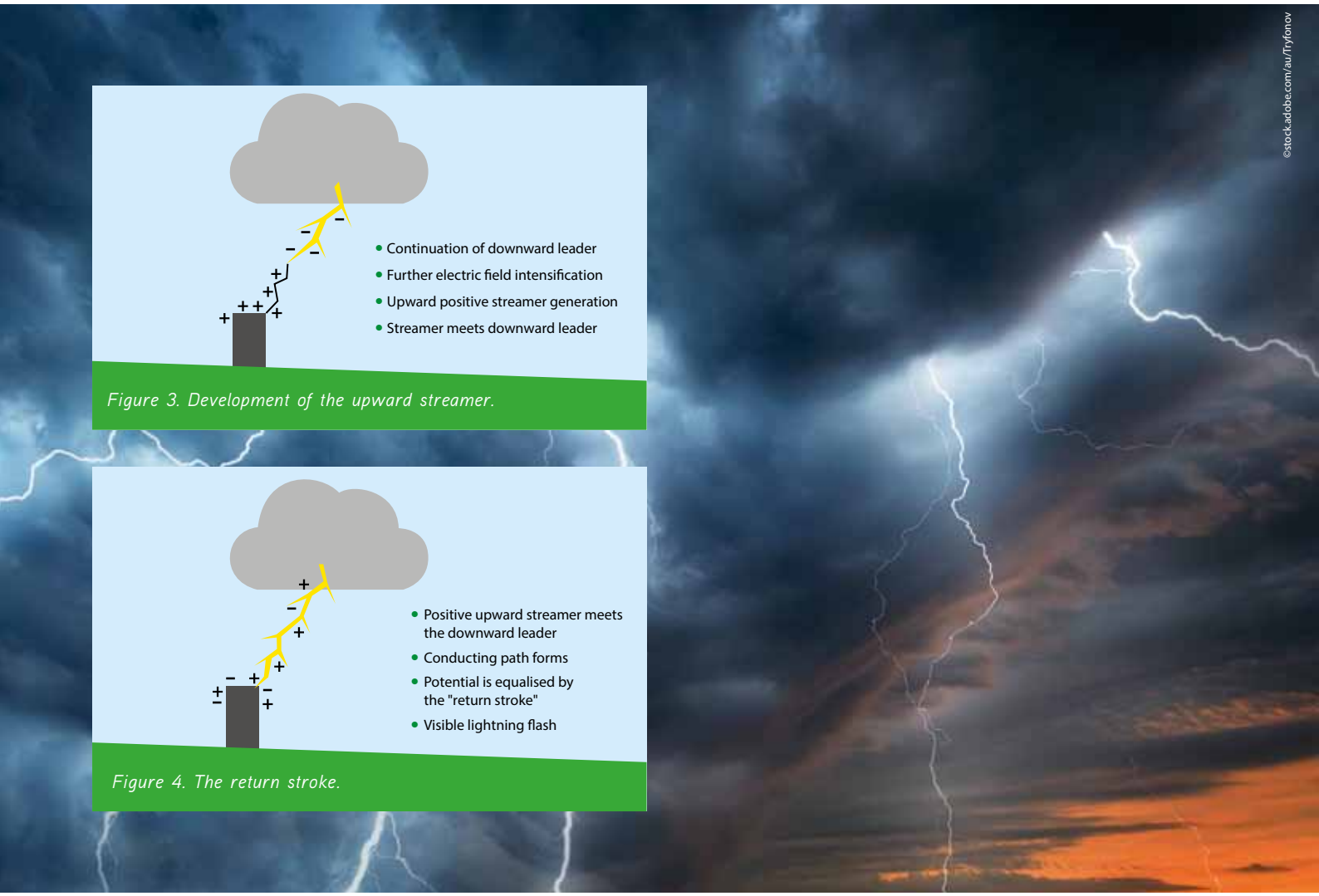

Figure 3. Development of the upward streamer.

Figure 4. The return stroke.

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Since the local ground potential rises, any cables leaving the vicinity of the tower will carry this potential to the transmitter building. Current will flow along coaxial cable sheaths and create a potential between the inner and outer conductors of these cables.

At many stations, the tower can often be located some distance from the equipment building so it cannot even be assumed that both the tower and building earth will rise to the same potential.

Whether the tower is struck by lightning or lightning strikes the incoming powerline, surge protection on all incoming services is essential. The aim is to reference all incoming services to the local ground either directly or via surge diverting components such as surge diverters, power surge filters, coaxial cable protectors etc.

Direct strike protection

A direct strike to an antenna tower is unlikely to damage antennas unless the antenna itself is struck or correct earthing and bonding principles have not been adhered to.

Antennas which form the highest point of the structure and are not at tower potential are particularly vulnerable and it is difficult to protect these effectively. High-gain whip antennas mounted at tower top are typical examples. The best form of protection is to carry some spares.

Where antennas are mounted on the lower faces of the tower, it is usual to erect a vertical spike, or Franklin rod, at the top of the tower to act as the air terminal. To be effective, the top of the rod needs to be at least 3 metres above the highest point of the antenna.

No special precautions with regard to down conductors on all-steel towers are necessary. The four legs of a self-supporting tower provide an excellent path for the lightning impulse current.

Special air terminals and proprietary down conductors consisting of custom-made coaxial cables etc are totally unnecessary. They do nothing to reduce the potential rise at the top of the tower and cannot possibly be insulated to the level required to prevent flashover to the tower itself.

Concrete towers and masts can utilise the concrete reinforcing, ladder and any other steel work for the down conductor path.

Earthing and bonding

Since a direct strike to the tower will raise earth potentials and cause current to flow in feeders and coaxial cable sheaths, it is essential to pay attention to correct earthing and bonding practices.

- Ensure that the antenna system is securely bonded to the tower structure.
- Bond the sheath of the feeder cable to the tower structure at the antenna.
- Bond the sheath of the coaxial feeder to the tower structure at the point where it leaves the tower. Do this just prior to the bend in the feeder. This will divert current on the feeders to ground.
- Ensure that the tower is securely earthed. For a 50 kA lightning impulse every one-ohm reduction in earth resistance will reduce the earth potential rise by 50 kV.
- Bond the sheath of the cable to the station ground at the point of entry to the equipment building.

Figures 5 shows the principle of earthing and bonding to create a common earth with single point earthing in the building and bonding of tower and building earths.

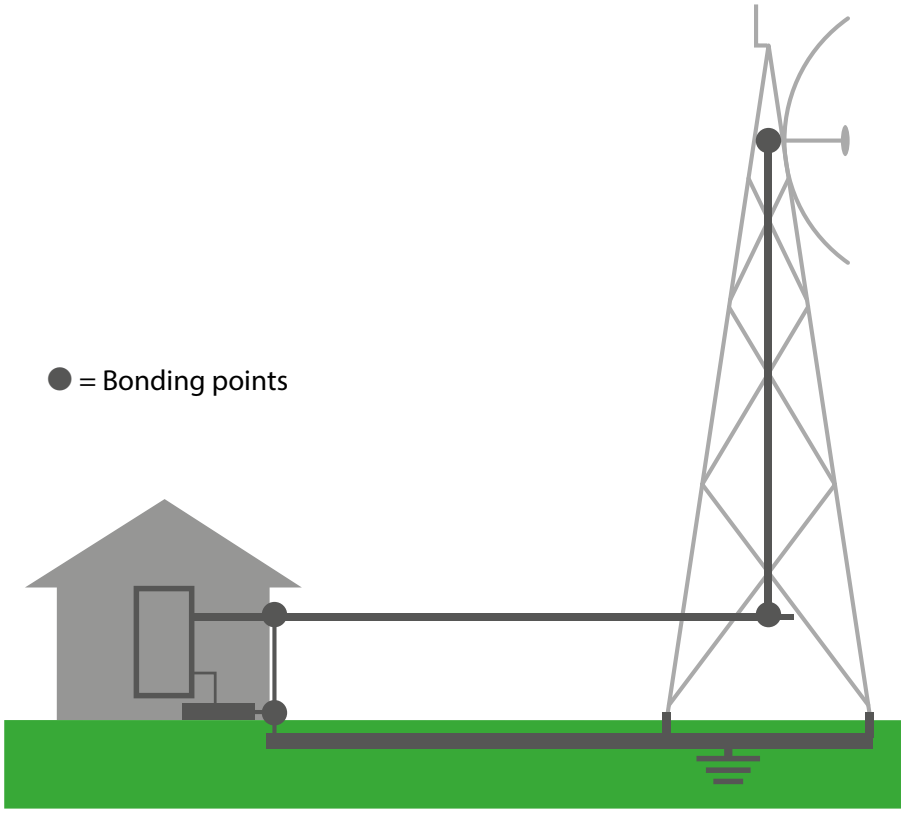

Figure 5. Earthing and bonding points.

Building layout

The geometry of the interconnections in and around the building are of vital significance to the effectiveness of the lightning protection system. The objective is to provide a path for the potentially destructive lightning current flowing from the antenna to the AC supply line via a path that does not include the interior of the building.

The ideal building layout would be one where the coaxial feeders, AC supply and other services enter the building at one point. At this point all services are connected to the building ground either directly in the case of coaxial cable sheaths, water pipes etc, or via surge protection devices in the case of AC power, telephone, coaxial feeders etc.

It is impossible to reduce earth resistance to zero so there will always be earth potential rises developed when lightning strikes. By carrying out the above procedures a single earth will be produced such that an equipotential earth rise will occur and current flow in the building through vital equipment will be eliminated.

AC power surge protection

The AC supply line to the building usually represents the lowest impedance to remote grounds and will therefore carry much of the lightning current flowing away from the site. The surge protection installed must thus have sufficient capacity to carry these currents.

This situation is altogether different from the case of induced voltages in powerlines, for which many surge protection devices are designed.

It is usual to choose mains power filters in preference to shunt connected surge diverters. The filters provide multistage protection and redundancy in the event of a component failure. In addition, their let-through voltage is low enough to protect the most sensitive electronic equipment. Shunt connected surge diverters are not.

Generally, three-phase versions with surge ratings no less than 120 kA would be employed. Current ratings depend on the station requirement. For typical cellular GSM sites this would be in the order of 40-plus amps per phase. These filters are installed at the building point of entry of the AC power supply.

Coaxial cable protection

At high frequencies, the components used in power filters are unusable. Metal oxide varistors have a high self-capacitance which shunts RF energy. The only useable device is the gas-filled arrester, which may be connected between the inner and outer sheaths of coaxial cables to clamp differential voltages.

Such devices are readily available for low-power transmitting and receiving equipment up to a few hundred watts.

When lightning strikes a communication tower, the potential at the top of the tower rises. This has already been established. Antennas located at the top of these towers must also be subjected to these potential rises. Antennas that are fed with coaxial cables must have their inner and outer conductors both subjected to these potential rises.

At the building entry the lightning energy can be diverted to earth by the action of bonding the coaxial feeds to earth. The inner conductor of these cables must also be protected. This is done by coaxial surge protectors which divert energy from the inner conductor to earth. A recommended procedure is to establish a station earth bar, then use bulkhead mount coaxial protectors mounted on this earth bar to provide the termination point for incoming coaxial feeders.

For cellular telephone sites there are two specific cases to be considered.

1. The protection of cellular antennas requires special attention. Gas arrester-type surge protectors, as described above, are not recommended. Instead, quarter-wave, stub-type surge barriers are to be preferred. They offer superior performance in terms of let-through voltage and minimal intermodulation. Quarter-wave stub-surge barriers are particularly useful on transmitter cables and offer superior performance on receive antennas. Active receive antennas with power feed up the feeder require gas-filled arrester types both at the equipment and head ends.
2. Link equipment that uses microwave bearers with active head units requires special attention. Protection is required at both the head and equipment ends. Attention must be paid to the signals, baseband, IF and power on the interconnecting cables.

In conclusion, the protection from lightning of radiocommunication sites can be achieved and protection from even direct lightning strikes is possible. There are no short cuts, and systems which purport to enhance the attraction of lightning, divert lightning, dissipate lightning or prevent lightning should be rejected.

Phillip R Tompson is Technical Director at Novaris. He is a chartered member of IE(Aust), IEE, and IEEE as well as a member of the Australian Standards Committee on lightning protection.

Novaris Pty Ltd
www.novaris.com.au

Handheld radio

The Sepura SC21 is a TETRA hand-portable radio that has a wide range of functionality inherited from the SC20 hand-portable, in a unit that is 25% smaller. Class 3 high-power RF transmission, coupled with its receive sensitivity, gives the SC21 extended operational range. The SC21's audio capability enables clear voice communication in noisy environments. A directional speaker projects audio to the user's ear, providing extra clarity, and Water Porting technology ensures that clarity is maintained even in continuous, heavy rain.

The SC21's worker safety features include automated man-down and lone worker protection, biometric user health monitoring and location tracking. Its 2.4″, high-resolution QVGA screen enables viewing in all light conditions, including direct sunlight.

Sepura PLC
www.sepura.com

Cable and spectrum analysers

The three pocket-sized SiteHawk cable antenna analyser models cover 300 kHz to 200 MHz, 1 MHz to 4500 MHz and 20 MHz to 6 GHz. Fully self-contained, the units feature an intuitive interface that is readily accessible to the first-time user and minimises clicks for the expert. There is the ability to download results to USB, and each unit includes the Bird RF Meter App to perform power measurement using external sensors.

The SignalHawk family of handheld spectrum analysers provides functionality in a compact, affordable package. Highly portable, the analysers easily fit in one hand and have an intuitive touchscreen user interface. The SH-60S-TC RF analyser enables user to view RF signals between 9 kHz and 6 GHz, while the SH-60S-AOA RF analyser extends the capability of the SH-60S-TC by adding the ability to triangulate the location of an interferer on a map.

Vicom Australia Pty Ltd
www.vicom.com.au

Radio Matters

Some members of RFUANZ have mentioned that the Department of Conservation (DOC) concession process and interpretation by DOC seems to differ from region to region, which can greatly affect concession charges for the applicant. We are interested to hear if members would like RFUANZ to work with DOC to clarify and tidy up the concessions?

Please let us know any issues that you have had with DOC concessions, and any areas that you would like to be addressed.

The rural broadband industry is able to have their first three years of concessions waived under the Rural Broadband Initiative (RBI). RFUANZ would like to see what DOC would be willing to do for our members with new concession applications.

I look forward to hearing from you with any feedback you can provide on these matters.

At our meeting in September, the RFUANZ committee decided to move to bimonthly newsletters. As there will not be a newsletter in November, I urge you to attend the annual meeting of RFUANZ via Zoom if possible. Alternatively, please complete the proxy form, available on request from our administrator.

We have had one vacancy on the RFUANZ committee for several months, with a further two members standing down at the upcoming meeting. Therefore again, I urge you to please complete a nomination form if you know of someone within your company who would be interested in joining the committee.

Any costs incurred by the member in order to belong to the committee will be covered by RFUANZ, including a per-meeting attendance rate, paid at the end of the 12-month term. The committee meets once per month, via Zoom, for approximately 1 to 2 hours.

The RFUANZ AGM will be held via Zoom at 4:00 pm on 11 November 2020. You are invited to attend. We require a minimum representation of at least 30 as we have a change to our Rules that needs to be adopted at the AGM.

To register for the meeting, please contact admin@rfuanz.org.nz.

As per Clause 15.5 – Alteration of Rules: These Rules may be changed by a special resolution of a meeting of Members at which at least 30% of the members are present.

This means we need to ensure at least 30 members are present, or have submitted a proxy voting form, in order to adopt the change to our Rules. The remit to be tabled is that the current Rule 19.1: Definitions and Interpretations, be amended as follows to include postal voting: "Post" or "Postal" can include "Electronically" in all instances where written notice either of an annual general meeting, ballot vote or termination of membership appears in these Rules.

The reason for this is that this year during the COVID-19 pandemic, we have been unable to hold our annual general meeting, nor gather in numbers for any occasion. In today's technological world we have been able to continue with work as usual, using Zoom and webinar meetings. A move to adopt posted items electronically will enhance this further, with a much better, faster and more economical form of communication.

Included with the AGM papers, to be mailed out early next month, will be a proxy form that we request you complete and return your vote regarding this Rule change.

Also with the AGM papers will be a nomination form that needs to be completed and returned to our administrator, should you or someone you know of, who is a current financial member of RFUANZ, wish to be a representative on the RFUANZ committee. For more information, please contact either myself or Candice, admin@rfuanz.org.nz, or post to PO Box 40-525, Upper Hutt, 5140.

Corey Weir
Chairman, Radio Frequency Users Association of New Zealand

RFUANZ
Radio Frequency Users Association of New Zealand

Waveform generator

The M8199A is Keysight Technologies' first 256 GSa/s arbitrary waveform generator (AWG), featuring 65 GHz analog bandwidth in a compact 2-slot AXIe module.

A new DAC-ASIC that translates memory data into an analog signal, an RF connector placed at the DAC-ASIC and amplifier technology with a smooth frequency roll-off have resulted in a useable signal bandwidth beyond the nominal 65 GHz even up to 80 GHz.

The M8199A provides research engineers with a source for arbitrary signals, enabling development of designs that push beyond current limitations. Applications include testing the discrete components of an optical coherent transmission system or experimenting with terabit transmission for data centres.

Keysight Technologies Australia Pty Ltd
www.keysight.com

Surge filters

Novaris Surge filters are made in a wide range of sizes for all conditions to provide a high level of protection to critical equipment, from 6 to 2000 A. They feature handmade inductor coils together with high-quality capacitors to form a high-end LC circuit.

Coupled with primary and secondary surge protection, they provide optimum power filtering and surge protection in one unit, for protecting everything from the smallest radio to the largest transmitter site.

Novaris Pty Ltd
www.novaris.com.au

Router

The Robustel R1520 industrial IoT router/gateway from Glyn offers 5x Ethernet ports for access and control of a wide variety of remote industrial applications, as well in-vehicle usage thanks to its in-built GPS chipset. The unit offers a 2-wire RS485 interface for connecting legacy instruments with full Modbus support, as well as an RS232 port featuring RTS/CTS lines to accommodate applications that require hardware handshaking. For industrial users, it includes optically isolated digital inputs and outputs as well as a 10-bit analog input capable of interfacing directly with sensors in the range of 0 to 24 VDC or 0 to 20 mA.

The R1520 offers WAN failover and dual-SIM connectivity to 4G/LTE Cat-4 networks with coverage for the majority of frequency bands used worldwide. The unit is powered by Robustel's proprietary Linux-based operating system, RobustOS, enabling users to install a variety of applications to enhance the router's interoperability with various systems including industrial protocol convertors, VPNs and interfaces into common IoT cloud platforms.

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FINLAND STRIDES AHEAD WITH VIRVE 2.0

Jonathan Nally

Finland's Erillisverkot Group is seeking information from public safety end users about the types of communications devices they want to use.

Erillisverkot Group has issued an RFI for end-user devices that could be used by the country's forthcoming public safety mobile broadband (PSMB) network, called Virve 2.0.

Finland is currently served by a national TETRA public safety radio network called Virve, operated by Erillisverkot Group (a non-profit company owned by the Finnish government). Virve is used by a wide variety of public agencies — such as the Emergency Response Centre Agency, fire and rescue services and police — as well as social services, defence forces, border guards, customs, railway operators and vital private businesses such as those in the energy sector.

Virve has 41,000 subscribers and more than 1300 base stations spread across the nation. On an average day, users make 150,000 group calls and send 7.5 million short data messages, the latter being far higher than for any other country.

Virve 2.0, however, will use commercial networks to provide PSMB capabilities for public safety agencies — such as priority and pre-emption powers — with Erillisverkot becoming a virtual operator (later to be upgraded to service provider status).

In April, Erillisverkot announced that it had selected Elisa to provide the Virve 2.0 radio access network as a service, with the core systems to be provided by Ericsson. Contracts were signed in May.

According to Erillisverkot, under the current phase — phase 1 — the building of the network is ongoing. Once ready for service next year, the network will be able to offer prioritised data, voice and other services to the public safety authorities and other users.

Phase 2 will see the service enhanced by the provision of 3GPP-specified mission-critical services, built on top of the core and virtualisation platform services implemented in phase 1.

The end-user devices RFI

In what could very well be the first public safety communications RFI of its kind anywhere in the world, Erillisverkot is sensibly seeking out the views and input of the end-user community. The feedback received will guide the ecosystem design process.

The RFI said that "The purpose of this document is to find out what kinds of devices users would like to use, would expect to use, or what kinds of devices the manufacturers plan to produce. What kinds of end-user devices and IoT devices can be used on the Virve 2.0 network in different kind of use cases and what is the availability, development stage and performance of those devices/peripherals/equipment?

"The scope of this document is limited to those devices that have direct Virve 2.0 connectivity ie, those devices with a Virve 2.0 UICC (SIM card or embedded SIM) inside them. Essential accessories and wearables are a natural part of the devices."

Erillisverkot has invited answers and comments "from all parties working on public safety/PPDR mission-critical broadband communication solutions and applications, but we are especially interested in hearing from companies specialising in 3GPP-based end-user devices".

The RFI seeks a wide variety of information about potential end-user devices, asking more than 100 questions on topics such:

- Mission-critical service capabilities
- Enterprise mobility management and mobile device management
- Information security
- Electromagnetic protection
- Location-based services
- Device functionalities
- Approval, testing and certification
- Device maintenance

The device and equipment types envisioned include:

- Rugged handheld devices
- Secure smartphones
- Vehicle-mounted mobile radios
- Computer tablets
- Vehicle-mounted routers
- Non-traditional devices such as wearables and IoT devices

Erillisverkot has set a closing date of 16 October 2020 for RFI submissions and feedback, with joint submissions permitted.

The national goals of Virve 2.0

Virve 2.0 is an ambitious project, intended to provide coverage for country of extremes — from lowland and coastal landscapes to rugged mountainous areas, from densely populated cities to sparsely populated rural areas, and in climatic environments from pleasant summers to harsh, snowbound winters.

The high-level national goals set for Virve 2.0 reflect the smart, considered and cooperative way in which Finland has assessed its needs and defined the project's parameters, which are:

- It must provide secure, 3GPP-based, mission-critical mobile broadband with wide geographic coverage, high availability, QPP functions and national roaming.
- The service must be competitively priced in order for it to become the network of choice for PPDR users.
- Erillisverkot will be the service operator, handling subscriber services and application development using open standards.
- It must support mission-critical and non-mission-critical services based on different user needs, and eventually provide 3GPP MCPTT, MCVideo and MCData services.
- Availability must be ensured through improved power supplies, transmission links and redundant network elements.
- Security must be top of mind during and after development to ensure services and data are protected and unauthorised use prevented.
- Interoperability is the aim for all Finnish public protection and disaster relief (PPDR) users, plus the system should enable them to work with other European PPDR mobile broadband users.
- Access must be available to any 3GPP-based terminal, while Erillisverkot will be responsible for implementing a high-security terminal ecosystem.
- A solution will be implemented to ease migration from TETRA, and there will be integration of other systems such as the ERICA national emergency response system.
- It will be based on open 3GPP standards, with the minimum requirement being Release 15.
- The system will be hardened in terms of supply and preparedness, eg, in terms of coverage, availability, usability, data security and power resilience.

It's fair to say that eyes of the mission-critical communications world are currently on Finland, as it works steadily and intelligently towards providing what will become a best-in-class PSMB capability. Many other nations, Australia included, could learn a thing or two from the way the Finnish authorities and Erillisverkot in particular have conducted the process.

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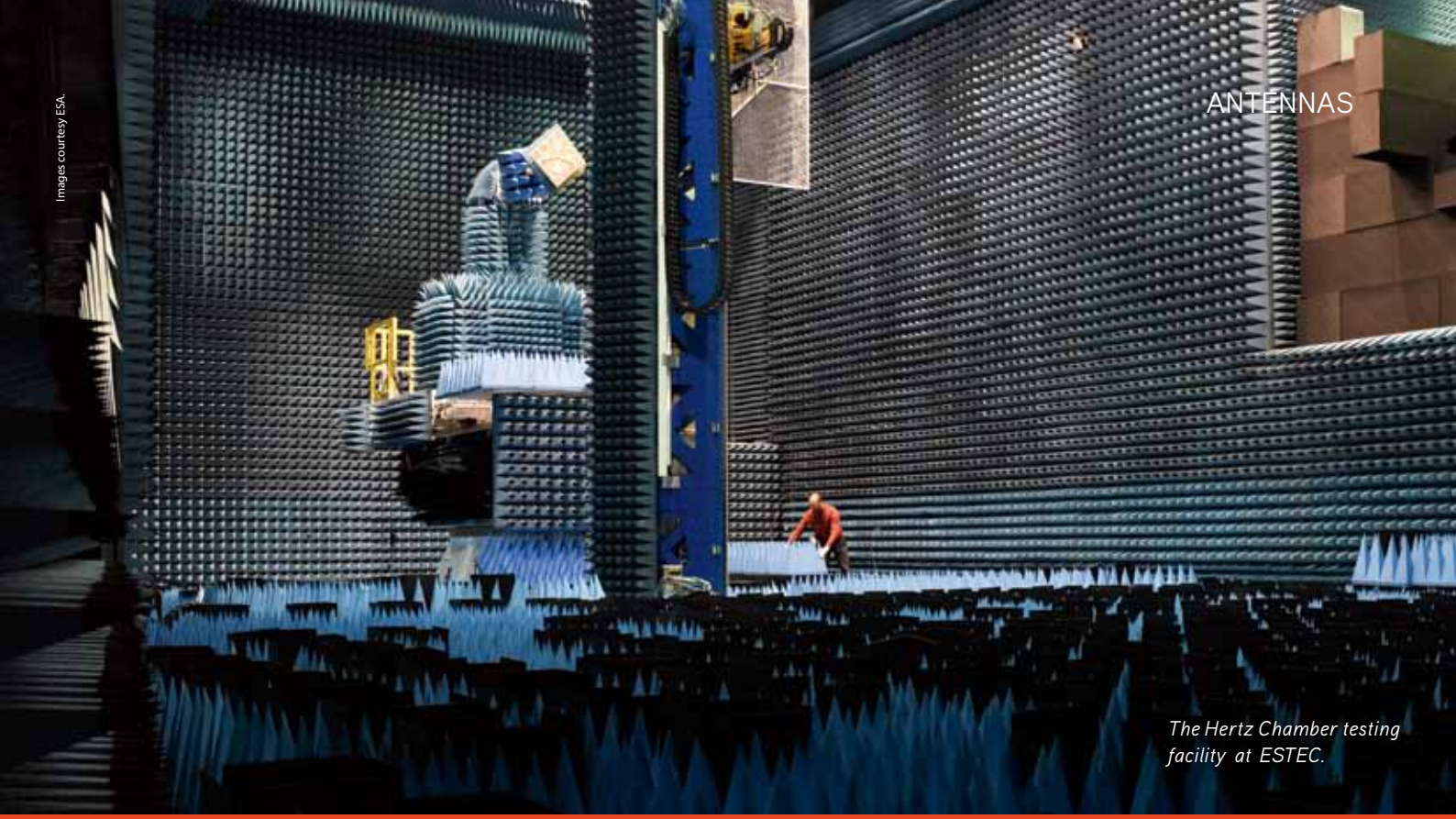
Images courtesy ESA.



The Hertz Chamber testing facility at ESTEC.

MESH ANTENNA DESIGN IS A SMART SATELLITE SOLUTION

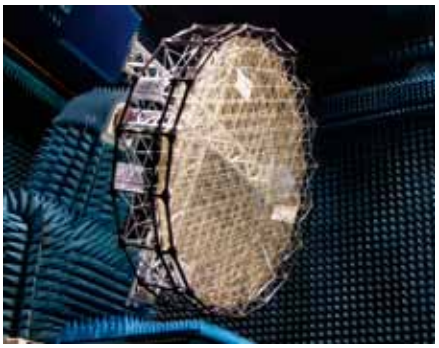
A new mesh antenna design for satellites enables contouring of the surface shape for spot beam enhancement.

A prototype 2.6 m-diameter metal-mesh antenna reflector developed by a European consortium can be manufactured to reproduce any surface pattern that antenna designers wish — something that was previously possible only with traditional solid antennas.

Satellite antenna reflectors often have a surprisingly 'bumpy' appearance, with their basic paraboloid convex shape distorted with additional peaks and valleys. Those bumps serve to contour the radio frequency beam, typically to boost signal gain over target countries and minimise it beyond their borders.

"This is really a first for Europe," said European Space Agency (ESA) antenna engineer Jean-Christophe Angevain. "China and the US have also been working hard on similar-shaped mesh reflector technology."

The lightweight mesh solution "is needed so that sufficiently large antennas can be deployed in orbit, which would otherwise be too bulky to fit inside a launcher fairing,



The AMPER antenna under test at ESTEC.

while also meeting required performance levels", he added.

The ESA's 'Advanced techniques for mesh reflector with improved radiation pattern performance' (AMPER) project has been developed with Large Space Structures in Germany as prime contractor and TICRA in Denmark as subcontractor.

According to Angevain, tailored surface shaping is traditionally achieved using traditional metal or carbon fibre reinforced plastic composite reflectors.

"The challenge was how to reproduce such shaping using a mesh reflector design," he said.

"The obvious solution would have been a conventional tension truss double-layer solution, with the mesh held together tautly on an alternating 'push and pull' basis."

Instead, he said, "A smart alternative solution has been proposed and followed by the team."

"The design of our shaped mesh reflector is based on tension members supported by a peripheral truss structure which enables decoupling of the shaped surface and the structure," said Leri Datashvili, CEO and Chief Designer at Large Space Structures.

"Therefore, the design can be implemented for any size of reflector, for any frequencies ranging from P-band to Ka-band. Furthermore, either deployable or fixed reflector technology can be realised."

"This 2.6 m 'breadboard' prototype proves the concept at C-band frequency, and the RF measurements have shown good correlation with radio frequency and mechanical predictions," added Angevain.

The AMPER project was supported through ESA's Technology Development Element, with prototype testing carried out in ESA's Hertz chamber at its ESTEC technical centre in the Netherlands.

The AMPER team plans to next produce a deployable version, intended for use by Earth observation and telecommunication satellites.

SATELLITES FOR SECURITY

The federal government and private companies are investing in new Australian-controlled satellite capabilities for defence, security and commerce.

As announced earlier in the year in the Defence Strategic Update and Force Structure Plan, the federal government is taking steps towards investing in Australia's first fully owned and controlled military satellite communication constellation, as part of a $7 billion investment in space capabilities over the next 10 years.

Minister for Defence, Senator the Hon Linda Reynolds CSC said the significant investment demonstrates the Morrison government's commitment to protecting Australia's space assets and increasing our self-reliance and resilience.

"The Australian Defence Satellite Communications System project will be a critical enabler for the future operational capability of Defence, by providing real-time operational and logistical information which is essential for the command and control of deployed forces," Minister Reynolds said.

"In our increasingly information-dependent warfighting domains, it will provide Australian-controlled communications and assured access for the ADF and for others including Emergency Services."

The new future satellite communications capability will supplement, and then replace, the existing Defence satellite communications system, with a focus on supporting operations within the Indo–Pacific region.

The sovereign-controlled system will be augmented by contracted commercial satellite communications and industry partners, to assure resilient communications globally for the ADF across a range of space operations.

"Over the next 15 years, Defence, in co-operation with the Australian Space Agency, will invest $50 million in the Australian Space Industry for research and innovation in satellite communication technologies for future consideration," Minister Reynolds said.

A request for tender, which aims to engage a single prime contractor to deliver, upgrade and sustain the capability over its life of type, is set to be released in late 2020.

Potential opportunities for Australian industry involvement include software development, systems integration, facilities construction, system operators, sustainment and participation in the supply chain through manufacture and supply of sub-systems and components.

Eyes in the sky

Australian-based company LatConnect 60 has announced a global space partnership to build and deploy a smart satellite constellation over Australian skies to help the Australian Government and commercial clients monitor and protect their interests in the region.

With plans to launch in June 2021, the new low earth orbit smart satellite constellation will provide close-to-real-time data

upon request, giving Australian strategic observation capabilities a boost.

Founded by Venkat Pillay and Rueben Rajasingam, the leadership team at LatConnect 60 brings with it a track record of having worked with the likes of NASA, the Canadian and European space programs, CSIRO and BHP Billiton.

Pillay, the company's CEO, said that "The reality is [that] until now Australia has had to rely on overseas providers for access to critical earth observation data.

"COVID-19, coupled with rising global tensions, has made governments and companies take a closer look at the technologies they need and who they can rely on to provide those technologies in a crisis. Australia is too reliant on overseas companies for observation data and that data is not exclusive or secure."

LatConnect 60 also announced a new security partnership with ProximaX that will use a combination of two-layer encryption, de-centralised storage and blockchain technology to encrypt and secure all data captured by LatConnect 60 satellites to ensure it is resilient to attack.

LatConnect 60's smart satellite constellation will offer a service differentiator in the geospatial market by collecting high-resolution earth observation imagery products and RF signal intelligence at the same timestamp and processing it on-orbit with machine learning capabilities to make sense of the data.

"Our competitors have launched expensive multipurpose satellites not tailored to the Australian market. What sets our patent pending technology apart is that it is fit for purpose and as a result our services are more flexible, more reliable but also more affordable while providing the same quality, if not better, imaging," Pillay said.

LatConnect 60 has chosen to set up its headquarters in Perth, while it is also plugged into the growing South Australian space ecosystem. It is also a start-up member of the SmartSat Cooperative Research Centre based in Adelaide.

"We have based our headquarters in Perth to take advantage of the space innovation hub which is coming to life thanks to the WA Government's recent investment and leadership in developing these technologies which will provide the jobs of the future," Pillay said.

LatConnect 60 is collaborating with satellite partner York Space Systems and Perth's Curtin University, which will develop local capability in WA.

Professors Ba-Ngu Vo and Ba Tuong Vo, from the Intelligent Sensing and Perception (ISP) Group at Curtin University, have been selected as the main research partners with LatConnect 60.

"The ISP Group is developing new algorithms to exploit rapid advances in AI, IoT and embedded systems, which are expected to underpin the signal processing and data analytics on board the new satellites," Professor Ba-Ngu Vo said.

"We are very pleased to collaborate with LatConnect 60 on this endeavour and we look forward to helping them to provide world-class remote sensing capabilities to their customers in the region," said Charles Beames, Executive Chairman of York Space Systems.

"LatConnect 60 requires satellite constellations delivered on-orbit in months instead of years, and York is honoured to not only be selected to do this but also to deliver and improve upon their national security efforts."

The key industries set to benefit from access to the new RF signal intelligence and high-resolution multispectral imaging include government security and intelligence agencies, as well as mining, oil and gas, agriculture, and maritime. Potential examples of use are maritime surveillance, resource exploration, and crop yield and change detection in farming.

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SECURITY FOR MOBILE AND WEARABLE DEVICES

Jonathan Nally

Potential security vulnerabilities inherent in smart devices being used by first responders are reviewed in a new NIST report.

First responders around the world are making increasing use of the latest mobile communications and computing technologies. Sometimes this usage is officially sanctioned and formally delivered, while at other times individual first responders might make use of personal equipment.

In either case, many newer technologies being employed are consumer grade rather than mission-critical grade. Examples include Bluetooth headsets, body cameras, smart glasses and vital-sign monitors/body sensors.

The employment of such devices, while enhancing operational effectiveness, also carries risk in the form of potential security vulnerabilities.

That risk will only increase as more countries deploy public safety broadband networks.

To analyse that risk, the US National Institute of Standards and Technology (NIST) undertook a review of public safety mobile and wearable devices and their current capabilities, assessing them against the security objectives identified in NIST Interagency Report (NISTIR) 8196, 'Security Analysis of First Responder Mobile and Wearable Devices'.

NISTIR 8196 was produced during a previous study to understand the security needs of smart devices for first responders.

"The ultimate goal of this effort is to provide guidance that enables jurisdictions to select and purchase secure devices and assist industry to design and build secure devices tailored to the needs of first responders," the review's authors said in the new report.

"As with any new technology, there are security concerns, such as the vulnerabilities and threats to their users. In the case of public safety there are concerns that exploits of vulnerabilities may inhibit first responders from performing their duties and put their safety at risk."

The report assesses the various use cases of public safety mobile and wearable devices, reviews known attacks on such devices and includes information from interviews with public safety officials.

"Mass production of mobile and wearable smart devices makes it easy to find and buy any device that may meet one's wants and needs. Technology is primarily produced for the general consumer or enterprise and not specifically designed with public safety in mind," the report says.

"This could lead to potential repercussions if the appropriate device is procured without consideration of the security and safety of first responders.

"When it comes to selecting mobile and wearable devices, there is little security guidance that focuses on the particular needs of public safety. During an emergency, a first responder should have some assurance that their devices are reliable and secure."

The report shares a "high-level overview of the current capabilities of public safety mobile and wearable devices" and gives an insight into the security capabilities of today's devices. It also provides guidance for procuring and designing secure mobile and wearable devices specifically for public safety.

Additionally, it includes a list of tests developed to analyse public safety mobile and wearable devices, with each test providing an overview of the outcome and the analysis derived from observation of that outcome; and a collection of best practices and guidance for the use of such devices.

You can read the report at https://csrc.nist.gov/publications/detail/nistir/8235/draft.

Workstation

Zetron's CommandIQ is a portable workstation designed for robust functionality in a compact unit that's easy to store, transport and quickly activate to provide a fully operational workstation for Zetron Dispatch from anywhere connectivity is available.

The traditional audio handset combined with touch-screen operation gives it a mix of capability and mobility for applications where traditional or permanent operator workstations aren't convenient, practical or necessary.

CommandIQ includes the ATOM E3845 Quad-Core processor to provide high-performance computing and graphics and is designed for high reliability with completely solid-state operation, with no processor fans or rotating storage.

CommandIQ's small physical footprint enables it to easily fit in existing workstations without having to add furniture, yet provides full access to all of Zetron's Dispatch system functionality. The unit easily fits into a drawer, hangs on a wall, sits on any flat surface or can be stored out of the way when not in use.

Zetron Australasia Pty Ltd

www.zetron.com

Server

The Crystal Group RS1.532L21X2F rugged twin server has a small, integrated footprint that enables it to fit into standard rack slots. Like all Crystal Group products, it is engineered and tested to meet or exceed strict MIL-SPEC standards.

The unit uses custom heatsinking solutions and special air management techniques for thermal performance. The GPU and networking capabilities combined with the Intel Xeon Scalable processors deliver secure, near-zero latency at the edge.

Features include: lightweight aluminium construction (12.7–14.51 kg); shared 1500 W power supply that operates from 110/220 V 50/60 Hz AC or 180–350 VDC; dense SWAP capability with two dual-socket motherboards per chassis; 2nd Gen Intel Xeon Scalable processors up to 125 W each; four removable U.2 NVME SSDs; four low-profile HHHL PCIe x16 slots, plus 2x SIOM modules with up to eight ports of network connectivity per chassis; and 4x USB 3.0, 2x VGA and 2x Gigabit IPMI.

Metromatics Pty Ltd

www.metromatics.com.au

Test set

The library of autotest/alignment routines on the VIAVI 8800SX (available from Vicom) can be used to maximise the coverage of digital radios, which should be of interest for first responders and commercial users alike. Experience shows that the time taken for even the best techs to test and write up a report on a radio can vary between 35 and 60 min. Recent tests demonstrated that Autotest routines on the 8800SX can reduce this to as little as 3 min and 32 s; for some models automatic alignment offers even greater savings.

The extensive range of test routines includes portables from all major manufacturers; recent additions to the routines include Motorola APX NEXT Series Auto-Test and Alignment and Autotest for KENWOOD Viking VM6730, VM6830, VM6930, VM7730 and VM7830 radios.

The portability of the 8800SX enables the improved coverage achieved through correct testing and alignment to be verified in the field… even inside buildings. And the VIAVI NEON Signal Mapper automates the geo-referencing, cloud storage and 3D visualisation of LMR test data for technicians who use VIAVI test equipment to record and analyse two-way radio signals inside buildings.

Vicom Australia Pty Ltd

www.vicom.com.au

Car cradle kit

The DAMM VHF TETRA radio is available as a car cradle kit, which enables fixed mounting in a vehicle. Key features of the VHF FT5 car cradle kit are: full TETRA feature set; emergency PTT; controller microphone and PTT; 12 VDC power input; external antenna connection; external speaker power of 8 W; easily accessible radio side port; and additional 115/230 VAC charger.

The 3 W high-power option for this VHF TETRA radio enables savings on infrastructure costs, compared to UHF, by reducing the number of base stations needed to cover the same area. With DAMM's MultiTech Outdoor Base Stations it is possible to either run a VHF-only network or a combination of UHF and VHF on separate base stations in the same network. This means that users operating only in wide, rural areas or in a mix of rural and built-up areas can do so with the one infrastructure.

Damm Australia

www.damm-aus.com.au/

Router

The Peplink EPX from Wireless Tech is a rapidly deployable and versatile SD-WAN router that connects a wide range of WAN options, from LTE-A to satellite modems to fixed line networks. With a 19″ 2U rack-mountable form factor, it can combine up to 18 LTE-A connections and support 36 SIM cards to provide gigabits of bandwidth on the go, such as for high-definition video streaming and high-volume data transfers.

The EPX enables service providers to build a flexible SD-WAN backhaul to the main network, incorporating as many Ethernet, fibre and cellular links as needed to provide fast and solid connectivity.

Equipped with an EPX, mobile headquarters can combine private LTE, commercial LTE and satellite links to form fast and unbreakable VPN connections both to mobile HQs and to patrol vehicles. With this configuration, patrol vehicles benefit from increased cellular coverage. Even if they are outside the range of one cellular provider, they will still be within the range of others.

Wireless Tech (Australia) Pty Ltd
www.wirelesstech.com.au

MIMO antennas

The WMM[X]9G range of antennas from Panorama Antennas is designed to provide MIMO wireless coverage for external or internal areas and is available in versions for Wi-Fi or private 5G networks (CBRS) with 2x2, 3x3 or 4x4 MIMO function.

The WMM[X]9G-24-58-NJ provides directional coverage for 2.4 and 5.0 GHz Wi-Fi and the WMM[X]9G-36-55-NJ version offers directional coverage for private 5G (CBRS)/ LTE networks in the 3.4–3.8 GHz and 5–6 GHz bands.

The WMM[X]9G offers high gain in a robust compact housing that features up to four antenna elements, providing effective isolation and low correlation. It is available in 2x2, 3x3 or 4x4 MIMO configuration. Designed for rail or mast mounting, the antenna has N-type bulkhead sockets, which enable a choice of cable type to be used.

The WMM[X]9G range is certified to IP69K ingress and IK10 impact protection levels, making the antennas suitable for use in harsh environments.

Panorama Antennas Pty Ltd
www.panorama-antennas.com

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FEEDBACK ON THE ACMA'S SPECTRUM OUTLOOK

Jonathan Nally

A consultation on the ACMA's Five-Year Spectrum Outlook has seen a number of concerns raised and ideas suggested.

The ACMA regularly issues its Five-Year Spectrum Outlook (FYSO) document, which details its spectrum management work program. The current draft FYSO spans the years 2020 to 2024.

Having called for feedback on the draft, the ACMA has published an addendum document that outlines the submissions it received. There were 49 such submissions from industry, peak bodies, government agencies and individuals, with the Authority stating that it has "given careful thought to all submissions and incorporated submitter reflections into our internal considerations".

The consultation covered topics such as the short- and medium-term effects of the COVID-19 pandemic, the ACMA's spectrum work program, technological developments, replanning of bands and forward allocations.

As a result of the consultation, the ACMA has added some activities to its work program, such as investigating Wi-Fi developments and needs (including the 6 GHz band) and reaffirming its ongoing consideration of spectrum sharing.

Regarding the effects of the COVID-19 pandemic, submissions outlined the increased telco network demand as a result of changed work and study patterns. Other submissions "identified the need for financial assistance and support for regional and remote communication and emergency services".

Regarding, technological developments, the ACMA noted great interest in 5G and associated spectrum matters. In response, the Authority said that it is "making a significant amount of spectrum available for 5G and is on track to allocate spectrum in the 26 GHz band for spectrum licensing in early 2021".

"Subject to Ministerial consideration, we are working towards an auction of 850/900 MHz band spectrum in late 2021. Defragmentation of the 3.4 GHz band is also underway. Apparatus licensing arrangements supporting wireless broadband are also being developed in a number of bands, including 26 and 28 GHz. This will support industry in its continued rollout of 5G networks.

"A work program to review and, where appropriate, update existing spectrum licence technical frameworks to better support 5G technologies is underway. This will support industry in its continued rollout of 5G."

On the topic of local area wireless broadband (including private LTE and private 5G), some submissions said that "the ACMA should be doing more to find dedicated spectrum for uses such as industrial complexes including factories, enterprises, ports, mines, petrochemical installations and agricultural environments".

In response, the ACMA said that it "has released an information paper detailing spectrum options currently, or in the process of being made available for local area private wireless broadband networks. Of note is the current review of arrangements in the 3700–4200 MHz band and implementation of class and apparatus licensing arrangements in the 26 GHz and 28 GHz bands.

"The new FYSO work item looking at possible changes to class and apparatus licences in 1880–1920 MHz band may offer additional opportunities for private and local area wireless broadband purposes."

The ACMA received many submissions concerned with priorities for proposed band planning activities, covering interests in the satellite, Wi-Fi, private LTE and ITS (automotive) sectors.

"On balance, given current FYSO commitments and industry feedback, we intend to focus on consolidating and delivering the existing work program commitments, with the addition of a small number of new activities," the ACMA said, listing Wi-Fi, local area wireless broadband/private WBB and ITS as specific points of interest.

There were also submissions about various aspects of the "planning 'stages' process used in the FYSO to describe the ACMA process for undertaking major replanning activities," with the ACMA clarifying its processes and outlining more details within the FYSO.

Another matter raised by some submissions was the topic of pricing; in particular, pricing arrangements for shared spectrum and spectrum used for research purposes. In response, the ACMA said that it is "developing a work program to implement the Spectrum Pricing Review".

The full FYSO and its addendum can be read at https://www.acma.gov.au/publications/2020-09/publication/five-year-spectrum-outlook-2020-24.

Telecommunications essential to keeping Australians connected

The COVID-19 pandemic and the bushfire disasters in late 2019 and earlier this year have once again — and more powerfully than ever — highlighted the criticality of telecommunications infrastructure for all Australians. With all aspects of our lives now being digitised in some form or another, telecommunications networks are essential to the functioning of Australia's economy and society, especially in emergencies.

Telecommunications infrastructure has held up well in the recent crises: mobile and fixed voice and broadband services saw no major congestion and in many cases delivered even higher speeds than prior to the pandemic. Although the savage bushfire season caused significant disruption to telecommunication infrastructure and services in affected areas, 88% of outages were caused by loss of mains power, meaning that carriers' restoration efforts largely hinged on power networks becoming operational again.

Yet, as we move into another bushfire and cyclone season, and with the pandemic not behind us, we must not rest or become complacent.

Our industry stands united behind the objective to further improve the resilience of our sector's infrastructure, targeted to ensure that Australian communities have access to high-quality, uninterrupted communications, including vital emergency services, during times of crises.

The telecommunications sector, like many other sectors, has engaged closely with the Royal Commission into National Natural Disaster Arrangements and will strive to implement recommendations flowing from this process.

Independent of the findings of the Commission, it is clear that Australia can only successfully tackle major disasters if we work together across sectors, all layers of government and together with Australian communities.

Therefore, fixed and mobile carriers, together with a broad range of stakeholders from federal and state emergency organisations, have recently developed the Telecommunications Emergency Communications Protocol. This protocol constitutes a common operating model for telecommunications disaster management to underpin the efficient interaction between Australian Government agencies and telecommunications carriers.

Communications Alliance and Energy Networks Australia have also recently signed a memorandum of understanding to enhance effective collaboration and coordination between telecommunications and electricity networks in preparing for and responding to emergencies at a local, regional and state level, and to support the recovery of communities in those areas.

Warning Australians of dangers and delivering targeted information into affected areas is crucial but can be challenging during emergencies. Cell broadcasting, a standards-based technology that is already being used in New Zealand and internationally, offers capabilities that would help overcome many of those challenges. Australia's mobile operators stand ready to engage with government over ways of how such a solution could be implemented here in Australia.

Beyond the resilience of networks, it is important that Australians themselves know what to do to maximise the availability of communications to them in times of crisis. We are assisting the federal government with the development of a communications program designed to provide targeted information in disaster-prone areas about access to telecommunications during emergencies and natural disasters. Much in the same way as Australians prepare with evacuation plans, they need to have a telecoms emergency plan to help them out when disasters hit.

John Stanton is CEO of the Communications Alliance. Previously he was CEO of People Telecom (2006–09), UK President and Director of Intelsat Global Sales & Marketing and of the Data, Carrier and Internet Business Unit (2001–05), Vice President of Sales and Marketing for Intelsat US (1999–2001) and Chairman of the Intelsat Board (1996–97). Prior to that he became Manager of Public Affairs for Telstra in 1992 after the merger with OTC.

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