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P2T SHADOW



P2T COMPACT

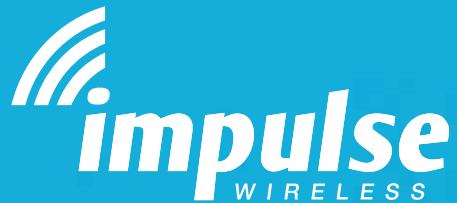
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ON THE COVER



Push-to-Talk over Cellular (PoC or PTT) is not new technology, though the approach to get it to market and its applications have evolved over time. In a nutshell, PTT enables instantaneous communication more commonly associated with mobile phone services that uses a button to switch a device from sending voice to receiving voice. That is, PTT switches a phone from full duplex mode, where both parties can hear each other simultaneously, to half duplex mode, where only one party can speak at a time. Multiple parties can also be added to the conversation. This version of PTT is based on 3G and 4G packet-switched cellular networks using a form of VoIP.

New player in the Australian PTT landscape Press2Talk (P2T) has roots in the two-way radio and wireless networks arena. P2T has invested significantly in Australian-based PTT servers supported by local engineers, and it owns its own network — resulting in an optimum experience and improved call quality.

The P2T offering includes dispatcher software that provides customers with enhanced functionality in fleet management, from setting up a vast array of call groups, GPS positioning and tracking, to SMS messaging to one or all. P2T is also broadening the range of accessories available to include gooseneck microphones, footswitches and Bluetooth add-ons.

You can find P2T on Stand 3 at Comms Connect Melbourne this November.

Press2Talk Pty Ltd
press2talk.com.au



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www.CriticalComms.com.au/magazine



Safety is paramount in any industry, and none more so than in radiocommunications, where hazards include working at height and potential exposure to dangerous doses of radio waves. So it's great to see that there are resources available that can be used to help keep workers safe. If you didn't manage to catch Tony Paul's presentations at Comms Connect, his article in this issue will fill you in on

the innovative solutions that have been devised to boost worker safety near radio transmitters.

There will be two important meetings in September that will be of interest to all in the communications world. First, Telstra will host representatives from the 3GPP on the Gold Coast for a plenary meeting, where the next evolutionary steps for 5G will be discussed. Then, at the University of Melbourne, 3GPP and local experts will provide a briefing for government and industry about progress towards global standards that will shape the communications field for years to come.

Melbourne will also be the place to be in November. Please take the time to peruse the Comms Connect Melbourne preview in this issue, mark down which sessions you can't afford to miss and then make sure you register before the early bird deadline (12 October). As always, Paul and co. have put together a varied and informative program, which this year for the first time will feature an international regional delegation (from Finland). There'll also be increased emphasis on emerging and converging technologies such as the Internet of Things. Don't miss out — register your attendance today to ensure you catch up with all of the latest critical communications developments.

Jonathan Nally, Editor
jnally@wfmedia.com.au

September 2018

5G Asia 2018

18–20 September
Singapore
tmt.knect365.com/5g-asia/

Critical Communications MENA 2018

23–25 September
Dubai
critical-communications-world.com

October 2018

RadComms 2018

30–31 October
Maritime Museum, Sydney
acma.gov.au

November 2018

MilCIS 2018

13–15 November
Canberra
milcis.com.au

Comms Connect Melbourne 2018

20–22 November
MCEC, Melbourne
melbourne.comms-connect.com.au

March 2019

Critical Communications Europe 2019

12–13 March
Ricoh Arena, UK
critical-communications-world.com

May 2019

Critical Communications World 2019

18–20 May
Kuala Lumpur, Malaysia
critical-communications-world.com

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



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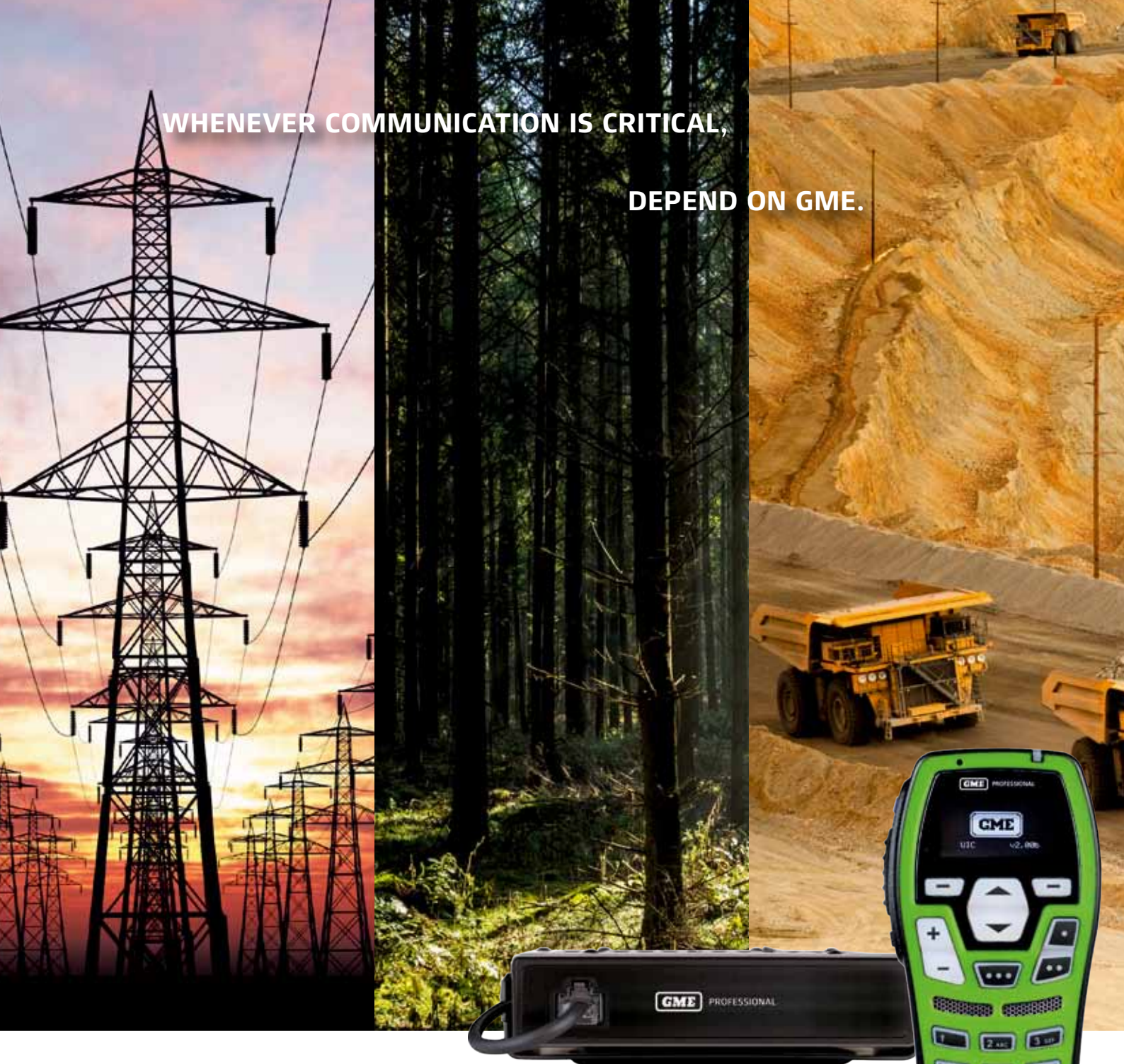
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Introducing the CM60 Series

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

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

The advanced User Interface Control (UIC 600 Series) features an OLED screen for high-visibility characters, back-lit keypad, powerful front facing speaker and a secure in-vehicle interactive bracket.

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



STORM WARNING

Solar flares disrupted communications during the September 2017 Atlantic hurricane relief effort.

An X8.2 class solar flare flashes in the edge of the Sun on 10 September 2017. This image was captured by NASA's Solar Dynamics Observatory and shows a blend of light from the 171 and 131 angstrom wavelengths. Credit: NASA/GSFC/SDO



An unlucky coincidence of space and Earth weather in early September 2017 caused radio blackouts for hours during critical hurricane emergency response efforts, according to a new study in *Space Weather*, a journal of the American Geophysical Union.

The new research, which details how the events on the Sun and Earth unfolded side by side, could aid in the development of space weather forecasting and response, according to the study's authors.

On 6 September, three hurricanes advanced in a menacing line across the Atlantic Ocean. Category 5 Hurricane Irma ravaged Barbuda in the Caribbean's Leeward Islands in the early morning and churned onward to St. Martin, St. Barthelemy, Anguilla and the Virgin Islands, causing massive damage. Tropical Storm Katia hovered in the Gulf of Mexico and Tropical Storm Jose approached from the open ocean. Both were upgraded to hurricane status later that day.

On the surface of the Sun, 150 million kilometres away, a different kind of storm was brewing. A class X-2.2 and major class X-9.3 solar flare erupted on the morning of 6 September, prompting the US National Oceanic and Atmospheric Administration's (NOAA) Space Weather Prediction Center to warn of a strong radio blackout over most of the sunlit side of Earth, including the Caribbean.

Amateur radio operators assisting with emergency communications in the islands reported to the Hurricane Watch Net that radiocommunications went down for most of the morning and early afternoon on 6 September because of the Sun's activity, according to the study. The French civil aviation authority reported a 90-minute loss of communication with a cargo plane, and NOAA later reported that HF had been unavailable for up to eight hours that day.

Another large class-X flare erupted from the Sun on 10 September, disrupting radiocommunications for three hours. The disturbance came as the Caribbean community coped with Category 4 Hurricane Jose's brush with the Leeward Islands and

the Bahamas, and Irma's passage over Little Inagua in the Bahamas on 8 September and Cuba on 9 September.

"Space weather and Earth weather aligned to heighten an already tense situation in the Caribbean," said Rob Redmon, a space scientist with NOAA's National Centers for Environmental Information in Boulder, Colorado, and the lead author of the study.

Bobby Graves, an experienced amateur radio operator who manages the Hurricane Watch Net from his home near Jackson, Mississippi, said the flares caused communications to go down for hours. The Hurricane Watch Net is a group of licensed amateur radio operators trained and organised to provide communications support to the US National Hurricane Center during storm emergencies.

"You can hear a solar flare on the air as it's taking place. It's like hearing bacon fry in a pan, it just all of a sudden gets real staticky and then it's like someone just turns the light completely off, you don't hear anything," Graves said. "We had to wait till the power of those solar flares weakened... It was a helpless situation."

The study detailing the activity on the Sun and its effects on radiocommunications from 4–13 September serves as an overview to a collection of journal articles in *Space Weather* investigating the solar activity of September 2017. The collision of Earth and space weather in September delivered a reminder that solar events can happen at any time and may coincide with other emergencies.

The information in the study could help scientists improve space weather forecasting and response, according to the study's authors. By understanding how the events on the Sun and Earth unfolded, scientists can better understand how to forecast and prepare for future events.

The study shows the solar flares affected shortwave radiocommunications, which were being used by amateurs and professionals in emergency response efforts, although it does not detail how emergency efforts may have been affected by the radio blackout.

"Safeguards put in place to prevent dangerous disruption to GPS from solar events worked," said Mike Hapgood, head of space weather at Rutherford Appleton Laboratory in the United Kingdom, and a scientist not connected to the new study.

"In many ways, we were ready. Some things that could have caused big problems didn't, but shortwave radio is always tricky to use during solar events. But good radio operators are aware of the events and will work hard to overcome problems.

"It's the Sun reminding us that it's there," Hapgood added. "The Sun's been very quiet



Hurricanes Katia, Irma and Jose lined up in the Atlantic on 6 September 2017 in an image captured by the Suomi NPP weather satellite. Credit: NASA.

for the last 10 years. It reminds people not to be complacent."

Unexpected space weather

The 2017 flares were the largest since 2005 and the best documented solar storm to date, observed from a fleet of spacecraft between the Earth and the Sun, in Earth's orbit, on Earth and Mars.

Solar flares release bursts of X-rays that travel outwards in all directions at the speed of light. Space weather forecasters have only minutes to broadcast warnings to spacecraft, aviation and other administrators before effects are felt on Earth.

The 6 and 10 September flares were accompanied by bursts of high-energy solar material explosively ejected from the Sun in an expanding bubble much larger than the Earth. Such coronal mass ejections, which arrive within one to three days, have the potential to wreak the most havoc on human technology. The geomagnetic storms generated by coronal mass ejections can damage power grids, confuse GPS systems and damage or disrupt communication with spacecraft, including weather satellites.

NOAA's Space Weather Prediction Center issued warnings for potentially severe geomagnetic storms for 7–9 September.

An unlucky coincidence

The unexpected burst of space weather coincided with high hurricane activity in the Atlantic Ocean.

Irma, one of the most powerful Atlantic hurricanes on record with sustained winds of 287 kilometres per hour, hit the tiny island of Barbuda at maximum intensity, razing

95% of its buildings. The storm destroyed most homes and much infrastructure on St. Martin, Anguilla, Great Inagua and Crooked Island in the Bahamas, and the US and British Virgin Islands. It caused power outages and damage in the Cuban Keys, Turks and Caicos and the south-eastern United States. Wind and rain from the storm killed 37 people in the Caribbean and 10 on the US mainland, according to the National Hurricane Center.

During the September crisis, the Caribbean Emergency and Weather Net logged many 'radiograms' relaying survival notes between anxious family members on the islands and the mainland via ham radio operators, Redmon said.

"Seeing that logbook really brought home to me the human dimension of the storm," Redmon said. "It put the humanity in the science."

Ham radio hobbyists routinely volunteer to disseminate hazard information from the US National Weather Service to island communities and ships during major storms, report real-time ground conditions and damages back to the National Hurricane Center, and assist the Red Cross with communications.

Graves, the ham radio operator, said many people trapped by storms appreciate hearing a friendly voice over amateur radio relaying the latest weather update, even if they are not able to reply. During a storm, ham radio volunteers strain to listen for lone stations in the affected area that may still be transmitting, Graves said.

"A lot of folks in the area were asking us: 'We heard there's Jose coming behind Irma, what's this thing going to do?'" he said.

Article courtesy the American Geophysical Union.

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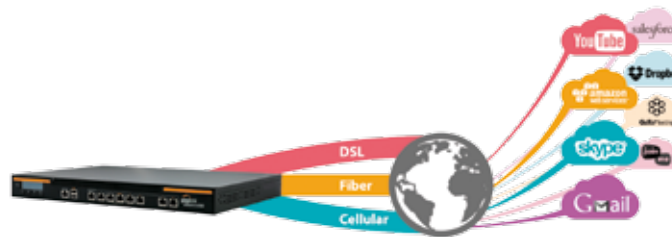


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Software-Defined Wide Area Networking (SD-WAN) is a revolutionary way to approach the simplification of branch office networking and assure optimal application performance by using centrally controlled and managed WAN virtualization.



The Peplink SD-WAN Advantage

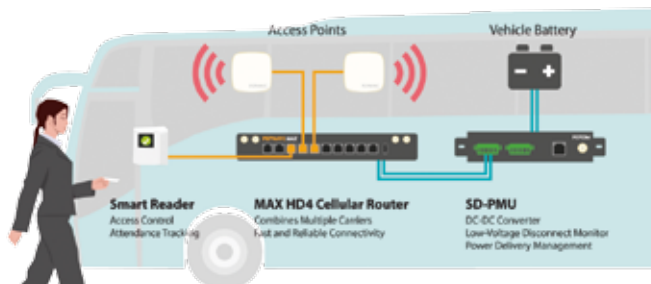
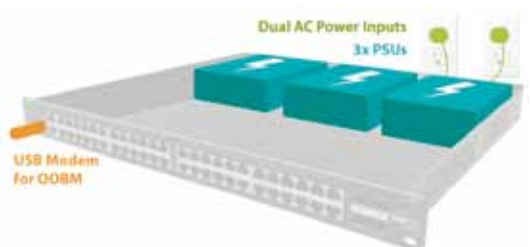
Over the years, Peplink has developed a potent combination of products and technologies that can help to build SD-WAN networks with unbreakable connection resilience, unmatched deployment flexibility, and intuitive ease of use.

The Peplink SD-Switch Advantage

Centralized Reporting: View the status of every SD Switch, what ports are connected to which devices, and what firmware it is running, all on a single interface.

Tools to Quickly Find the Culprit: Use InControl2 (cloud-based management tool) to see all devices in your network. Search by MAC address and pinpoint the culprit's exact port.

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The Peplink SD-PMU Advantage

Voltage Regulation and Boost: The SD-PMU can take power from sources with low or fluctuating voltage and turn them into a reliable streams of 52V. Then, it sends battery voltage information over the IoT Cloud for remote monitoring.

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4G NETWORK FOR NORFOLK ISLAND

Phone and internet services will be enhanced on Norfolk Island, following federal government funding for installation of a 4G network. The government is committing \$3.45 million towards the \$4.6 million Futureproofing Telecommunications in Norfolk Island project, where a modern and reliable 4G mobile telecommunication network will replace the obsolete 2G mobile phone network. This support will be provided via the Building Better Regions Fund Infrastructure Projects Stream. The Norfolk Island Regional Council will provide the remaining \$1.15 million towards the initiative. The project will unlock capacity in areas of health, education, safety, business and tourism.

More info: bit.ly/2nT3ffc



ICOM AWARDED FOR LTE TRANSCEIVER

The Icom IP501H LTE transceiver has been honoured at the Australian Business Awards 2018. Masahiko Komoda, Managing Director, said the award recognises Icom's achievements in research and development. "Icom (Australia) has worked hard to bring into the Australian market the IP501H, and winning the 2018 ABA Product Innovation Award is a reinforcement of the hard work and commitment our team has put into this product. This solution offers the consumer a secure backbone system based in Australia and is able to overcome traditional radio obstacles of distance and environmental barriers," Komoda said. The IP501H enables secure two-way communication managed through a secure cloud server based in Australia.

More info: bit.ly/2PpuXwG



Vector signal generator

The R&S SMBV100B vector signal generator offers spectral purity, output power and easy, intuitive touchscreen operation. It specifically address the requirements of RF semiconductor development, telecommunications, and aerospace and defence.

The R&S SMBV100B vector signal generator has a frequency range from 8 kHz to 3 GHz or 6 GHz, ultrahigh output power up to +34 dBm, 500 MHz modulation bandwidth with accuracy, high-quality EVM and ACPR results up to high power levels. Also available is the easy upgrading of the instrument at customer premises via software key codes and convenient operation via 7" touchscreen.

The R&S SMBV100B comes with a three-year warranty.

Rohde & Schwarz (Australia) Pty Ltd

www.rohde-schwarz.com.au

Rack-mount DC to DC converter

The ICT Site Converter Series are a high-current, high-efficiency, rack-mount DC to DC converter. They are designed for dual-voltage site applications where a 24 or 48 VDC input needs to be converted to a 24 or 12 VDC output to power two-way radios, repeaters, RF amplifiers, trunking systems or other sensitive electronic equipment.

With wide-ranging input of 20 to 60 VDC, the site converter will support 24, 36 and



48 V systems. There are four models available to support 35 A or 50 A at 24 V output, and 70 A or 100 A at 12 V output. Efficiency is 90%, meaning less energy will be lost in the conversion process.

The site converter is fully isolated and can be used in positive or negative ground environments. The wide-ranging input voltage is also ideal for sites where the DC voltage may fluctuate. The site converter's built-in protection features protect the converter as well as the connected loads from abnormalities.

Output voltage is adjustable between 12.5 and 14.5 VDC or 25 and 29 VDC using a front-mounted trim pot. A remote alarm contact will signal when DC fails or the converter shuts down. A remote contact terminal allows the converter to be shut down remotely for servicing or to conserve the battery when not in use.

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YSAR GETS FREE SATELLITE INTERNET

Wireless Nation will provide free satellite internet for Youth Search and Rescue (YSAR) in New Zealand under a new partnership. The service will be used for communications, data sharing and navigation across the country. Wireless Nation will also provide YSAR with a portable base station to connect with sensors in the field, such as GPS trackers, temperature sensors, vibration sensors and panic alarms. YSAR will share relevant data gathered from field exercises with Wireless Nation to help the company develop solutions for search and rescue and emergency services working in the most challenging environments.

More info: bit.ly/2LaA6W5



WIN FOR DEFINIUM TECHNOLOGIES

Launceston-based Definium Technologies has landed a major contract to supply electronic components for a large-scale mining project with international reach. The \$1.5 million contract will see Definium locally develop and manufacture 31 multichannel LoRa gateways and approximately 6500 sensors for the Australian mining sector. "We are proud to have supported Definium's continued growth with support from both the Department of State Growth and the Office of the Coordinator-General and through our Innovation and Growth Voucher System and Advanced Manufacturing Market Expansion Program," said Jeremy Rockliff, Tasmania's Minister for Advanced Manufacturing and Defence Industries.

More info: bit.ly/2wcF8fe



RF signal generator

The R&S SMB100B RF signal generator offers performance and versatility in a small footprint. It provides spectral purity and high output power combined with comprehensive functionality and simple operation.

These characteristics have been integrated into a compact and lightweight form factor. Even without extra options, the R&S SMB100B delivers high performance, but it can be enhanced for a specific application. For example, the R&S SMBB-B1 option (OCXO) reduces the ageing and temperature dependency of the reference frequency and improves single sideband (SSB) phase noise. The R&S SMBB-B1H high performance OCXO option further improves these performance parameters. Compared to the standard instrument, the ageing and temperature dependency are improved by more than a power of ten.

Two optional high-output power levels are available. The base unit alone provides 20 dBm of output power at 1 GHz. The R&S SMBB-K31 high output power option provides 8 dB more output power with 28 dBm. This first 'high output power' level can be activated using a keycode directly on the instrument with no added service costs. Additionally, installing the R&S SMBB-B32 ultra-high output power option gives the instrument another 6 dB. It therefore offers an ultra-high output power of 34 dBm (all values are measured at 1 GHz).

The R&S SMB100B is suitable for a wide range of applications in R&D, production, service and maintenance where a good price/performance ratio is also a key factor.

Rohde & Schwarz (Australia) Pty Ltd

www.rohde-schwarz.com.au

Mission-critical group communication solution

The Airbus Tactilon Agnet application enables smartphone users (such as those who work in offices, laboratories, workshops and depots) to talk to individual, group and control room PMR users (eg, those who repair power lines, fight fires or save lives) and send and receive text, images, video and documents.

Used with 3G/4G/5G networks and Wi-Fi, the app is versatile, yet easy to learn. It works in a wide range of smartphone models as well. Unlike other commercially available apps that claim to turn a smartphone into a two-way radio, Tactilon Agnet is built with the mission-critical professional user in mind.

Tactilon Agnet is designed to be secure and reliable, and it lets the user make group calls and individual calls, and send messages and multimedia without switching between the applications on the smartphone. In dangerous situations, Tactilon Agnet will automatically send the emergency call together with the user's location to the right recipient(s).

With Tactilon Agnet, users get the convenience of mobile internet and the power of professional mobile radio. They can easily expand their team's flexibility leveraging the existing PMR communication groups as well as IT and dispatching systems.

Airbus/Secure Land Communications

www.securelandcommunications.com





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R&S COMMS SYSTEM FOR NZ ATC

Airways Corporation of New Zealand has selected the Rohde & Schwarz VCS-4G IP-based voice communications system for ATC communications in New Zealand airspace. Rohde & Schwarz will provide a quad-redundant R&S VCS-4G IP-based voice communications system in two tranches. Tranche one will see the equipment and infrastructure installed in the Auckland and Christchurch air traffic control centres, while tranche two (anticipated to start in 2021) will deliver tower-based equipment across 22 tower locations nationwide. The technology will support Airways New Zealand as it moves towards a new one-centre, two-location operational model across its Auckland and Christchurch locations.

More info: bit.ly/2wgZFij



LASD DEPLOYS BACKUP HF

The Rockwell Collins UrgentLink communications network has been deployed within the Los Angeles County area for the LA County Sheriff's Department (LASD) to provide a countywide backup system for use during disasters. UrgentLink is a nationwide HF communications system that has ground stations throughout the US to provide redundant coverage when normal communications infrastructure fails. To maximise coverage across the 10,600 square kilometres of Los Angeles County the LASD serves, three facilities were strategically selected for the installation of the network hardware. The LASD plans to expand its use of the system to offer increased regional coverage in the event of a disaster.

More info: bit.ly/2L9f4q0



Emergency and disaster management courses

The CQUniversity emergency and disaster management courses are designed for participants looking to give their emergency and disaster management career an edge.

Both courses are delivered online, allowing participants to tailor their study to suit their lifestyle. They can enjoy the flexibility of recorded sessions and online forums, as well as benefiting from the support and experience of a university ranked in the top 2% of universities worldwide.

For those working or volunteering in emergency services or a disaster management related role with a relevant vocational education and training qualification, the Bachelor of Emergency Service will help deepen their knowledge. They can choose a minor to suit their interests and career goals from public health, community safety and education, safety science or management.

The Graduate Certificate in Emergency and Disaster Management allows participants to further enhance their skills in community-based disaster management and explore current and emerging trends.

CQUniversity

www.cqu.edu.au

CATV analyser

The VeEX VePAL CX350s is a portable, all-in-one test solution for legacy analog and digital cable TV networks. It is available to rent from TechRentals.

With a frequency range from 5 MHz to 1 GHz, the device supports SLM, DOCSIS 3.0/3.1, HD DVB-C carriers and Ethernet. Comprehensive SLM measurements include single channel, system scan, tilt and installation check.

The product is equipped with 10/100/1000-T/X Ethernet interfaces, BERT, RFC2544 and related test applications. It can test and troubleshoot backbone connections to the CMTS and verify the full bandwidth of a DOCSIS 3.0 and 3.1 network while operating in modem pass-through mode.

The analyser has a lightweight chassis packed with powerful features including a high-resolution, 7" colour touchscreen with a graphical user interface. Test results can be transferred quickly and efficiently to a USB memory stick or FTP upload via LAN or DOCSIS ports.

TechRentals

www.techrentals.com.au





Finally, a real LTE Radio Solution!

(Not a mobile phone app, pretending to be radio)

The Icom IP501H is a Government & Enterprise Grade, 4G (LTE) Two Way Radio System; Powered by an Australian, AES Encrypted, Blistering Fast, Private LTE Cloud. Contact us today to arrange your free demo and experience the evolution.



The image shows a black Icom IP501H two-way radio with a screen displaying '9/29 14:30' and 'TG001'. To its right is a black microphone with 'LTE' branding. To the left of the radio are several icons: a blue cloud with '4G LTE' and a lock icon, a group of people with speech bubbles, two people with a double-headed arrow, a person in a hard hat, and a red circle with 'GPS' and a person running. Below these icons are two white boxes with black text: 'IP67' and 'MIL-STD 810G'.

IP67

MIL-STD 810G

Need Loud Industrial Audio?

Unleash The Power™ of your Icom IP radio when you connect it to the Wireless Pacific LTE Power Mic™, delivering 1 Watt of LOUD & Clear Industrial Audio. This is ideal for high noise construction sites, warehouse and industrial environments.

Exclusive to Radio Warehouse, a proud Certified Icom Networking Partner.

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RadioWarehouse.com.au/LTE



THE ACMA: DELIVERING THE FUTURE

James Cameron, Full-Time Authority Member, ACMA

Technological change, streamlining regulation and encouraging secondary spectrum markets are firmly on the agenda.

Spectrum has become a key enabler of the digital economy. It paves the way for a future Internet of Things connected by 5G, by LoRa technology, by terrestrial and satellite wireless links. These developments foreshadow a profound transformation of the world in which we live and what many are now calling the Fourth Industrial Revolution. If there is to be a revolution, we all need to be prepared for the challenges and opportunities that it will present.

The ACMA is preparing for that disruptive change and has an ambitious spectrum reform program ahead of it. This is the result of changes to government policy that will bring about new radiocommunications legislation that will move away from prescriptive primary provisions. These changes will put the ACMA at the forefront of implementing future reforms and creating spectrum management arrangements.

Based on the exposure draft released last year, a new Radiocommunications Act, if passed by the parliament, would establish a single licensing framework. The exposure draft proposes removing the existing legislative distinctions between kinds of licence, imposing fewer statutory licence conditions

and streamlining equipment regulation, while also introducing more graduated interference management and enforcement powers.

There would also be a greater ability for third parties to manage spectrum, to settle interference concerns and for licensees to choose how to use their spectrum with less involvement from the regulator.

Our prime goal in preparing to implement these government reforms is to ensure that spectrum management maximises the economic and social benefits and opportunities that new technologies can deliver to all Australians. To achieve this, there needs to be a conversation between the regulator implementing reform and the industry that is to benefit from it.

Our conversation with industry started last year with the release of ACMA supporting material as part of the Department of Communication's consultation about the Exposure Draft of the Radiocommunications Bill. RadComms 2017 — our flagship spectrum management conference — provided us with the opportunity to engage more deeply with industry through workshops on radiocommunications licensing, equipment rules and interference management. The department is now working towards the release of a second exposure draft

and the ACMA is working to ensure that RadComms 2018 — to be held in Sydney in October — is again an opportunity to share our thinking, hear industry views and understand concerns as well as the opportunities ahead.

It is worth reiterating that the ACMA is not just planning for 5G, not just for mobile broadband and not just for wireless broadband. By pursuing a wider strategy and work program about the spectrum being made available for a range of radiocommunications, our aim is to hand to industry greater freedom to decide which generation of technology to deploy, in which band and at what time. Most importantly, our approach provides industry with greater freedom to decide the services that it will offer to its customers.

With this freedom comes responsibility. We will increasingly look to the holders of valuable spectrum to make the most of it themselves. It means doing what we can to help the secondary market deliver on the trading and consolidation of spectrum holdings that are seriously fragmented and therefore underutilised.

Increasingly, demand for spectrum in many bands is contested, including, but not limited to, those bands sought by mobile



THERE ARE CLEARLY OPPORTUNITIES FOR SECONDARY TRADING OR OTHER COMMERCIAL ARRANGEMENTS TO OPTIMISE THE USE OF ALLOCATIONS BELOW 1 GHZ AS WELL AS AROUND 3.5 GHZ.

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RadComms 2018

RadComms 2018 will be held at the Australian National Maritime Museum, Darling Harbour, Sydney, from 30–31 October with the theme of 'Delivering the future'. The flagship forum for the Australian radiocommunications sector, RadComms attracts a wide range of expert participants from industry, academia and government. Topics for discussion this year will include the continuing progress of 5G, transformational developments such as the establishment of the Australian Space Agency and a major national investment in a Space Based Augmentation System that will dramatically improve location information and positioning services across Australia.

For more information and to register, visit the RadComms 2018 website (<https://www.acma.gov.au/theACMA/About/Events/Radcomms>).

As spectrum becomes increasingly important, RadComms and the ACMA's broader consultation initiatives — from our annually updated Five Year Spectrum Outlook and annual work program, to the industry 'Tune-ups' we organise on specific issues — will increasingly become critical for the radiocommunications industry. I welcome your participation and contributions.

Australian Communications and Media Authority
www.acma.gov.au

network operators. And the case for the regulator to reallocate spectrum away from other users is weakened when there are current holdings that can be more efficiently utilised. Secondary market trading to achieve more efficient holdings is not necessarily easy or quick — it will need industry to take a lead and it will require market participants to identify common objectives. But a sector hungry for new spectrum will be more effective in demonstrating the case for those difficult changes affecting spectrum that other people are already using, when they can show that they are actively working to optimise use of their own, existing holdings.

There are clearly opportunities for secondary trading or other commercial arrangements to optimise the use of allocations below 1 GHz as well as around 3.5 GHz. While we recognise the challenges for licensees in negotiating with their commercial rivals, this is a conversation that needs to take place and which the ACMA will seek to revitalise and reinvigorate at RadComms 2018. And wherever a case can be made that further ACMA action is necessary, before industry has the flexibility it needs to optimise spectrum configuration through trades, we will be giving that work appropriate priority in our annual published work program.



James Cameron, Full-Time Authority Member, ACMA

Industry Talking

The ARCIA committee is made up of members from all over the country, volunteering to assist the association where they can. Thanks to the efforts of these people, the association continues to go from strength to strength. We also thank their employers for allowing our committee members to contribute time during working hours.

The most recent event on the ARCIA calendar was held in Brisbane. Members enjoyed stunning views over the Brisbane River and we heard from GOLDOC on the importance of communications during the 2018 Commonwealth Games earlier in the year. The Queensland Industry Award was presented to Geoff Wood; this was warmly received by everyone at the event and is recognition of someone who works quietly in the background.

The next event will be held in Adelaide on 4 October at the National Wine Centre, when members will get together to talk about the industry and hear from an interesting guest speaker. South Australian members, please make sure you support this event — maybe you could bring along someone from the security, cabling or CB industry for a great evening and to share our networking opportunity.

Once Adelaide has done attention will move to the Annual Gala Dinner at the Melbourne Convention & Exhibition Centre. Planning for this event has been underway all year and, combined with Comms Connect, it is set to be the biggest yet. We understand that WFevents has put together an outstanding program with some key international guests, so if you ever needed an excuse to get to Melbourne, this is the year.

Another thing we have been talking about providing is training. Our industry is relatively small, spread all over Australia and has many unique characteristics that are not part of mainstream teaching any more. However, we also know the value of trained people and what they can add to our organisations. So it is pleasing to report that, under the guidance of Chris Stevens, we are beginning to see some options... the first of which will be a dedicated training session as part of Comms Connect at Melbourne this year. The idea is to provide a reason for ARCIA members to send more staff to these events and, hopefully, enjoy both the training and all the other activities.

After a long discussion with the AMCA on the merits of opportunity cost pricing for UHF spectrum in high-density areas, it is very pleasing to report that the ACMA has dropped the plan for more 15% price increases. ARCIA has always argued that what we expected from the ACMA was transparency in the usage of, and fair pricing for, spectrum. From the time of all the changes in UHF spectrum and the movement to harmonised government spectrum, we did not agree with the ACMA that there was suddenly an overall increase in the use of spectrum — especially when the majority of industry members were reporting the exact opposite. So we thank the ACMA for listening to our arguments and for allowing the association to engage with the regulator on such an important issue.

Finally, I would like to thank our committee members for their dedication and commitment over the last 12 months. We also welcome our new committee, many of whom have carried on from last year. I

would also like to thank our commercial partners for their support of the association and WF Media and WFevents, our media and event partners, for their efforts across the country.



Hamish Duff, President,
Australian Radio Communications
Industry Association



Wireless Ethernet sensor nodes

The Advantech WISE-4220 and WISE-4470 series of wireless Ethernet sensor nodes are based on microelectromechanical systems (MEMS) and microcontroller (MCU) technology with built-in encryption provided by STMicroelectronics (ST).

The WISE-4220 is equipped with ST's temperature and humidity sensor (HTS221) with Wi-Fi technology to control end devices and enable cloud connectivity. Its most significant feature is its support for MQTT, RESTful and other IoT communication protocols. These enable the WISE-4220 to connect directly with Microsoft's Azure IoT Hub, Advantech's WISE-PaaS and other cloud platforms without requiring additional gateways.

The WISE-4470 also utilises an STM32L4 microcontroller and can integrate various products on a mobile network. In the near future, this model will also support NB-IoT and eMTC. Similar to the WISE-4220, the WISE-4470 also supports multiple IoT protocols and it is equipped with an RTC data logger. However, the WISE-4470 also incorporates a USB interface provided by the ST microcontroller, which allows for the rapid connection of various types of wireless communication modules.

By inheriting the direct cloud connectivity design of the WISE-4000 series, the WISE-4220 and WISE-4470 are suitable for environments such as factories, server rooms, data centres and cold chain storage facilities.

Advantech Australia Pty Ltd

www.advantech.net.au

Software for automated test systems

NI has announced the release of its InstrumentStudio software for NI PXI modular instruments. InstrumentStudio improves the live, interactive use model for modular instruments and makes debugging while running tests more intuitive. It is designed to help engineers in the aerospace, automotive and semiconductor industries benefit from a more effective workflow for test system development.

The software evolves the concept of single-instrument soft front panels into a unified, multi-instrument environment, so engineers can capture screenshots and measurement results in one view from their suite of instruments. It can also save project-level configurations for specific devices under test that can be repurposed later or shared with colleagues. This efficiency is key for testing high-mix devices and provides test repeatability at a convenience to the engineer or technician.

At different stages in the product design cycle, test engineers often waste valuable time correlating measurements between similar tests that ultimately use different hardware. And in production test, engineers who need to debug on the manufacturing floor may invest in separate hardware either for monitoring their tests or debugging their automated test equipment.

InstrumentStudio addresses these challenges by exporting configuration files to programming environments that reproduce settings, thereby simplifying measurement correlation. Additionally, test engineers can monitor PXI instrument behaviour by running the software while test sequences execute in parallel, streamlining the debug process.

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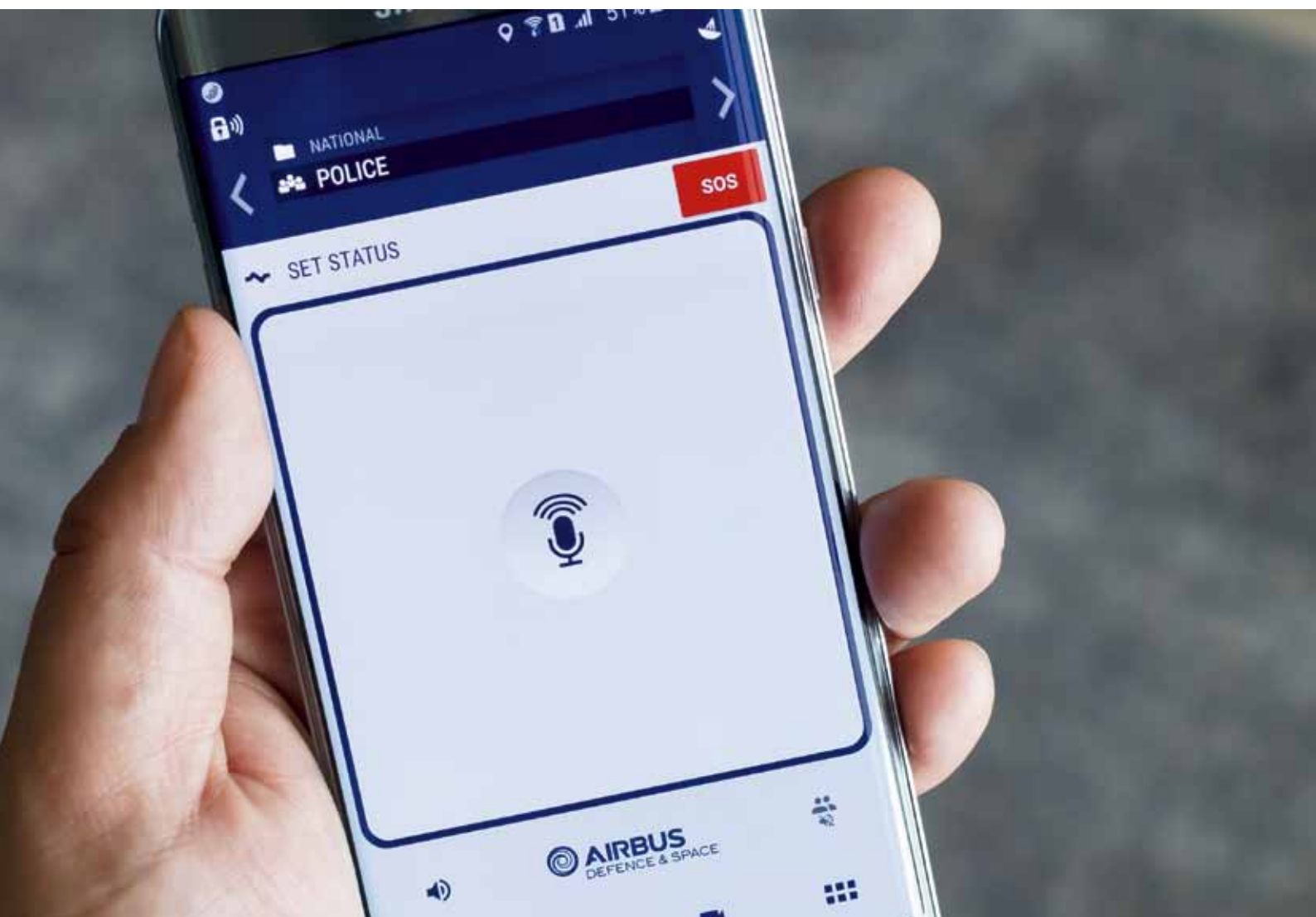
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FLEXIBLE COMMS

A smart app is keeping communications flowing for Bulgarian Border Police officers, whichever device they use.



The detention of 23 people illegally transported over the border from Greece in a lorry and the seizure of more than 300,000 smuggled cigarettes have been among the most notable recent successes for Bulgaria's Border Police. Effective communications is key to successes such as these.

Charged with policing the country's borders with five neighbouring countries as well as a coast on the Black Sea, Bulgaria's Border Police faces many challenges. The country's security services faced an additional workload in the first half of 2018 when Bulgaria took on the six-month rotating presidency of the European Council. The country took as its motto for the presidency "United We Stand Strong", a phrase that could also sum up the approach of the country's Border Police and how it is using advanced communications technology to work together more closely.

To help safeguard its borders, the Border Police needs good communications, so it uses a network owned and operated by the Ministry of Interior (Moi). The Bulgarian Moi network is based on more than 180 base stations and uses the latest Airbus Professional Mobile Radio (PMR) switching technology.

Widely used

The Border Police's philosophy of working together is strengthened by ensuring that everyone can keep in touch through the network. Officers on the ground have their radios to coordinate operations, but what if they need support or advice from people who do not carry PMR devices?

Many people in any organisation will use smartphones. However, if this is their only device, they can be cut off from the operational side of things. There is a clear need to make smartphones more connected to the professional mobile radio network used in the field. This need is met with Tactilon Agnet, an app that lets smartphone users contact Border Police PMR talk groups at the touch of a button. With Tactilon Agnet, smartphone users can talk to users who carry a PMR radio and also with the control room. Voice, SMS and location services can all be used.

Bulgaria is making good use of the app, with the Border Police employing it since 2017. A wide range of users, from executives to employees from different structures within the Mol, are using smartphones loaded with the app.

Staying in the loop

Tactilon Agnet has been used in Bulgaria for both individual and group calls. Calls are made to and from Agnet, from Agnet to PMR and from Agnet to a PABX. PMR radios are the main communication method, with Agnet-equipped smartphones used as a back-up, particularly for special events and special circumstances where smartphone users need to be kept in the loop.

Used with 3G/4G/5G networks and Wi-Fi, the app is versatile and easy to learn — in Bulgaria's experience, users have needed no special training to immediately start using the app and benefit from its features.

Those users have also reported that the app's interface is very user friendly and they have had no issues or problems using it so far. It has also been used on a wide range of smartphone models and there are plans to use it on iPhones in the future.

Similar experiences have been reported by users in Estonia. Military users in the National Defence League found that with good LTE coverage, the combined use of PMR and LTE is useful. Users gave plenty of positive feedback about the messaging functionality of the app, which they felt was very easy to use and helpful.

A world of difference

Unlike commercially available

apps that claim to turn a smartphone into a two-way radio, Tactilon Agnet is built with mission-critical professional use in mind. Vital capabilities it brings include the ability to talk to groups, as well as enabling individual or one-to-one calls. This removes the need to close the app and make a phone call.

It also enables the user to keep their place in a queue if they cannot speak straight away because someone else is speaking. Even more important is the app's emergency call capability.

A user in a dangerous situation can make an emergency call to get help very quickly, while not wasting resources by allowing one to be made accidentally. The app also automatically sends the call to the right place and, if the first choice of recipient doesn't answer, the call is sent automatically to someone else.

Smartphone users may not always be on the frontline, but when they need to keep in touch with operational events, the right app can make a world of difference.

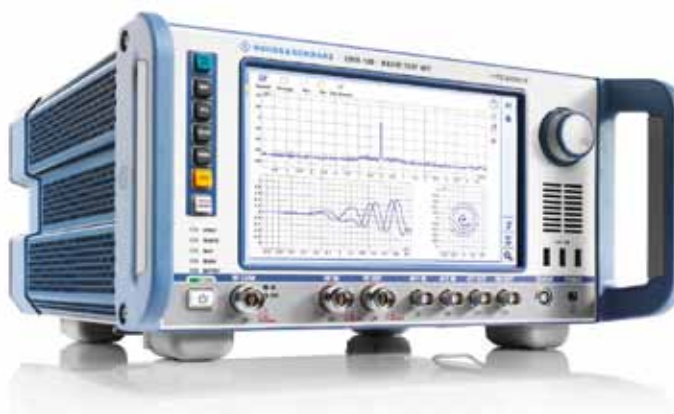
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**20–22 November
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COMMS CONNECT MELBOURNE 2018

The future of communications will be on show at Australia's premier communications event.

Next-generation communications technologies and systems will be at the forefront of the presentations and discussions at Comms Connect Melbourne (20–22 November). As well as the traditional topics you would expect to see at the conference, a range of other subjects will be put under the microscope... such as public safety mobile broadband (PSMB), the Internet of Things (IoT), FirstNet, the UK's ESN, below-ground comms and many more.

Of great interest will be an update on Australia's forthcoming PSMB solution, presented by Luke Brown from the Department of Home Affairs. Brown gave a well-received address at Comms Connect Sydney in June, and perhaps by November there will be more he can say about the status of the project. There'll also be an update from the NSW Telco Authority on that state's critical communications roadmap.

There will be a large contingent of leaders and experts from other countries, who will share their knowledge and insights into developments in critical communications: Mike Poth (CEO, First Responder Network Authority), Lieutenant Dan Gomez (LAPD), TJ Kennedy (Public Safety Network and formerly, FirstNet), Duncan Swan (Mason Advisory), David Lund (PSCE and BroadMap), Tero Pesonen (TCCA CCBG), Chris Goldsmith (New Zealand Emergency Services), Dr Yong Chang (Samsung Electronics) and Tony Gray (TCCA).

They will join a strong line-up of local leaders and professionals, whose presentations will cover a wide variety of technologies, methodologies and philosophies.

There'll also be Comms Connect's first ever country pavilion, featuring a large contingent of delegates from Finland. Businesses and organisations represented will include Bittium, Cloudstreet, Nokia, Business Finland, Dedicated Network Partners, Savox, Wirepas, Erillisverkot (State Security Network), Codea, Mentura

Group, Roger-GPS, Bandercom, Beaconsim and Insta DefSec. Finland has an enviable reputation for producing cutting-edge technologies and far-sighted communications solutions, so this will be a great opportunity to quiz all of those delegates on their latest and greatest ideas.

The preconference workshops will be held on 20 November. New to this year's line-up will be the LTE Connect workshop, which will feature hands-on demonstrations and plugtests — so make sure you bring along your LTE device. There'll also be a professional development training workshop on multicoupling.

This year's panel sessions will range widely, from the IoT to specific public safety IoT, and from PSMB to 3GPP developments (the latter to include an update from September's 3GPP meetings on the Gold Coast and in Melbourne — see the separate article in this issue).

Don't forget that the annual ARCIA Gala Industry Dinner and Industry Awards will be held on the evening of Wednesday, 21 November. The dinner is always a fantastic opportunity to celebrate what makes the radiocommunications industry great, and to mix with partners, clients, employees and colleagues. Book your tickets through ARCIA's website (arcia.org.au).

Check out the conference program and exhibitor list on the following pages, and watch for last-minute updates on the Critical Comms (criticalcomms.com.au) and Comms Connect (melbourne.comms-connect.com.au) websites — on the latter you'll also find full details of the registration process for the conference, workshops and exhibition (including a free trade expo pass option).

This year's Comms Connect Melbourne promises to be the best one yet. Make sure you're there to participate!

Comms Connect (WFEvents)
www.comms-connect.com.au

TRAINING WORKSHOPS/ MASTERCLASSES TUESDAY 20 NOV



(Additional fee applies — limited availability. Book with one or two-day conference packages or individually)

MORNING WORKSHOPS (9.30am-12.45pm)		
9.30am-11.00am LTE Connect Presenter: Ian Hastie — <i>Wireless Systems Specialist, Link Information Technologies (LINKIT)</i> 11.15am-12.45pm Critical messaging in the modern world Presented by: Brad Welch — <i>General Manager, TPL Systems Asia Pacific</i> and Liam Darling — <i>Sales Director, Australia, Tellen</i>	9.30am-12.45pm Radio spectrum management — what's trending in 2018 Presenter: Peter Hilly — <i>Managing Director, Spectrum Engineering</i> and Andrew May — <i>Licensing Manager, Spectrum Engineering</i>	9.30am-12.45pm Community safety information management: an international perspective Moderator: Inspector (Ret.) Lance Valcours O.O.M Panel members: Mike Poth — <i>CEO, FirstNet</i> , Lieutenant Dan Gomez — <i>CTO, Los Angeles Police Department</i> , David Lund — <i>Coordinator, BroadMap</i> , Steve Correll — <i>Executive Director, Nlets</i>
AFTERNOON WORKSHOPS (1.30pm-5.00pm)		
1.30pm-5.00pm ARCIA Professional Development Training workshop — multicoupling Moderator: Chris Stevens — <i>Managing Director, CartGIS/ARCIA Training Advisor</i> Presented by: Mark Mezzapica — <i>Chief Technology Officer, RFI Wireless</i> and Scott Alford — <i>Systems Engineering Manager, RFI Wireless</i>	1.30pm-5.00pm Digital land mobile radio and mobile broadband landscape — key information for evolving critical wireless communications Hosted by: Australasian TETRA & Critical Communications Forum (ATCCF) chapter of the international TCCA organisation with key speakers representing global players in the critical communications industry, including update of 3GPP critical LTE releases and local case studies	1.30pm-5.00pm Critical control rooms for the next generation of operations Presented by: David Williams — <i>University of Melbourne</i> , Inspector Ged Griffin — <i>Victoria Police</i> , Geoff Spring — <i>University of Melbourne</i> , Mark Homes — <i>CIRCADIAN AUSTRALIA</i> , Jenny Long — <i>Jennifer Long Visual Ergonomics</i> , Russell Ockendon — <i>Control Centres Australia</i> , Graham Manson — <i>International Resilience Group</i> , Hamish Duff — <i>Mastercom</i>

EXHIBITORS ON THE SHOW FLOOR INCLUDE

4RF Australia	CommSite Group	M2M One	Spectrum Engineering Australia
Addcom Contact Solutions	Cradlepoint	Mentura Group	STI Engineering
Airbus	Critical Comms	Motorola Solutions	Swissphone
Anritsu	CRS Accessories	NEC Australia	Tait Communications
ARCIA	DAMM Australia	NICE	Tellen
ATDI	Dedicated Network Partners	Nokia	Telstra
Australasian TETRA + Critical Communications Forum (ATCCF)	Emona Instruments	Novaris Surge Protection	TIPRO
Bandercom	Genesis	Omnitronics	TMG Test Equipment
Beaconsim	Glyn High Tech	Open Spectrum	TPL Systems APAC
Bittium	GME	Orion Network	TRBOnet
Benelec	Harris Corporation	Panasonic	Trio Test & Measurement
Cambium Networks	Hytera	Powerbox Australia	Unicom
Centre for Disaster Management + Public Safety	i-keytec	Press2Talk	Vertel
Challenge Networks	Icom (Australia)	Prism-IPX	Vicom Australia
Chatter PTT	Insta DefSec Oy	RFI Technology Solutions	Wave1 Wireless Communications
Cloudstreet	IPMobileNet	RF Technology	Wireless Innovation
Cobham Wireless	JVCKENWOOD	ROGER-GPS	Wireless Tech (Aust) P/L
Codan Radio Communications	Kalibre	Rohde & Schwarz	Wirepas Mesh
Codea	Keysight Technologies	Savox	ZCG Scalar
	Logic Wireless	Sepura	Zetron
	Loop Telecommunications International Inc	Simoco Wireless Solutions	
		Socius Technology	

PROGRAM

WEDNESDAY 21 NOV



8.50am	Welcome and opening remarks: <i>Paul Davis</i> — Events Director, WFevents followed by <i>Conference Chair: Kit Wignall</i> — DXC Technology		
9.00am	Opening Keynote: FirstNet and the global development of public safety wireless communications <i>Mike Poth</i> — CEO, First Responder Network Authority		
9.45am	Keynote: Innovation and partnerships in technology: how the Los Angeles Police Department is staying ahead of the curve <i>Lieutenant Dan Gomez</i> – Innovation & Strategic Planning Division, Los Angeles Police Department		
10.30am Morning Break — Exhibition Hall			
	Public safety and emergency management	Technology	Industry
11.15am	Next-Generation Critical Communications programme — a sector approach <i>Chris Goldsmith</i> — Programme Manager, New Zealand Emergency Services	Getting to 5G using innovative fixed wireless technology <i>Eddie Stephanou</i> — Regional Technical Manager – ANZ, Cambium Networks	PTT over LTE for mining operations <i>Ian Hastie</i> — Wireless Systems Specialist, Link Information Technologies (LINKIT)
11.45am	BroadWay — procuring innovation to enable pan-European mobile broadband for public safety. <i>Dr David Lund</i> — Vice President, Public Safety Communications Europe/ Coordinator — BroadMap	Wireless mesh networks explained and applied — what can they do for you? <i>Grant Jamieson</i> — Satellite System Engineer, Wireless Innovation	LTE underground – can it be done? <i>Simon Lardner</i> — Director, Challenge Networks
12.15pm	Technologies and innovations for critical communication industries <i>Dr Yong Chang</i> — Senior Director, Global Mobile B2B Team, Samsung Electronics	Unifying critical communications <i>Nick Rayner</i> — Unify Product Line Manager, Tait Communications	Global public safety and critical communications on the road to 5G <i>Peter Clemons</i> — Founder, Quixoticity
12.45pm Lunch Break — Exhibition Hall			
2.00pm	How Queensland Ambulance Service and New South Wales Ambulance Service are working collaboratively to share technology platforms <i>Geoff Waterhouse</i> — Senior Project Manager, Radio Telecommunications Capital Works Programme, NSW Ambulance	Critical messaging — saving money, saving lives <i>Graeme Hull</i> — Director of Business Development, Swissphone Wireless	An update on the review of the Radiocommunications Act and changes within the ACMA <i>Speaker TBC</i>
2.30pm	Surviving Hurricane Maria: Lessons with P25 Interoperable Systems <i>Rudy Torres</i> — Director, EFJohnson, a division of JVCKENWOOD	New technology for the 915 to 928 MHz class licence SRD frequency range <i>John Yaldwyn</i> — CTO, 4RF Australia	DMR Tier 3 Network – Voice radio coverage testing: A story of collaboration and innovation <i>Nick Wigley</i> — Telecommunications Engineer, Powerco
3.00pm	Nlets — The International Justice and Public Safety Network <i>Steve Correll</i> — Executive Director, Nlets, <i>Wyatt Pettengill</i> — Vice-President, Nlets, <i>Leon Frederick</i> — President, Nlets	A smart world — so what? <i>William Heapy</i> — Director of Planning and Strategy, Axicom	Generational change: mission-critical communications in heavy-haul rail <i>Chris Reid</i> — Design Manager, Aurizon
3.30pm Afternoon Break – Exhibition Hall			
4.00pm	Tasmania Police leveraging the cloud to improve officer safety via body worn cameras. <i>Senior Sergeant Marco Ghedini</i> — Business Improvement Unit, Strategic Projects, Tasmania Police	IoA/IoT and deliverable use cases — what would be the one question that you would ask your assets if you could? <i>Brett Orr</i> — General Manger, Bigmate	Converging parallels between automated vehicles and driverless trains <i>Rodrigo Alvarez</i> — Practice Director, Rail Systems Australia
4.30pm	Trends & developments in critical communications; the impact and progress of critical broadband technologies for PPDR and other mission-critical users <i>Tony Gray</i> — CEO, TCCA	Key roadblocks holding back the Internet of Things <i>Justin Wyatt</i> — Solutions Architect, Titan ICT	Making autonomous shuttles a public reality <i>Erik van Vulpen</i> — Manager Centre for Technology Infusion, La Trobe University
5.00pm	Disruptive technologies — what do you need to know? <i>Graeme Stanley</i> — Director — Public Safety Innovation, Motorola Solutions	Panel discussion: The growing footprint of IoT — application, delivery and outcomes. Panel: <i>Justin Wyatt</i> — Solutions Architect, Titan ICT, <i>Brett Orr</i> — General Manager, Bigmate, <i>William Heapy</i> — Director of Planning and Strategy, Axicom	Panel discussion: 3GPP in Australia Panel: <i>Tony Gray</i> — CEO, TCCA, <i>Tero Pesonen</i> — Chairman, Critical Communications Broadband Group, Kevin Graham — Director, ATCCF/Managing Director, Global Digital Solutions Moderator: <i>Inspector Ged Griffin</i> — Victoria Police
5.30pm	NETWORKING DRINKS — EXHIBITION HALL — sponsored by Wireless Innovation		
6.30pm	ARCIA ANNUAL INDUSTRY GALA DINNER — MCEC		

PROGRAM

THURSDAY 22 NOV



8.55am	Welcome and opening remarks from the Chair: <i>Kit Wignall</i> — DXC Technology		
9.00am	Plenary Address: An update on the status of Australia's public safety mobile broadband <i>Luke Brown</i> — Assistant Secretary (a/g), Emergency Management Australia, Department of Home Affairs		
9.30am	Plenary Address: Empowering public safety with lifesaving technologies <i>TJ Kennedy</i> — Co-Founder, The Public Safety Network		
10.00am	Plenary Address: Mission-critical communication of the 21st century <i>Karim Nejaim</i> — Director, Global Enterprise Product Engineering, Telstra		
10.30am Morning Break — Exhibition Hall			
	Public safety and emergency management	Technology	Finnish Critical Communications
11.00am	So, you want to implement a mission-critical LTE service...? A view from the UK <i>Duncan Swan</i> — Director, Mason Advisory, UK	What's it all about — 5G? <i>Roger Kane</i> — Managing Director, Vicom Australia	Finnish critical communications — success in cooperation <i>Tero Pesonen</i> — Finnish representative in TCCA board
11.30am	Application of PTT to a layered communications environment — case study <i>Anneke Dorgelo</i> — Principal Officer, Communications Capability, Queensland Fire & emergency Services	5G roadmap: pipe dream to reality <i>Dale Stacey</i> — Technical Director, SAT Pty	Deep dive into key solutions to enable successful field operation <i>Speakers from Insta DefSec, Bandercom and Beaconsim, Codea, Mentura Group and Roger-GPS</i>
Noon	Panel discussion: Public safety meets the Internet of Things: a whole new world of benefits — saving lives and delivering first responder safety <i>Moderator: TJ Kennedy</i> — Co-Founder, The Public Safety Network, Panel members TBC	Looking under the bonnet of 5G and it's over-the-air RF performance <i>Steve Karandais</i> — General Manager, Keysight Technologies	Requirements for broadband to meet the critical communications sector demand <i>Speakers from Bittium, Cloudstreet, and Nokia</i>
12.30pm Lunch Break — Exhibition Hall			
	Public safety and emergency management	Technology	Industry
1.30pm	Managing mission-critical communications across the largest land mass in the world covered by one single ambulance service: St John Ambulance <i>Ray Pullen</i> — Radio Communications Manager, St John Ambulance (WA)	Li-Fi: mobility for the 2020s <i>Lawrence McKenna</i> — Telecommunications Section Manager, Wood & Grieve Engineers	5G and the environment for safe work at heights <i>Tony Paul</i> — AMTA RF Safety Program Manager & Principal, PicoNet Consulting
2.00pm	The future — next-generation mission-critical public safety mobile broadband network (PSMB) and its usage <i>Sohan Domingo</i> — Business Development Manager, Nokia	Reliable everywhere communications <i>Keith Richardson</i> — Technical Manager, Applied Satellite Technology Australia (ASTA)	Rethinking two-way radio intrinsic safety – NSW Fire & Rescue <i>Paul Barnes</i> — Director IT Operations & Communications, NSW Fire & Rescue
2.30pm	Critical communications roadmap for New South Wales <i>James Corkill</i> — Wireless Solution Architect, NSW Telco Authority	Radio management systems and data analytics — using a dispatch console as data collector and integrator for safety and productivity <i>Paul Whitfield</i> — Research & Development Manager, Omnitronics	Capturing the built environment at continental scale: location intelligence for every address <i>Gerry Stanley</i> — Product Portfolio Manager, PSMA Australia
3.00pm Afternoon Break — Exhibition Hall			
3.30pm	Closing panel session: The Q&A of PSMB — what have we learned, or more importantly what do we still need to learn? <i>This Q&A panel session will see your questions being answered by our international panel of experts. Questions can be submitted throughout the conference over the three days, as well as directly during the session, and our panel will both respond to and debate the issues raised. Moderator: Ian Miller</i> — Executive Officer, ARCA. Panel: <i>TJ Kennedy</i> — Co-Founder, The Public Safety Network, <i>Duncan Swan</i> — Director, Mason Advisory, UK, <i>Dr David Lund</i> — Vice President — Public Safety Communications Europe/ Coordinator — BroadMap, <i>Tero Pesonen</i> — Chairman, Critical Communications Broadband Group, other panel members TBC		
4.30pm Conference closes			

To view the full program visit melbourne.comms-connect.com.au.
Change of program content — Wfevents will endeavour to ensure that this conference program is correct at the time of the event. We may need to alter the program prior to the event and reserve the right to do so without notice.

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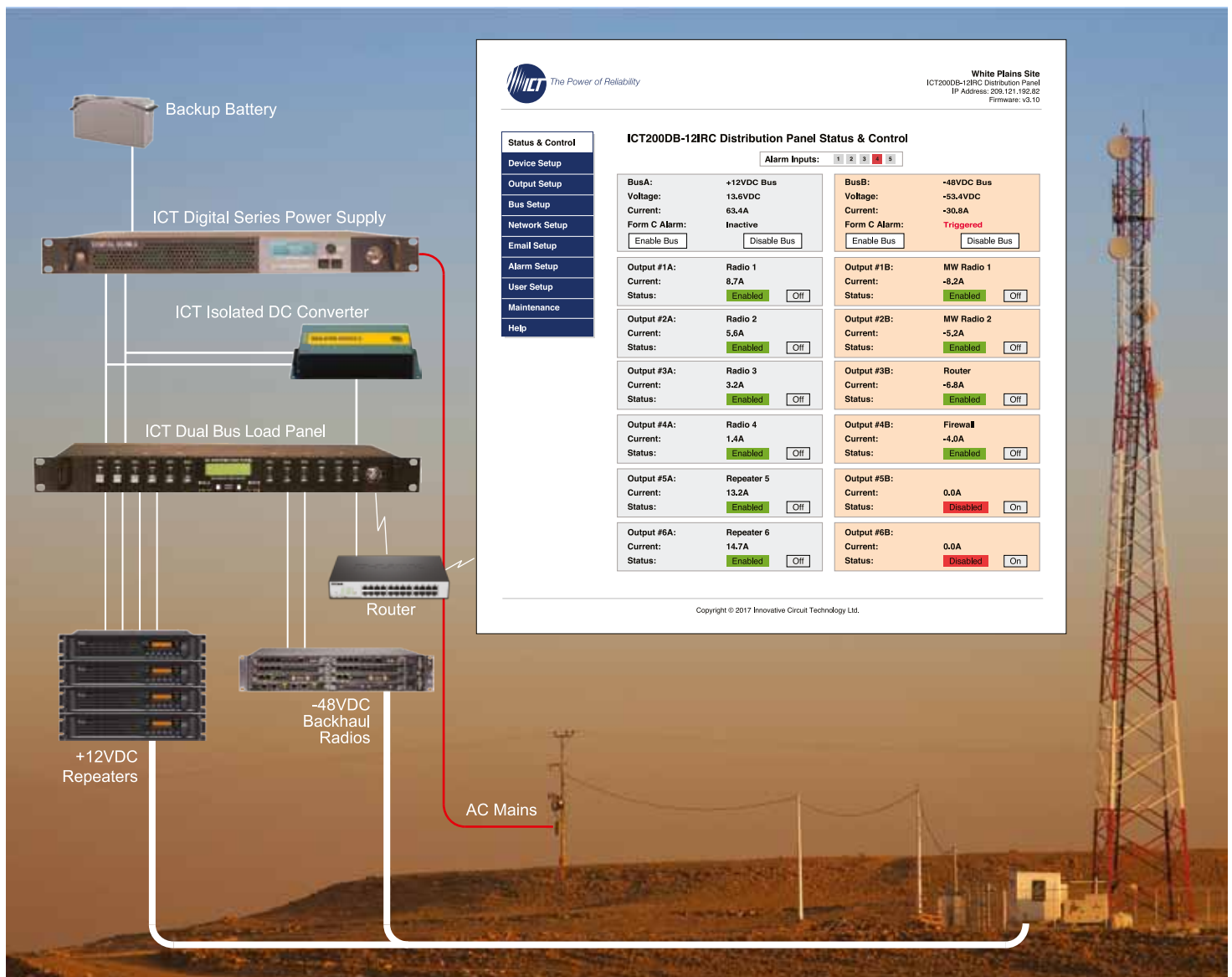
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NSW MOVES AHEAD WITH CCEP

The NSW Telco Authority has consulted industry for the build, operation and maintenance of an enhanced communications network.

The NSW Telco Authority issued a call for information from key industry stakeholders in August, to help determine the scope of work required to construct, operate and maintain the services of the NSW government radio network (GRN) into the future.

“Through the Critical Communications Enhancement Program, the government radio network will grow from 180 to approximately 400 sites over the next few years increasing to 700 sites when fully built across metropolitan and regional NSW,” explained Managing Director of the Authority, Kate Foy.

“This significant expansion will be a major piece of infrastructure and will almost double the size of the current government radio network.

“The program aims to deliver world-class critical communications services to our public safety and law enforcement agencies well into the future.”

The government radio network currently services the operational communications needs of 44 government agencies and essential services, including emergency services and law enforcement, utilities and power providers, local councils and state and federal government agencies.

As part of the NSW Government’s 2018/19 Budget, the Telco Authority was allocated \$320 million over four years to enhance the government radio network.

“With an expansion of this size, we need to scale up how we operate, maintain and deliver network services to address the increased scope of the operating environment,” said Foy.

“We’re seeking feedback from industry to inform our Request for Tender on potential improvements and cost-effective solutions.”

The Request for Information (which closed on 12 September) appealed to industry for innovative ideas and models for the construction, operation and maintenance of the expanded network ahead of a formal tender process.

The GRN is managed by the NSW Telco Authority on behalf of the NSW Government. More information is available on the Authority’s site at telco.nsw.gov.au/content/operate-and-maintain-transformation.

Meanwhile, emergency and essential services in the Sydney suburb of Chatswood have received a significant boost in radio coverage with the installation of a 15-channel macro site.

The new single-tower site, recently constructed by the NSW Telco Authority, provides in-building coverage at Westfield Chatswood and substantially increases coverage and reliability for public safety in the area.

According to Foy, as the Chatswood CBD expanded and new buildings were constructed, government radio network coverage had become affected across the area.

The site is part of the wider Critical Communications Enhancement Program. The construction of a single, multipurpose site saves NSW taxpayers approximately \$250,000.

The new site handles more than 400 radio calls daily, made by emergency services including Ambulance NSW, Fire and Rescue NSW and NSW Police.

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- Mining Operations
- Rail Operations
- Intelligent Transport Systems (ITS)

3GPP COMES TO MELBOURNE

3GPP leaders will take part in an industry briefing at the University of Melbourne's Centre for Disaster Management and Public Safety.

On 18 September, Australian policymakers, academics and industry representatives will have the opportunity to meet and deliberate on contemporary communications matters, when leaders from the 3G Partnership Project — 3GPP, the organisation that develops the technology standards that make our smartphones work — come to Melbourne to discuss the future direction of 3GPP standards, including 5G.

3GPP has been working with the University of Melbourne's Centre for Disaster Management and Public Safety (CDMPS) to convene an event that will provide information about the important role performed by 3GPP in the development and maintenance of the open standards that support both current and future mobile networks.

The event will see a number of local and international leaders and experts gathering to share their views. The discussions will be led by:

Euan Ferguson: Co-Chair of the University of Melbourne CDMPS-CSDILA International Advisory Committee, and the 3GPP event convener. Ferguson has more than 40 years' experience as a forester and fire and emergency management professional, including as Chief Officer of Victoria's Country Fire Authority and Chief Officer and CEO of the South Australian Country Fire Service. He is a past Chair and President of the Australasian Fire and Emergency Services Council and past Chair of Australia's National Aerial Firefighting Centre.

Adrian Scrase: Chief Technical Officer, ETSI. Scrase has operational responsibility for all activities associated with the production of ETSI standards and played a central role in the creation of the 3GPP in 2004. He is responsible for the operations of the 3GPP Project Co-ordination Group and is also Chair of the 3GPP Mobile Competence Centre, an international team with members from more than a dozen countries. Scrase was also principally involved in the formation of the 'oneM2M' Partnership Project and oversees ETSI's support for that initiative.

Georg Mayer: 3GPP Core Networks and Terminals (TSG-CT) Chairman. Employed by Huawei Technologies, as TSG-CT Chair Mayer is focused on the coordination of 5G-related work both inside and outside 3GPP, participating in the IETF and working closely with several of the new stakeholders in 5G, such as public safety, railways, autonomous systems and IoT service providers.

Balázs Bertényi: 3GPP Radio Access Networks (RAN) Chairman. Bertényi has participated in the 3GPP for more than 15 years, gaining technical experience as a contributor in the TSG-SA and TSG-RAN Groups. He has served terms as Chairman of SA Working Group 2 and as Chairman of the 3GPP SA Plenary. In March 2017 he was elected Chairman of the RAN Plenary. At Nokia, he has worked on several different projects across the 3G core, GPRS, EPS, IMS and most recently, on 5G architecture and radio.

Tero Pesonen: TCCA Board Member and Director and Chair of the Critical Communications Broadband Group (CCBG) sub-group of the TCCA. Pesonen has been involved in PMR since 1997 and in particular with promoting and organising TETRA interoperability activities. As Chair of the CCBG, he is involved in bringing stakeholders together to create a common critical broadband future. As a TCCA Board Member he represents the Finnish government public safety operator, VIRVE.

Setting the standards

3GPP is developing a specific set of mission-critical standards to provide the world's public safety and security agencies with a broadband communications capability that will enable these agencies to gather, analyse and share information at a scale never before seen to keep our communities safe.

3GPP unites seven of the world's telecommunications standard development organisations to provide a stable environment in which to define the open standards underpinning current and future mobile cellular networks. 3GPP's work aims to:

- support global operational communication technologies and capabilities for specific business- and mission-critical sectors of the communications market;
 - provide a path to a connected society via LTE and 5G specification work to meet future use cases, specifically by evolving broadband access, meeting the need of machine-type communications and by providing ultrareliable and low-latency connectivity;
 - progress dialogue at government, public safety, security agency, transport and industry stakeholder level.
- Globally, the emerging favoured model





Image courtesy Nokia.

is a hybrid one involving a partnership with mobile broadband network operators, who will need to demonstrate the same capabilities that we expect to get from our smartphones but at a 'mission critical' level. Australian federal and state governments have decided that the hybrid model is the best way to provide a broadband capability for Australia's public safety agencies.

Melbourne's 3GPP/CDMPS event will provide the opportunity for discussion about how best Australia can collaborate with 3GPP and its global partner organisations in the development and maintenance of mission-critical standards.

SAVE THE DATE

The 3GPP/CDMPS briefing is the first of its type in Australia and it therefore presents a unique opportunity to hear directly from the 3GPP leadership about the current status and strategic direction for standards, including future 5G plans.

Date: Tuesday, 18 September 2018

Time: From 1.15 to 5.00 pm

Venue: Room 108, Greenwood Theatre, Department of Electrical and Electronic Engineering, University of Melbourne, Grattan Street, Parkville

Registration: <https://www.eventbrite.com.au/e/3gpp-insights-on-global-mobile-telecommunications-tickets-48583571771>



Software for handheld base station analysers

Anritsu introduces PIM over CPRI software for its BTS Master handheld base station analysers that allow passive intermodulation (PIM) measurements to be made from the ground for the first time. By eliminating the need for installation and maintenance crews to climb the tower to test for PIM, the new BTS Master-based solution is a more cost- and time-efficient tool for ensuring optimal operation of wireless networks.

PIM over CPRI is a patented PIM measurement technique that uses live traffic, unlike traditional RF PIM measurements that require a site be turned down for tests to be conducted. All that is required for PIM over CPRI to be performed are two Small Form-factor Pluggable (SFP) transceivers and an optical tap. Another benefit is that no component in the transmission line needs to be disconnected, eliminating the possibility of PIM being introduced into the system due to elements such as metal shavings or improperly torqued connectors.

If the BTS Master with PIM over CPRI capability detects PIM at the ground level, the network operator can dispatch a tower crew to perform a traditional RF PIM measurement using the Anritsu PIM Master MW82119B battery-operated, high power, portable passive intermodulation analyser. For rooftop base stations where PIM is detected, the Anritsu PIM Hunter test probe can be used. If the system is PIM-free, the network operator can conduct other tests to locate issues affecting the site, such as interference.

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Digital radio test set

The Aeroflex 8800SX Digital Radio Test Set combines high performance and portability to deliver features that would be expected from a bench-level test set. It has been designed with advanced frequency, power and modulation analysis instruments to test for both analog and digital systems. The user-defined frequency list provides an easy way to test multiple frequencies. It is available to rent from TechRentals.

The 8800SX weighs only 7.71 kg and is equipped with a radio that has an internal battery capable of 2.5+ h of operation. The radio is designed for complete automated radio test and alignment using accurate instrumentation and high-speed remote command architecture. Additionally, it features a large 12" display with the easy-to-use 'fast-Stack' interface that allows users to stack test tiles on one another, store/recall pre-sets, and display meters and test functions.

The instrument has also been upgraded with a 10 MHz external reference and new software capabilities. The frequency range is between 2 and 1000 MHz. The unit also includes a 50 MHz wideband analyser that enables desired signals, interferes and other spectrum anomalies to be viewed.

With its hybrid portable design, large colour touch-screen display, internal battery, power accuracy, advanced automated test and alignment, fast VSWR/return loss and cable fault measurements, the 8800SX offers RF professionals a different experience in radio test.



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LTE broadband network infrastructure

The Motorola LXN 500 LTE ultraportable broadband network infrastructure is a small, light, full-power broadband network.

This LTE network system enables first responders to establish high-speed public safety LTE coverage within minutes.

It is an easy-to-carry, miniaturised, full-power site that fits in a briefcase, backpack or vehicle so public safety organisations can bring the broadband network with them or install it at a fixed location.

The network is built on a platform that combines an eNodeB (eNB) and evolved packet core (EPC). It creates an on-demand LTE bubble with a reach of up to 1 km, which scales up to 100 subscribers. With an activation duration of approximately five minutes, first responders will instantly get the secure LTE coverage and capacity they need.

It is Wi-Fi equipped and a complete standalone LTE network that can host software applications such as mapping, messaging and video streaming to pinpoint in-field resources in cases of emergency and enable seamless collaboration. Its compact, IP54-rated design is made for harsh environments and can withstand heat, cold, rain and other conditions faced by first responders. Roof-mounted external antennas with multiple-in-multiple-out (MIMO) configuration provide extended range and performance. Moreover, built-in GPS enhances personnel safety and route optimisation.

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SAFETY FIRST

For gas pipeline operator Jemena, communications means more than just relaying information. It's about keeping teams connected.



In managing a network of 23,000 kilometres of gas pipeline in New South Wales, fast and accurate communications are crucial to Jemena's control room, to ensure emergency communications as well as routine, daily information exchanges with those in the field are effective.

Jemena owns and operates a diverse portfolio of energy assets in Australia with more than \$10.5 billion worth of major utility infrastructure, and supplies millions of households and businesses with essential services every day.

In New South Wales, the company distributes natural gas to 1.3 million customers in Sydney, Newcastle, the Central Coast, Wollongong and rural areas.

Sue Jackman, General Manager, Networks Operations and Control, said the safety of field resources is the key factor in the organisation's commitment to providing accurate and reliable communications systems.

"We learned a lot about communications during the Blue Mountains bushfires in NSW in 2013," she said.

"With mobile towers down and no GPS, the only devices working were radio. Fortunately, our radio system not only enabled our field crews to communicate with each other, the system also enabled the control room to locate and track the whereabouts of our people on the ground.

"Similarly, geofencing allowed us to automatically ensure our people were at muster points when required. During the several



"WE LEARNED A LOT ABOUT COMMUNICATIONS DURING THE BLUE MOUNTAINS BUSHFIRES IN NSW IN 2013." — SUE JACKMAN, JEMENA

days of this emergency we could account for every employee for every minute they were working," she added.

"From that point on, we knew communication across the whole Jemena network had to be about more than just relaying information. We knew it also had to be about using technology to keep our teams connected."

Today, Jemena equips its gas distribution field resources with the latest wireless communications radio technology, using Motorola 4000e-series devices with wide-area group voice communications, GPS, Wi-Fi and BLE features to meet the day-to-day field operations within the business.

The technology solution was supplied by Mastercom using the Motorola-powered Orion Network — the largest IP-connected radio network in Australia.

The Orion Network provides connectivity between Jemena's first responders and its control room in Sydney to manage field service activities for maintenance, servicing and emergency response. The solution provides control room communications services — via TRBOnet console and dispatch software — including GPS location, to determine the current status of Jemena first responders.

The application layer has enabled incident planners in the control room to make informed operational and business decisions to improve resource management, reduce first responder travel time and meet the regulatory response time commitments.

"We have worked over many years as Jemena technology and service partners to meet the evolving critical business communications needs of Jemena for both voice and data services across the gas distribution network," said Hamish Duff, Managing Director of Mastercom and Director and founder of the Orion Network.

The Mastercom solution has also provided a strategic improvement in the systems report modelling. Not only has the managed service enabled the control room to locate, allocate and communicate with resources, it has also helped streamline the process itself. Job dispatch times are now less than three minutes from the time of initial call and on-site response times have improved to be now under 30 minutes from the time of the initial call to arrival on-site. (The NSW regulator standard is 60 minutes.)

"Technology is evolving all the time and it is important that Jemena, and the industry, keep up to date with the latest updates and features. Therefore, we need to ensure that our communications systems are reliable, robust and user friendly," said Jackman.

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SAFE WORK AT RADIO SITES

Tony Paul



Whether you're a contractor, comms worker or facility manager, it's vital to know the safety steps for working near radio transmitting antennas.

Radio has been an efficient and cost-effective method of communication for over a 100 years and today, critical communications, land mobile radio, mobile telephony and broadcast services are essential to our daily lives. The communications industry is well versed in safe work with radio services; however, it is evident that other 'workers at heights' have a variable level of awareness and understanding of EME safe work practices.

Safe work at heights is a long-held priority for any worker and in the mobile telecommunications industry safety is paramount to our operations. Height workers need to deal with a variety of hazards on a daily basis, and tragically in some situations lives have been lost or permanently changed due to falls from elevated work areas.

When it comes to working with radiocommunications and mobile transmitters, electromagnetic energy (EME) exposures are governed by rigorous safety standards and safe work practices. This also includes work on radio and television broadcast transmitters where specialised care and training is required due to the high-powered equipment.

Why is this an issue? The increased usage of mobile and wireless services has resulted in an increase in the number of installations, and many of them in dense areas use existing structures — building rooftops, facades, light poles, traffic signs and street furniture for the smaller base stations referred to as small cells. The Mobile Carriers Forum (known as the MCF, a division of the Australian Mobile Telecommunications Association, AMTA) has developed the AMTA-branded 'RF Safety Program' to undertake compliance and safety assessments of all mobile phone base station installations nationally. The program utilises a national database for site details, settings and site safety documentation.

The compliance assessments are undertaken by NATA accredited independent assessors who provide Compliance Certificates for the sites to ensure they meet the exposure standards set by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Radiation Protection

Standard (RPS No 3), required in the ACMA radiocommunications licences.

To assist with EME safety, the MCF carriers (Optus, Telstra, TPG and Vodafone Hutchison Australia) engage the independent assessors to prepare a Site Safety document known as the EME Guide. The EME Guide is a document that is available to the site owner or facility manager free of charge to assist with their management of safe work on the site.

When it comes to workers who may not be on the site, but are working in close proximity to the EME exclusion zones around an antenna or cluster of antennas, EME awareness is key. As with any risk or safety limitation, training, awareness and risk controls must be in place. AMTA and the MCF are focused on increasing this awareness so that employers and workers

is in operation, who to contact, where they can access training and safety videos, and other important information resources. The safety checklist available on your mobile is a great feature and very easy for all workers to use.

RadioWorkSafe is free and is available on your mobile, tablet and pc at www.radioworksafe.com.au.

Click before you climb

Today's community expects to be 'always connected' and this means we need an extensive network of base stations and radiocommunications sites to provide continuous mobile coverage. Knowing where radiocommunications and mobile base station antennas are located and how to work safely around them is critical for a range of occupations.

RadioWorkSafe already has global appeal, and earlier this year, Mike Wood, Chair AMTA Health and Safety (EME) Committee and Telstra's EME specialist, spent significant time in Europe with mobile operators and EME safety equipment manufacturers where the new app was put through its paces. Mike reported, "The educational resources, safety videos and easy-to-use checklist was a universal feature suited to a global market."

The app is a key element in AMTA's RF Safety Program, which is world leading in providing an open, transparent and informative approach to safe work around radio transmitters. RadioWorkSafe provides workers with location-based safety information to assist facility managers, technicians and height workers assess the on-site hazards when preparing for safe work.

RadioWorkSafe

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

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

- basic safety steps



Example of a rooftop facility with mobile base station antenna and access for height workers.

at heights include EME in their safe work management plans.

AMTA and the MCF are taking a lead role in this awareness with the release of the RadioWorkSafe mobile app, which is designed to help building maintenance staff, height workers and facility managers with information to provide safe access around radiocommunications and mobile base station antennas. Whether you are a contractor, specially trained communications worker or facility manager, it's important to know the basic safety steps for working around radio transmitting antennas and mobile base stations. RadioWorkSafe provides this information in an easily accessible application.

At the Melbourne Comms Connect launch for RadioWorkSafe, the app was described as the 'Dial Before You Dig' for height workers. The RadioWorkSafe app includes resources to assist workers understand where mobile phone transmitter equipment



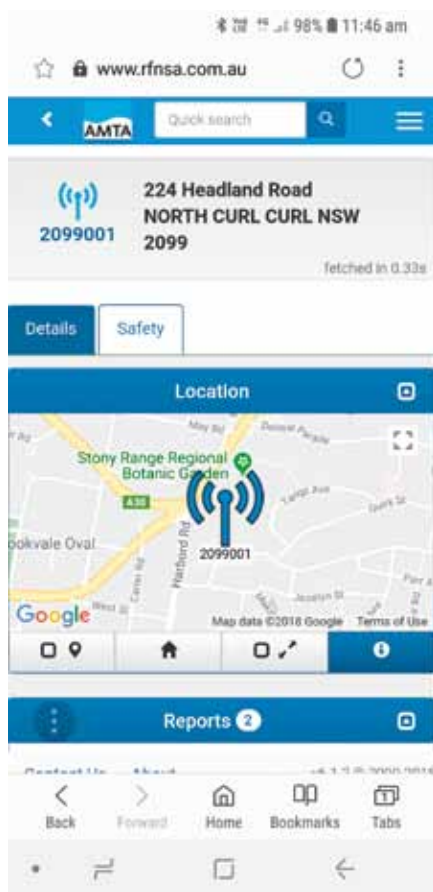
RadioWorkSafe is available on PC, tablet and mobile devices. The Bookmark is a handy reminder of the EME Safe Work steps.

- a Safe Work checklist
- training videos
- fact sheets
- information resources
- site contacts
- safety bookmark.

RFNSA and MobileSiteSafety

The RadioWorkSafe program builds on a primary resource of site safety information housed in AMTA's Radiofrequency National Site Archive (RFNSA). If you're a builder or maintainer working on new construction, upgrades or maintenance, your workers should know where to find information about RF sources and know how to work safely around them.

AMTA has developed the RFNSA database (rfnsa.com.au) and its mobile version MobileSiteSafety.com.au, which shows a map of your location and the mobile telecommunication sites nearby. Each site has Safe Work information and carrier contacts to assist with your site safety implementation. The EME Guide should be available from the facility manager or owner or from the carriers present on the site, and signage will also make visitors aware of areas where exclusion zones may exist. The ACMA Register of



The MobileSiteSafety.com.au website shows a map of your location and the mobile telecommunication sites nearby.

Radio licences can also assist in identifying transmitter licensees if they are not shown on the RFNSA or MobileSiteSafety.

It is also very common for a development adjacent to a building that hosts radio antennas to miss the potential for work on, in or near EME exclusion zones during planning, demolition and construction until the new structure reaches a similar height and someone notices the antennas nearby. Architects, planners and designers could also benefit from EME awareness for their site inspections and designs going forward.

If you are a first responder in an emergency situation there may be many hazards present, but a quick check of the sites around the location can alert those in command of the situation if there is a need for management of work around the EME sources. Examples might be firefighters in an overhead appliance fighting a factory fire or rescue workers working to recover a person from a building site.

EME awareness training and PPE

Like any workplace safety matter, employers and workforce managers must ensure their workers gain awareness of EME through

training and understanding of the resources available for identifying the radio service operators. The Radio WorkSafe app identifies a number of accredited EME awareness training agencies and there are several other independent trainers available in the Australian market.

The use of personal RF monitors is important if your workers are operating very close to exclusion zones; however, the purchase and calibration costs are only justifiable where the risk is commonly encountered. The usual approach for work other than on the antennas is to contact the carrier or radio service operator to reduce or switch off power to the source (an outage) or other temporary arrangements if necessary.

The AMTA RF Safety Program has also been adopted by a number of federal, state and local government, utilities, resources and enterprise radio service operators. The advantage of this wide participation in the program is that the assessment of shared sites is fully cumulative and not just limited to those of carrier systems. The program aims to provide EME safe work information free of charge for all employers and workers to work safely around the mobile carriers' and partner radio service operators' antennas.

The message we are passionate about is 'Click before you climb', and this should be the mantra for all work at heights. We welcome your input to making this work for everyone.

The AMTA RF Safety Program

AMTA takes EME safety very seriously and the RF Safety Program is world leading in providing an open, transparent and informative approach to EME Safe Work. AMTA's innovations include:

- national RFNSA database for all base stations in Australia
- national antenna database — consistency of data
- MobileSiteSafety app for access to the data base
- YouTube channel for RF safety education
- collaborative site data sharing between carriers
- national accredited RF safety assessment process
- Environmental EME Reporting
- RadioWorkSafe app — combines all of the above into an accessible program for all workers.

The program can be accessed by radio service operators, particularly where they share facilities with the mobile carriers.

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

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The Airbus logo, consisting of the word "AIRBUS" in a bold, white, sans-serif font, positioned in the bottom right corner of the advertisement. The background of the entire advertisement features a woman in profile, holding a tablet, with a semi-transparent overlay of a complex control room interface containing various maps, data feeds, and video feeds.

100G hardware will be flown aboard the Proteus demonstration aircraft developed by Northrop Grumman subsidiary Scaled Composites. Courtesy Northrop Grumman.



FASTER DATA

City-based wireless transmission test will soon take to the air.

Northrop Grumman Corporation and the US Defense Advanced Research Projects Agency (DARPA) have set a new standard for wireless transmission by operating a data link at 100 gigabits per second (Gbps) over a distance of 20 kilometres in a city environment.

The two-way data link, which featured active pointing and tracking, was demonstrated on 19 January 2018 in Los Angeles.

The data rate is fast enough to download a 50 Gigabyte Blu-ray video in four seconds. The demonstration marked the successful completion of Northrop Grumman's Phase 2 contract for DARPA's 100 Gbps (100G) RF Backbone program.

The 100G system is capable of rate adaptation on a frame-by-frame basis from 9 to 102 Gbps to maximise data rate throughout dynamic channel variations. Extensive link characterisation demonstrated short-term error-free performance from 9 to 91 Gbps, and a maximum data rate of 102 Gbps with 1 erroneous bit received per 10,000 bits transmitted.

The successful data link results from the integration of several key technologies. The link operates at millimetre wave frequencies (in this case, 71–76 GHz and 81–86 GHz) with 5 GHz of bandwidth and uses a bandwidth efficient signal modulation technique to transmit 25 Gbps data streams on each 5 GHz channel.

To double the rate within the fixed bandwidth, the data link transmits dual orthogonally polarised signals from each antenna. Additionally, the link transmits from two antennas simultaneously (spatial multiplexing) and uses multiple-input-multiple-output (MIMO) signal processing techniques to separate the signals at

two receiving antennas, thus again doubling the data rate within the fixed bandwidth.

According to Louis Christen, director, research and technology, Northrop Grumman, "This dramatic improvement in data transmission performance could significantly increase the volume of airborne sensor data that can be gathered and reduce the time needed to exploit sensor data."

"Next-generation sensors such as hyperspectral imagers typically collect data faster, and in larger quantity than most air-to-ground data links can comfortably transmit," said Christen. "Without such a high data rate link data would need to be reviewed and analysed after the aircraft lands."

By contrast, a 100G data link could transmit high-rate data directly from the aircraft to commanders on the ground in near real time, allowing them to respond more quickly to dynamic operations.

The successful 100G ground demonstration sets the stage for the flight test phase of the 100G RF Backbone program. This next phase, which began in June, demonstrates the 100G air-to-ground link up to 100 Gbps over a 100 km range and extended ranges with lower data rates.

The 100G hardware will be flown aboard the Proteus demonstration aircraft developed by Northrop Grumman subsidiary Scaled Composites.

Northrop Grumman's 100G industry team includes Raytheon, which developed the millimetre wave antennas and related RF electronics, and Silvus Technologies, which provides the key spatial multiplexing and MIMO signal processing technologies.

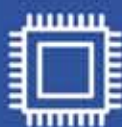
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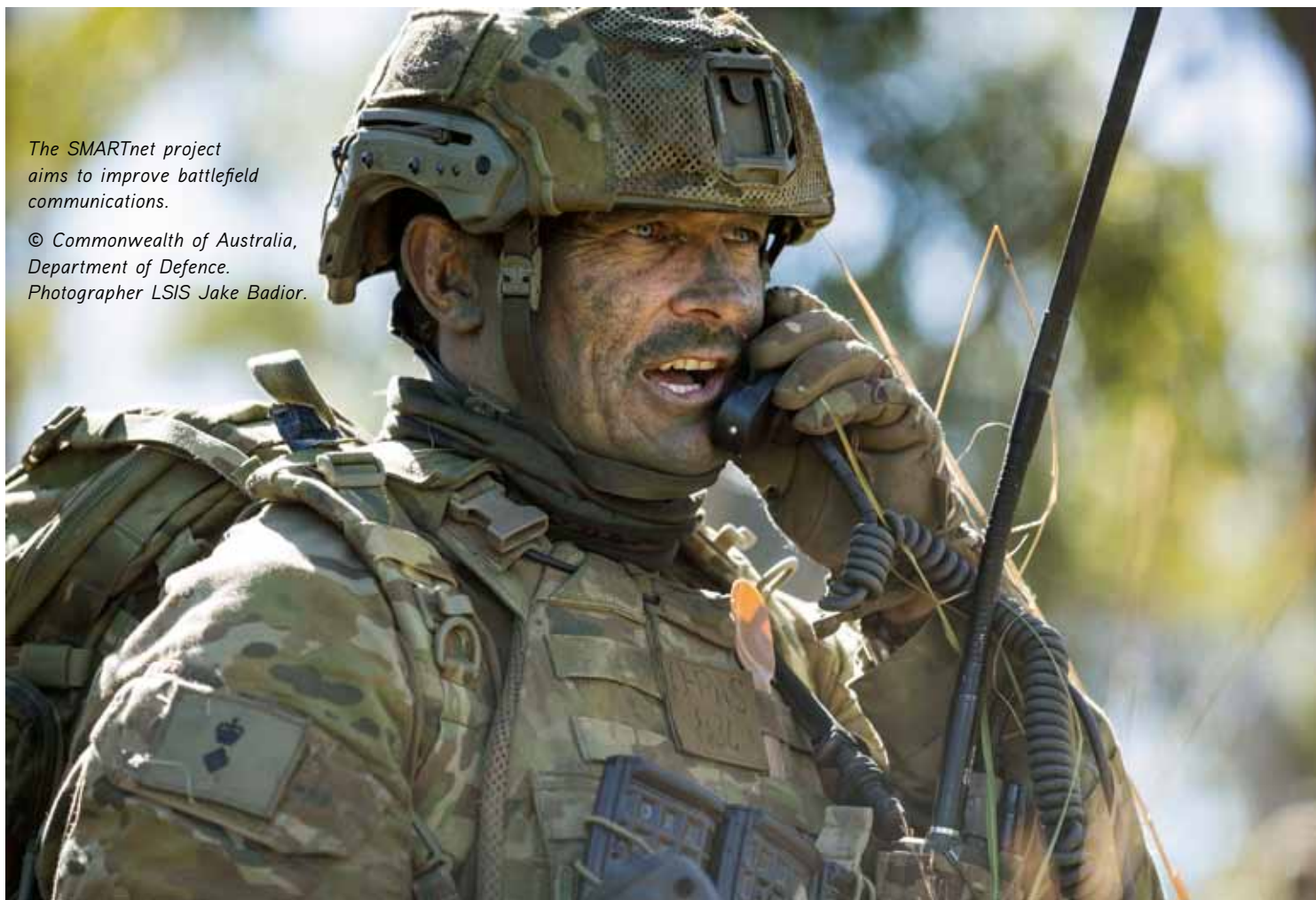
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The SMARTnet project aims to improve battlefield communications.

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Photographer LSIS Jake Badior.



SMARTER MILITARY COMMS

An Australian research project aims to develop dynamic tactical communications for the difficult land battlespace environment.

Recall the scene from countless movies where the army signaler in the heat of battle calls for urgent air support. He had control, was acutely aware of the battle context and what information needed to be transmitted, and got immediate feedback about the state of the voice radio network (by the presence or lack of voice acknowledgement).

But since the advent of digitisation of the tactical network, the data deluge has become too much for humans alone to manage. There are just too many decisions to be made. Should the network be reporting enemy locations, sharing friendly force locations or requesting assistance with casualties? Calling for fire support or downloading the latest software update?

Greg Judd and Keith French, members of DST's Systems Integration and Tactical Networking (SITN) team, have been working

with the Army for many years. (DST is the Australian Government's lead agency responsible for applying science and technology for national defence.) Their research into smarter networking systems arose from their involvement in the operational test and evaluation of the new Land 200 battle management systems (BMSs), where they saw firsthand some of the issues that Army is trying to cope with.

"The idea came to us that we need to automate things," said Judd. "SMARTNet (Semantically Managed Autonomous and Resilient Tactical Networking) was born as a way to improve the functionality of the BMS."

Right information, right person, right time

French explained the subtle difference between their aim and that of other DST teams developing ways to ensure the resilience of the physical side of the network.



*An Australian Army soldier checks communication equipment.
© Commonwealth of Australia, Department of Defence. Photographer CPL Nunu Campos.*



*An Australian Army officer makes a radio call during Exercise Talisman Saber 17.
© Commonwealth of Australia, Department of Defence. Photographer LSIS Jake Badior.*

"We are trying to ensure resilience in the information that is being communicated. What we want is to be given any network, and then to add in some software smarts to give a greater surety of information transfer," he said.

"In other words, to satisfy the general information management mantra across all levels of Defence: right information, right person, right time."

Why is dynamic tactical communication management so difficult that it's never been attempted before? In the land battlespace environment, Judd said the communication infrastructure is not fixed.

"There are no base stations you can rely on like a mobile phone network. It's fragile because all the links use combat net radios that drop out and are continually on the move," he said.

"Your adversaries are also trying to jam your communications," added French.

"Everything is against you. It's just not an environment where you can send lots of data because it's not going to get through in a timely fashion."

The answer is to distil the data and send the highest priority information first. Less-important data can then get through eventually.

To be able to transform the data, and to link into the radio hardware, the SMARTNet team is calling on the skills of others in the field. A partnership has been established with US Army Research Labs (ARL) scientists who are now conducting research under the SMARTNet banner.

The state of the network

Along with transforming and prioritising data, the third aspect is understanding the state of the network so that SMARTNet can dynamically 'throttle' the amount of data being transmitted.

"The network state will be continually changing as the battle context changes, and if we send too much data at the wrong time the network can seize up," said French.

"So the two main research thrusts at the moment are computational intelligence and assessing the state of the networks. How does SMARTNet determine the current battle context and reason about it?" he added.

"It's important for SMARTNet to know if I'm in an assault phase and in contact with the enemy. How does it come to realise this fact and, once it does know, how should it use that knowledge to best transform, prioritise and throttle the flow of information — that's the challenge."

Judd said the second thrust is developing techniques to assess the state of the network and understand the implications.

"Let me emphasise, the reason this hasn't been done before in any other country is that dynamically prioritising information over a tactical network is difficult. How can we find out what the network is doing without clogging it up?" he said.

Deep thoughts

To solve these challenges, the SMARTNet team has been doing some deep thinking, in conjunction with colleagues at the University of Adelaide's Centre for Distributed and Intelligent Technologies, who are looking at the artificial intelligence side of things. The university's Centre for Defence Communication and Information Networking (CDCIN) has also joined the fray. And the team is partnering with Consilium Technology, a company with experience building and commercialising artificial intelligence-based systems.

The four-year strategy is to gradually build up the fidelity and capability of the SMARTNet middleware.

"We'll be verifying and validating our concepts initially through a simple simulator, ramping up to more complex emulations and finally running field trials using real kit," said Judd.

The ARL team will be with them for the journey, and Judd is particularly looking forward to using the impressive ARL tactical network emulators to evaluate SMARTNet algorithms.

"It will be important to know that we are leading to improvements over the way the battle management system works now," he said. "But SMARTNet over real radios will be the ultimate test, and for that we have field experiments planned in the US in 2020 and Australia in 2021."

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Jonathan Nally

LONG PATHS OF THE LAW

NEC's iPasolink technology is providing long-distance links for the NSW Police's state-wide microwave backhaul network.

NSW Police has awarded NEC Australia a contract to expand its state-wide microwave backhaul network, using NEC's iPasolink VR platform.

NSW Police has the largest network out of all NSW public safety agencies, so it needs to have voice communication pretty much everywhere in the state.

"We started the relationship with NSW Police in 2014," said NEC Australia's Krisztian Som. "In the past they built their network using UHF radio, which is a pretty reliable way of backhauling base stations, but it's got a very limited capacity. And also there was a re-farming of the UHF band, especially the 900 MHz band."

In seeking alternatives to UHF, in 2014 NSW Police made the decision that when it next did an upgrade it would start to move away from that band. A tender was issued, which was awarded to NEC. The first phase of the rollout involved deploying about 180 iPasolink terminals covering regions centred on Grafton and Wagga Wagga.

Then, earlier this year, NSW Police issued another tender — awarded again to NEC Australia — for the New England/Hunter Valley region, involving 110 terminals, which are being deployed in some "very harsh and remote environments", said Som.

Custom solution

NSW Police's original UHF system needed only very light infrastructure, "so the challenge for them was to replace that old, ageing infrastructure with something new which gives them more capacity but is not going to overload the towers, because to upgrade the tower costs may be 10 times more than the radio itself", said Som.

NSW Police also wanted to use a particular band (10.5 GHz) for the upgrade, which is Australia-specific and not fully aligned with the ETSI standard. There had been one company in the past, Mitec, which had a product that was suitable. "But since then no-one actually had a product because the market is too small to develop something specific," said Som. "But we developed a specific configuration for the Police [and did] a lot of development to get them on board, and it paid off."

"It needed R&D effort," he added. "10.5 GHz is a standard band globally, but the channel spacing which is used in Australia is specific to Australia. So we needed to fine-tune the product and redesign the circuits inside."

Technically, the project is considered a 'maintenance program' for NSW Police's existing infrastructure and is being done in parallel with the rollout of the NSW Telco

Authority's separate Critical Communications Enhancement Program (CCEP) and Government Radio Network (GRN). "For us it's good — we supply to both the CCEP for the GRN and also to the Police," said Som.

Naturally, for such a mission-critical application, path redundancy is absolutely necessary. The network comprises unprotected links, but has been designed with ring topologies for overall protection for the sites. "They're running an overlay MPLS network," said Som. So in the case of a failed link, "normally the MPLS router will find an alternative way".

"Each site has an east and west link coming in on the ring, and if the main path fails, then the MPLS router will just switch the traffic to the other way of the ring and get back to the same site," he added.

Long distances

While there hasn't been anything especially novel in the deployment, there are some noteworthy angles. "I think what's interesting is they tried to achieve the longest distances they could with the equipment," said Som. "All transmit power is really the highest on the market. What this allows for the Police is to deploy very, very long links with very small antennas.

"So for example, we've been deploying 50- to 60-kilometre links with 0.3- and 0.6-metre dishes — that's quite phenomenal in the wireless space," added Som. For the very longest hops, NSW Police uses mainly 7.5 GHz, which is not really prone to rain interference. "If you see the rain attenuation curve, it starts to go up at 10 GHz, so 10.5 GHz is still right at the edge," said Som.

The capabilities of digital radio mean "we can go further than 10 years ago and we can increase the transmit power — there's a lot better forward error correction now than there was 10 years ago", added Som. "So that all helps to recover the signal, so we can go further with small antennas."

Smaller antennas also equals smaller overall cost. Wherever NSW Police had existing tower infrastructure, it was used for mounting the iPasolink units without resorting to erecting expensive new towers. For 40- to 50-kilometre hops 10 years ago, "probably you would have been looking at a 1.8-metre dish which weighs 300 kg", said Som. "You'd need a crane to put it up on the tower and you need a massive tower, as opposed to now having someone just grabbing a 30-centimetre antenna and



Image courtesy NEC Australia.

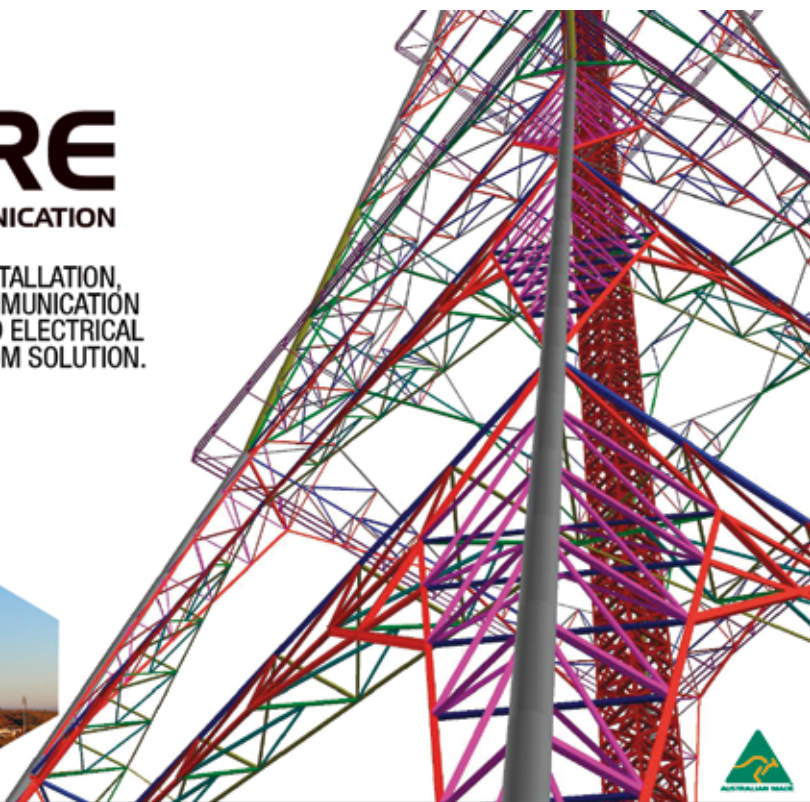
climb the tower. So there has been a huge evolution in terms of technology."

David Brogden, Commander Wireless Technology, NSW Police Force, added, "The new iPasolink platform is underpinning

our critical radiocommunications network, essential to the protection of NSW's seven million people. Not only is it robust in all conditions but its light weight also helps us reduce operational costs."

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BIG IMPACT FROM TINY ANTENNAS

John Toon

Research that combines electronics and antennas could lead to longer talk time and higher data rates in 5G devices.

By integrating the design of antenna and electronics, researchers have boosted the energy and spectrum efficiency of a new class of millimetre-wave transmitters, enabling improved modulation and reduced generation of waste heat.

The result could be longer talk time and higher data rates in millimetre-wave wireless communication devices for future 5G applications.

The new co-design technique enables simultaneous optimisation of the millimetre-wave antennas and electronics. The hybrid devices use conventional materials and IC technology, meaning no changes would be required to manufacture and package them.

The co-design scheme enables fabrication of multiple transmitters and receivers on the same IC chip or the same package, potentially enabling multiple-input-multiple-

output (MIMO) systems as well as boosting data rates and link diversity.

"In this proof-of-example, our electronics and antenna were designed so that they can work together to achieve a unique on-antenna outphasing active load modulation capability that significantly enhances the efficiency of the entire transmitter," said Hua Wang, an assistant professor in Georgia Tech's School of Electrical and Computer Engineering.

"This system could replace many types of transmitters in wireless mobile devices, base stations and infrastructure links in data centres."

Key to the new design is maintaining a high energy efficiency regardless of whether the device is operating at its peak or average output power.

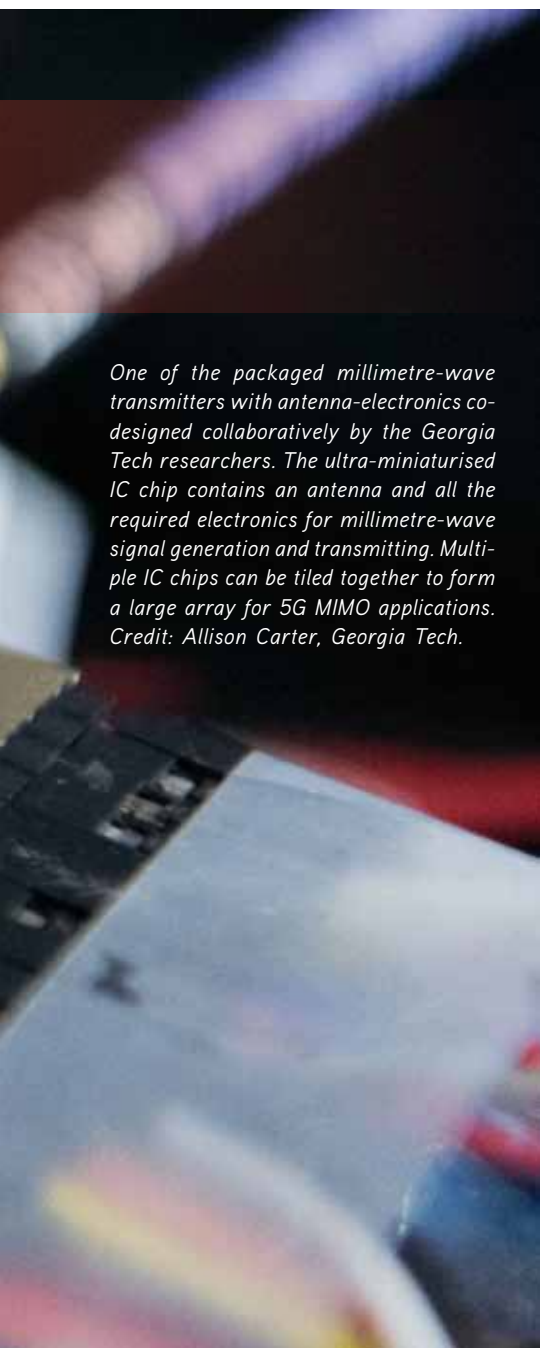
The efficiency of most conventional transmitters is high only at peak power but drops substantially at low power levels,

resulting in low efficiency when amplifying complex spectrally efficient modulations.

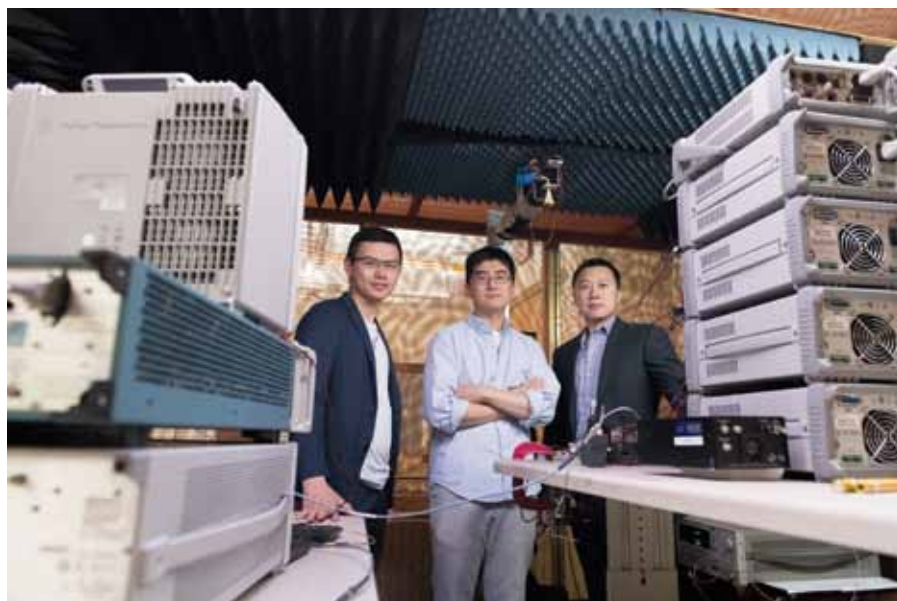
Moreover, conventional transmitters often add the outputs from multiple electronics using lossy power combiner circuits, exacerbating the efficiency degradation.

"We are combining the output power through a dual-feed loop antenna, and by doing so with our innovation in the antenna and electronics, we can substantially improve the energy efficiency," said Wang, who is the Demetrius T. Paris Professor in the School of Electrical and Computer Engineering.

"The innovation in this particular design is to merge the antenna and electronics to achieve the so-called outphasing operation that dynamically modulates and optimises the output voltages and currents of power transistors, so that the millimetre-wave transmitter maintains a high energy efficiency both at the peak and average power."



One of the packaged millimetre-wave transmitters with antenna-electronics co-designed collaboratively by the Georgia Tech researchers. The ultra-miniaturised IC chip contains an antenna and all the required electronics for millimetre-wave signal generation and transmitting. Multiple IC chips can be tiled together to form a large array for 5G MIMO applications. Credit: Allison Carter, Georgia Tech.



Georgia Tech Graduate Research Assistant Huy Thong Nguyen, Graduate Research Assistant Sensen Li and Assistant Professor Hua Wang with the electronics equipment and antenna set-up used to measure far-field radiated output signal from millimetre-wave transmitters. Credit: Allison Carter, Georgia Tech.

achieved by working on them independently. By taking advantage of this new co-design concept, we can further improve the performance of future wireless transmitters.”

The new designs have been implemented in 45-nanometre CMOS SOI IC devices and flip-chip packaged on high-frequency laminate boards, where testing has confirmed a minimum two-fold increase in energy efficiency, Wang said.

The antenna electronics co-design is enabled by exploring the unique nature of multi-feed antennas.

“An antenna structure with multiple feeds allows us to use multiple electronics to drive the antenna concurrently. Different from conventional single-feed antennas, multi-feed antennas can serve not only as radiating elements, but they can also function as signal processing units that interface among multiple electronic circuits,” Wang explained.

“This opens a completely new design paradigm to have different electronic circuits driving the antenna collectively with different but optimised signal conditions, achieving unprecedented energy efficiency, spectral efficiency and reconfigurability.”

The cross-disciplinary co-design could also facilitate fabrication and operation of multiple transmitters and receivers on the same chip, enabling hundreds or even thousands of elements to work together as a whole system.

“In massive MIMO systems, we need to have a lot of transmitters and receivers, so energy efficiency will become even more important,” Wang noted.

Having large numbers of elements working together becomes more practical at millimetre-wave frequencies because the wavelength reduction means elements can be placed closer together to achieve compact systems, he pointed out. These factors could pave the way for new types of beamforming that are essential in future millimetre-wave 5G systems.

Power demands could drive adoption of the technology for battery-powered devices, but Wang said the technology could also be useful for grid-powered systems such as base stations or wireless connections to replace cables in large data centres. In those applications, expanding data rates and reducing cooling needs could make the new devices attractive.

“Higher energy efficiency also means less energy will be converted to heat that must be removed to satisfy the thermal management,” he said. “In large data centres, even a small reduction in thermal load per device can add up. We hope to simplify the thermal requirements of these electronic devices.”

The research team — which also included Taiyun Chi, Huy Thong Nguyen and Tzu-Yuan Huang, all from Georgia Tech — presented its proof-of-concept antenna-based outphasing transmitter at the 2018 Radio Frequency Integrated Circuits Symposium (RFIC) in Philadelphia. The team’s other antenna-electronics co-design work was published at the 2017 and 2018 IEEE International Solid-State Circuits Conference (ISSCC) and in multiple peer-reviewed IEEE journals. The Intel Corporation and US Army Research Office sponsored the research.

Beyond energy efficiency, the co-design also facilitates spectrum efficiency by enabling more complex modulation protocols. This will enable transmission of a higher data rate within the type of fixed spectrum allocation that poses a significant challenge for 5G systems.

“Within the same channel bandwidth, the proposed transmitter can transmit six to ten times higher data rate,” Wang said. “Integrating the antenna gives us more degrees of freedom to explore design innovation, something that could not be done before.”

Sensen Li, a Georgia Tech graduate research assistant, said the innovation resulted from bringing together two disciplines that have traditionally worked separately.

“We are merging the technologies of electronics and antennas, bringing these two disciplines together to break through limits,” he said. “These improvements could not be

Backhaul

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

25 YEARS AGO. The cover of the October/November 1993 issue of *What's New in Radio Communications* featured the Motorola Communications Visar portable two-way radio, at the time the smallest two-way the company had ever released. Inside the magazine we reported on AEC deploying its Hybrid and In-House+ networked, simulcast, wide-area paging system across a hospital in western Sydney (claimed to be the world's most advanced networked paging system). Dr Peter Reitberger and Thomas Rieder of Rohde & Schwarz explained their company's approach to reducing adjacent-channel interference in mobile radio systems. We also reported on efforts of the Radio Communications Consultative Council and the Spectrum Management Agency to study Spectrum Licensing and interference issues.



10 YEARS AGO. The cover of the September/October 2008 issue of *Radio Comms Asia-Pacific* featured the Wireless Pacific RDX Pico rapid deployment repeater, which came in three models — Lite, Pro and P25. Elsewhere in the magazine, we reported on Tait Electronics becoming the first radio manufacturer to become an accredited ARCIA member (Vertel, Tetracom, AA Radio and Mastercom were already members). The ACMA had released a draft of its new Australian Radio Frequency Spectrum plan, which proposed changes to provide new spectrum opportunities for international mobile telecommunications, space research activities, radioastronomy, mobile-satellite services and harmonisation between space and future terrestrial services. We also published ARCIA's recommendations in response to ACMA's proposed changes to the 403–520 MHz band. Among them were a 'use it or lose it' approach to apparatus and spectrum licences; spectrum changes should be 'technology agnostic'; and consideration should be given to 6.25 kHz channel spacing instead of sticking with 12.5 kHz.

Spectrum

Gold Coast welcomes 3GPP as 5G comes closer

Four times per year, the 3GPP meets for a week-long plenary meeting to review the enormous body of work produced by its working groups, take key decisions and set the course for future developments. The next 3GPP plenary is being hosted by Telstra on the Gold Coast, from 10 to 14 September.

The critical communications community joined 3GPP back in the early 2010s in order to ensure the complementarity of (and, perhaps one day, the replacement of) existing digital LMR/PMR solutions such as TETRA and P25 with high-speed LTE capabilities. A number of government bodies regularly attend 3GPP plenaries and working groups, as do many member vendors and market representation partners such as TCCA and PSC Europe.

The focus for the past 18 months or so has been Release 15, also known in the community as 5G Phase 1. Although LTE/4G infrastructure, services and devices are still being rolled out across the world — a process that will continue for many years to come — the focus and emphasis of 3GPP standardisation work is now on fifth-generation communications, where networks will converge and be opened up to exciting new capabilities and use cases.

At the September plenary, Release 15 will be cleaned up and Release 16 will move forward. Release 15 has been a fairly complex undertaking as mobile operators around the world are at different stages in their deployment of LTE. A few more-developed markets such as the USA, Korea and Japan had been pushing for an early drop — so-called 5G NSA (Non Stand-Alone) — to be approved by 3GPP by end-2017, with all other Release 15 features, including 5G SA (Stand-Alone) completed in June 2018.

Demonstrating the importance of public safety within 3GPP, a separate working group, SA6, was convened in early 2015 to develop a mission-critical PTT (MCPTT) solution during Release 13, following the standardisation of some basic enablers for group calls (GCSE) and device-to-device (ProSe) during Release 12. SA6's work has continued through Release 14 to include common MC services, enhancements to MCPTT and separate MCVideo and MCData packages. As well as dropping the LTE moniker during Release 15 to enable MC services to run over 5G or other 3GPP/non-3GPP bearers at some point in the future, work is already well underway to standardise interworking and interconnect solutions to other 3GPP and legacy (eg, TETRA, P25) networks. ETSI has also organised MCPTT/MCX plugtests over the past 12 months or so to enable as many as 30 suppliers of different MC network and service components to test their solutions.

The Gold Coast plenary meeting comes at an important time for the wider converging fixed-wireless, mobile and critical communications communities as we await products and services based on earlier 3GPP releases and move closer to a future 5G world. Global standards and global cooperation embodied in 3GPP remain vital as we move into this new world of smart and safe cities, connected and autonomous vehicles, automation, virtualisation and digitalisation of almost everything.

As we convene in September, we must continue focusing on the final prize for humanity of radically different, more advanced societies and economies based on new governance, social and economic models that promise a better, smarter, safer world.



Peter Clemons is founder and managing director of Quixoticity, a critical communications consultancy, and a frequent visitor to Australasia where he regularly speaks at top-level conferences such as Comms Connect.

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