MAR/APR 2017 Vol.4 No.3

comms critical

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PD602 PD662 PD682

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ON THE COVER

Rohde & Schwarz has broadened its growing oscilloscope portfolio with the R&S RTB2000 series, a range of low-cost oscilloscopes that offer a 10.1″ capacitive touch screen as well as 10-bit vertical resolution. Oscilloscope usage is a visual experience, since users spend a significant amount of time viewing the instrument's display. R&S RTB2000 oscilloscopes have twice the display size and more than seven times the number of pixels of comparable oscilloscopes in this segment and therefore offer a better view of the signals under test.

Capacitive touch is becoming more important for oscilloscope users as it allows them to operate the instrument more quickly and efficiently. Plus, touch operation has become commonplace in the work and personal environment. With the R&S RTB2000, users with lower budgets have access to not only touch-screen, but capacitive touch-screen operation with a large display.

For most of the last three decades, oscilloscopes have predominantly offered eight bits of vertical resolution, which enables a signal to be mapped to one of 256 vertical positions. The R&S RTB2000 includes a proprietary 10-bit ADC with 1024 vertical positions, four times more resolution than any other oscilloscope in this segment. The increased resolution enables users to make measurements that are more precise — particularly useful for detecting small signals in the presence of large-amplitude signals.

Rohde & Schwarz (Australia) Pty Ltd
www.rohde-schwarz.com.au

Transmit

The provision of mobile broadband is still the talk of the town for public safety applications, and will continue to be until some sort of solution is agreed upon by the whole critical communications sector — legislators, regulators, users and the vendor community. We have several articles in this issue that canvas possibilities, including Ged Griffin's overview of discussions at a recent international meeting in Dubai and our case study of an LTE deployment at a gold mine in remote Australia.

While having connectivity is the most important part of mobile broadband, the second-most important factor would have to be knowing where you (or your colleagues) are. It's no wonder, then, that location services are a vital part of most modern business- and mission-critical communication solutions, and so it's great to see the investment by both the Australian and New Zealand governments in SBAS technology development, which promises to vastly improve the accuracy of location-based services in Australasia. This will be of benefit not only to the public safety community, but also to the mining and transportation sectors and many others.

Mobile broadband and locations services will be topics of discussion at Comms Connect Wellington (11–12 April) and Comms Connect Sydney (7–8 June), so make sure you're there to take part in the debate and hear all the latest news from local and international experts.

Jonathan Nally, Editor
jnally@wfmedia.com.au

Calendar

April 2017

Comms Connect Wellington
11–12 April
Te Papa Museum, Wellington
comms-connect.co.nz

May 2017

Critical Communications World
16–18 May
Asia World Expo, Hong Kong
tmt.knect365.com/critical-communications-world/

Australian & New Zealand Disaster and Emergency Management Conference
22–23 May
Jupiters Hotel, Gold Coast
anzdmc.com.au

June 2017

Comms Connect Sydney
6–8 June
Sydney Olympic Park
sydney.comms-connect.com.au

August 2017

APCO 2017
13–16 August
Colorado Convention Centre, Denver
apco2017.org

SAFETYconnect 2017
16–17 August
Rosehill Gardens, Sydney
http://www.safety-connect.com.au

September 2017

AFAC17
4–7 September
International Convention Centre, Sydney
afacconference.com.au

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

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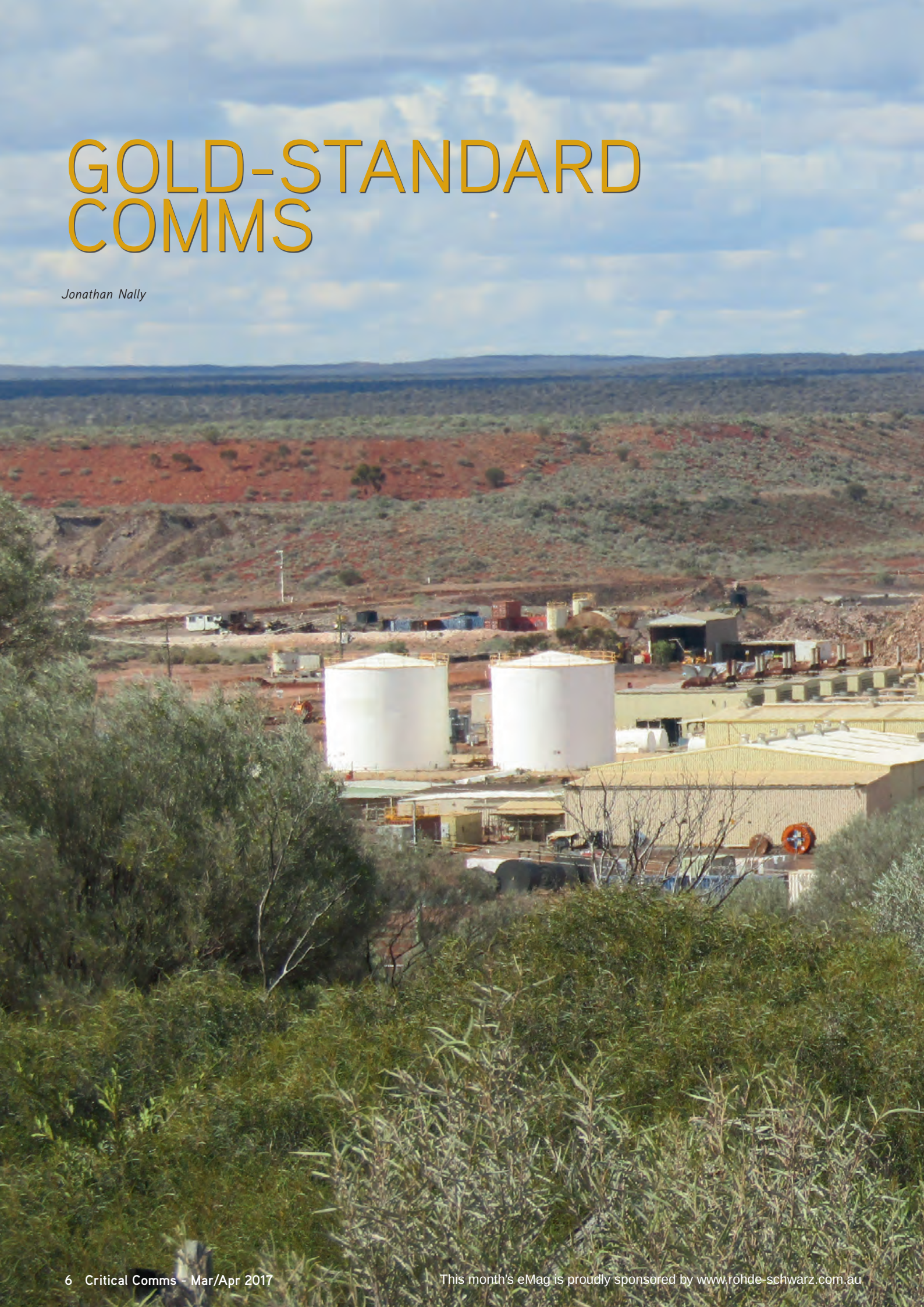
GOLD-STANDARD COMMS

Jonathan Nally



A private LTE network is paying dividends for one of the world's biggest gold producers.

Gold Fields is a South Africa-based gold mining company with operations in several countries, including four operating mines in Australia. In order to improve its operations, the company recently installed a private LTE network at its Granny Smith site near Laverton in Western Australia. The technology comprises base stations from Nokia, mobile core network and associated voice solutions from Cisco, and handsets and modems from a variety of vendors.

"Anything that can assist with safety and efficiency is of interest to Gold Fields," said Rodney Nebe, the company's senior network specialist, responsible for all IT and communications infrastructure across the region (Australia and Asia) and the project leader for the LTE implementation.

The system was designed and installed by Challenge Networks, a well-known Australian system integrator that specialises in building small PSTN, data and mobile networks. Based in Melbourne, it installs networks around the globe, especially in the developing world. In the last few years it has diversified and, based on its previous expertise, has started building private LTE networks for industry both in Australia and internationally.

Gold Fields chose Challenge Networks because "it has proven experience in rolling out LTE solutions, can provide a true end-to-end solution and can work not only in Australia but overseas on other Gold Fields mines," said Nebe. Having the backing of leading technology vendors Cisco and Nokia was a plus, too.

Gold Fields wanted to discontinue the Granny Smith mine's Wi-Fi network for production activities and move the functions to LTE. Those functions include control of SCADA devices and internet access for staff around the mine (which spans 20 x 5 km). And of course, the LTE system provides mobile voice communications as an expansion to the legacy DMR and PABX systems.

"Staff now have better access to information wherever they are in the mine site, and improved communications efficiency — they can contact anyone at any location around the mine," said Nebe. "Plus, additional coverage and capacity means that devices and systems that were previously unconnectable now are connectable."

An example of how the LTE network has improved safety and efficiency is the insight the company now has into multiple water bores that are some distance (10 to 30 km) from the main mine centre. Previously, these sites had no communications connectivity — staff had to drive to each of them each day to check their condition, status, fuel supply and so on. Now, each of the bores has LTE modem connectivity and can be monitored remotely.

As well as big savings in efficiency (ie, staff time), this development has also brought safety improvements since staff don't have to travel as much... and road conditions can vary greatly in the outback depending on the weather.

"As far as we can tell, this is the first private LTE network for the gold mining industry anywhere in the world," said Simon Lardner, director, Challenge Networks. "The LTE network is fully integrated into the legacy DMR network used in the mine, and the LTE handsets have PTT functionality that integrates with the DMR voice channels. This means that Gold Fields staff can now carry an LTE handset rather than a legacy DMR handset."

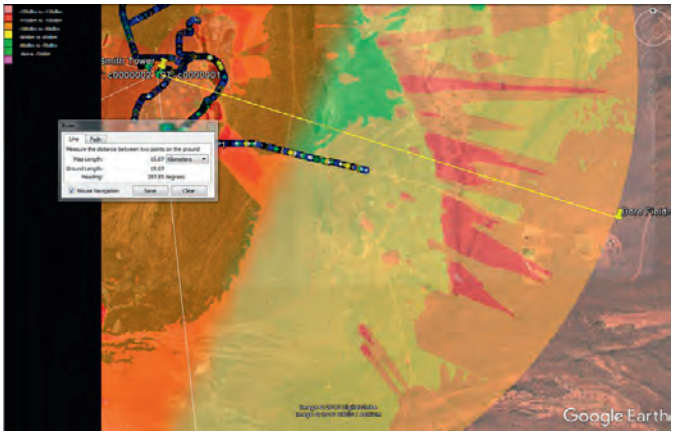
"Building the LTE network was easy; that is something Challenge Networks could do," said Lardner, citing bridging the legacy LMR into the Cisco PTT application on the LTE devices and integrating voice with the Cisco Call Manager PABX system as two challenges the company faced.

"The hardest parts are the components that can really only be done internally by a client — change management, and so on," added Lardner.

According to Nebe, the rollout was "pretty straightforward with no real problems". The solution was implemented approximately eight weeks after initial purchase order and the project was delivered on time and on budget.

The private LTE network was installed and operational within days.

> STAFF NOW HAVE BETTER ACCESS TO INFORMATION WHEREVER THEY ARE IN THE MINE SITE, AND IMPROVED COMMUNICATIONS EFFICIENCY." — RODNEY NEBE, GOLD FIELDS



Gold Field's LTE network has given it improved coverage right across the Granny Smith mine site in Western Australia.

"The initial deployment was seamless, a perfect installation," said Nebe. "We had comms within two days, and we were doing the drive tests by days 6 and 7, and the coverage is absolutely excellent. In places where we thought we weren't going to get coverage, well we were quite pleasantly surprised.

"We have a much bigger footprint now."

When asked why Gold Fields chose to implement a private network rather than go with one of the major consumer telcos, Nebe said that the consumer network options were actually much more expensive. Also, "They did not have the required reliability and features, nor the required flexibility and control," he said.

The next step will be expansion of the LTE solution to its other mines within Australia and overseas. The company is also looking at expanding coverage into its below-ground mines, as well as having redundancy of the core network between two mine sites.

"Granny Smith is predominantly an underground mine. The actual deployment [of this LTE network] was more for the processing plant; so for all the surface communications," said Nebe. "If we can deploy it underground, that'll be a huge leap ahead — then we won't have to have Wi-Fi units on the trucks. You can just have an LTE phone, clip it into your vehicle and you'll have coverage everywhere you go aboveground and underground.

"It would also be good to have roaming for handset devices on our private network to be able to transparently roam onto the consumer networks," added Nebe. "Gold Fields is currently working with Challenge Networks to resolve this.

"We also want to use the LTE network as a communications framework to develop new solutions and applications to further improve efficiency and safety," he said.

Challenge Networks Pty Ltd
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News

ERGON ADDS 18 APPRENTICES

Queensland's Ergon Energy has welcomed 18 new apprentices to its Rockhampton depot. The apprentices will train as communications technicians, distribution linespersons, electrotechnology electricians and transmission linespersons. State-wide, Ergon has accepted 65 new apprentices in the past year. "The 65 new recruits represent Queensland's great diversity and include five Indigenous apprentices and six females breaking into the traditionally male-dominated roles," said the Minister for Energy, Mark Bailey. "While the majority of new apprentices are school-leavers, about a third are aged 21 or older. The group also includes seven current employees who have successfully sought an apprenticeship to further their careers."

More info: bit.ly/2kYqrWk

CHANNEL NAMING STANDARDS

A new document issued jointly by the US APCO and the US National Public Safety Telecommunications Council sets out standard channel nomenclature for public safety interoperability channels. The set of standards, originally published in 2010, has been updated for 2017 by the NPSTC Interoperability Committee Channel Naming Working Group and approved by both APCO and the American National Standards Institute. In a report published in 2003, Kathleen Wallman, chair of the Public Safety National Coordination Committee, a Federal Advisory Committee chartered by the FCC, wrote that "The NCC views such standard nomenclature as essential to the interoperability process..."

More info: bit.ly/2kPzIz3

DMR drive testing solution

The DMR drive testing solution available from Survey Technologies measures the coverage and performance of digital radio systems. A DMR test-mobile controlled by STI's Field Test 7 application receives a standard 1031 pattern from radio towers to measure RSSI and BER. Field Test 7 samples RSSI every 5.5ms and BER every 33ms, satisfying all best practices standards for 40 Lambda measurements. Field Test 7 quantifies and displays the measured DMR coverage and performance in detailed tile reports or colored contour plots.

Survey Technologies Incorporated

www.surveytech.com

VHF/UHF data radio modem

The HB-225 VHF/UHF data radio modem is PLL synthesised and has 5 W FM transceiver modules, as well as offering a full modem option (FSK-V23, GMSK and 4FSK). The product supports analog with pre-emphasis and de-emphasis, has a mic and speaker with PTT and TOT, and compact dimensions that make it suitable for many applications.

Key features include a TX output of 1 to 5 W, which is programmable in 5 steps; channel space of 6.25 kHz/12.5 kHz/25.0 kHz prog-per channel; a support voice app, plus CTCSS/DCS prog-per channel; POCSAG encode jumper only, with no modification required; POCSAG decode (RAW), programmable via PC; digital squelch programmable via PC: 06 level (open to max mute .6 μV); RSSI output configurable via internal jumper; optical LED status indicator; DB-9 male for analog and DB-15 male for modem option; modem modulation protocol of FSK-V23 (1200 bps), GMSK (9600 bps), 4FSK (9600 or 19,200 bps — PC selectable); serial interface TTL, RS-232 and RS-485 (8, N, 1); transparent data transmitting mode, with RTS as an option; and supply voltage of 12.8 VDC ±10%.

Applications include water storage/waste treatment plants; GPS for vehicle fleet location apps; oil and gas field SCADA; security/alarm/duress switch for banking and institutions; weather and flood monitoring stations; mining remote control with high speed for robotics; irrigation system for farms; emergency call boxes; portable traffic lights for councils; and low-power repeater applications.

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News

AIRBUS UPGRADES ASTRID

Government approval has been granted for ASTRID to modernise its TETRA network in Belgium over the next few years. Airbus will work with the operator to upgrade its secure radio communication networks, infrastructure and services. The corresponding management and investment plan, in place until 2020, was approved by the Belgian government and ASTRID's Administrative Council in December 2016. The first steps of the network upgrade have already been initiated and the implementation will be intensified in the next few years. More than 50,000 users communicate securely via ASTRID's TETRA network. These users include, for instance, police, rescue services, firefighters and coastguards.

More info: bit.ly/2lm0913

HF DELIVERED BY WFP TO FIJI

Two HF radio packs have been delivered by the United Nations World Food Programme (WFP) to the Fiji Ministry of Rural and Maritime Development and National Disaster Management. The handover forms part of WFP's commitment to strengthening emergency communications in Fiji. The HF radio backpacks are a rugged, portable, all-in-one system for long-distance communications over an independent voice network. WFP upgraded 10 sites in 2016, including the NDMO headquarters. WFP established a technical presence in the Pacific in late 2015 to assist regional governments with their emergency preparedness measures and to enhance their capacity to assist people in need.

More info: bit.ly/2llXTHg

Yagi antenna

The RFI Wireless YW15-6989 yagi antenna offers wideband for 4GX and Next G (3G) services operating in the 700 and 850 bands. The advantage of the dipole design is the delivery of high 13 dBd gain with excellent pattern control across the full 698–890 MHz band, without the pattern distortion present in other wideband dipole designs.

The product is suitable for a range of applications including repeaters, signal boosters and RF control, as well as being suitable for telemetry installations where highly directional antennas are required for point-to-point and point-to-multipoint communications.

The passive elements on the antenna are fixed using a dual weld process, providing increased mechanical strength and a reduction in the generation of any passive intermodulation (PIM). The alodine plating on an all-aluminium construction makes it lightweight, with good conductivity and maximum resistance to corrosion. The antenna rests at ground potential to provide good lightning protection and reduction in static noise.

RFI Technology Solutions

www.rfi.com.au

Commercial mobile radios

The GME CM50/60-series commercial mobile radios are dual band. Based on the small footprint of each individual radio, the tethered concept offers installation options to users who must have multiple network access.

Two control options are available — the UIC600xC controller or the RH00x remote head with fist microphone. Both controllers enable seamless multiple network access by simply selecting the appropriate network channel.

The UIC control head has a high-contrast/high-visibility OLED screen for fast recognition in all lighting conditions, as well as a 170° viewing angle. It also provides high-power internal audio and a heavy-duty, 2 m stretch curly cord. These features are designed for emergency use by enabling the user to communicate while standing adjacent to a vehicle rather than leaning into the vehicle.

The product is offered as a factory-built solution or as an upgrade for existing mount mobiles using the DBSK-5060 conversion kit. This contains all necessary hardware including a dual split power cable, data interconnect cable, firmware and extended mount bracket. The bracket provides a vertical mount configuration that requires little more space than a single unit installation.

The product assists organisations needing analog and P25 coverage across multiple frequency bands and network protocols.

Standard Communications Pty Ltd

www.gme.net.au

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COMMS CONNECT WELLINGTON
11–12 APRIL 2017

A 'must attend' event for everyone involved in Australasian business- and mission-critical communications.

Since 1990, the Radio Frequency Users Association of New Zealand (RFUANZ) has held a highly successful annual conference that has helped bring radio and wireless communications industry users, dealers, consultants, manufacturers and other stakeholders together in order that they can network, learn, share ideas and do business together.

As of last year, the event is now called Comms Connect Wellington, as the RFUANZ works with WF Media and the team behind the Comms Connect brand and *Critical Comms* magazine to expand the conference's reach. This partnership is building on the success of this well-established and very well-respected conference and exhibition.

Comms Connect Wellington 2017 will take place at Te Papa, the national museum of New Zealand, on 11 and 12 April. It will be a must-attend event if you are: a first responder; work in public safety, transport or utilities; operate in the mining, oil and gas or the wider resources sector; work in security, defence, a commercial enterprise or government department; or if you're active in any other sector that uses radio and converged communications.

The conference will include technical presentations, case studies and workshops presented by a line-up 30-plus local and international speakers and subject matter experts. Here's a selection of the presentations scheduled:

- Technology choice and application within New Zealand Police (Superintendent Jevon McSkimming, CIO, NZ Police)
- Social media engagement in disasters (Caroline Milligan, Associate Director of Emergency Management, Crest Advisory)
- Case study: Improving the visibility and reliability of bus services within the public transport sector using digital two-way radio (Glen Norris, National Business Development, Manager, The Orion Network)
- Implementation of a four-site DMR network for Surf Life Saving New Zealand (Chris Stevens, SLSA Lifesaving Communications Advisor, Surf Life Saving New Zealand)
- Going the distance: Super-long microwave linking in the Pacific Islands and New Zealand (Aaron Prior, Senior Sales Engineer, and Richard Malley, Regional Sales Manager, Aviat Networks)
- Case studies in transforming wired and wireless consumer broadband into enterprise-grade networks (Gavin Wilson, Managing Director, Cradlepoint Asia Pacific)
- Using digital LMR to meet users' needs in rural New Zealand (Scott Bensemann, Director, Teletronics)
- Massive MU MIMO: Achieving much higher capacity fixed wireless networks (Roy Wittert, Regional Sales Director, Cambium Networks)
- Radio frequency protocols for Internet of Things (Jonathan Brewer, Consulting Engineer, Telco2)
- Defending critical communications network infrastructure against cyber-attacks (Bilal Javed, Senior Consulting Engineer, Nokia)
- On-the-fly communications, supporting emergency responders

Comms Connect Wellington

Conference:	11 April (9.00 am–5.00 pm), 12 April (9.30 am–5.00 pm)
Exhibition:	11 April (9.00 am–5.00 pm), 12 April (9.00 am–3.30 pm)
Where:	Museum of New Zealand Te Papa Tongarewa, 55 Cable Street, Wellington
Who:	More than 300 delegates and 40-plus exhibitors
Web:	comms-connect.co.nz

during major disasters (Station Officer Graham Tait, Systems Officer, Operational Communications, Fire & Rescue NSW)

- Seamless smart city network modelling for LoRA Mesh and LTE networks (Yahya Khaled, Spectrum Engineer, ATDI)
- Terrorism, natural disasters and lessons from Europe — how technology must support change (Matt Wroughton, Business Development Manager, Excelerate Technology)

There'll also be three panel sessions, covering a range of important topics:

- Building a radio network from the ground up — an independent session on planning required to deliver a private land mobile radio network (Chris Stevens, Surf Life Saving New Zealand)
- LTE 101 — its strengths, weaknesses and application (Simon Lardner, Director, Challenge Networks)
- Technology to shift the safety/risk paradigm (Monique Princen, Tenaz Communication Consultancy)

You can find full details of speakers, sessions and panel discussions at comms-connect.co.nz.

Exhibition

The exhibition will cover 1000 square metres and comprise more than 40 exhibitors, including all the big names in the Australasian comms market, including many dedicated New Zealand firms. You can see a full list of exhibitors and sponsors at comms-connect.co.nz/whos-exhibiting/.

RFUANZ AGM and Gala Dinner

The RFUANZ is a non-profit organisation whose membership ranges from local government authorities to transport operators, consultancies to radio dealers, and network operators to private individuals. Its mission is to protect, promote and preserve the rights of organisations and individuals who require access to the radio spectrum.

The association's annual general meeting will take place on the morning of 11 April at the same venue as the conference, and will be followed that evening by the RFUANZ Industry Excellence Awards and Gala Dinner, also at Te Papa. For ticketing and other enquiries, contact events@rfuanz.org.nz, visit rfuanz.org.nz or call +64 21 146 2380.

Essential event

It's important for all users of radio and converged communications in business- and mission-critical working environments, as well as dealers, manufacturers or suppliers in this sector, to seek out the very latest information, technologies and solutions and to cement relationships. Comms Connect Wellington will deliver the opportunity for you and your colleagues to achieve these objectives. See you there!

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

News

SEPURA WINS GERMAN CONTRACT

The Free State of Thuringia in Germany has awarded Sepura a contract for almost 20,000 radios. The contract, won by Sepura's partner, Selectric, will see Sepura provide a combination of STP9000 and STP8X hand portables, as well as vehicle installations of SRG3900 mobiles, for use by non-police public safety organisations throughout the region. "We are extremely proud that our radios have been selected by Thuringia — a state whose communication solutions have, historically, been held by our competitors," said Hooman Safaie, Sepura's regional director for DACH (Germany, Austria and Switzerland).
More info: bit.ly/2kYCxyJ

SOUTH AUSTRALIA STORM REPORT

In response to communications problems encountered during the intense storms of September 2016, the Local Government Association of South Australia gathered interested parties for an analysis and discussion day in November. More than 50 local government representatives participated, from CEOs to emergency management and engineering staff. According to a wrap-up report, the "disruption of electricity supply for an extended period had the knock-on effect of telecommunications loss", and the weather events "raised many communication challenges and reinforced the need for adequate and appropriate communication strategies in emergency response planning". The report can be found on the LGA website.
More info: bit.ly/2lZJcMU

Wideband radiofrequency amplifier

The ENI 604L 4 W wideband 1 GHz radiofrequency amplifier is a Class A linear wideband RF power amplifier. Available to rent from TechRentals, the rugged, solid-state amplifier system is housed in a durable aluminium cabinet. Extended performance typically gives saturated output to a maximum of 16 W at 10 MHz and 12 W at 100 MHz.

Features include saturated output of 7 W, 0 dBm input; 4 W output at an input of 0.13 mW; frequency range of 0.5 to 1 GHz; and harmonic level of -20 dBc minimum at rated RF power output.

Applications include medical ultrasonics; non-destructive testing; HF research (linear accelerators); EMI tests; and HF and VHF radios and transmitters.

TechRentals
www.techrentals.com.au

Vector signal generator

The Innovative Integration Model XU-TX 5.6 GHz PXI RF vector signal generator has 3 GHz bandwidth for 5G design and testing.

It can be programmed using C++ to create specific designs or test configurations. It has a user-programmable Kintex UltraScale FPGA with high-speed serial and parallel digital interfaces in an 8 HP PXI express module.

The module's wide 3 GHz analog bandwidth will allow it to be used for 802.11ac/ax device testing as well as early-stage 5G design and testing.

Wi-Fi has evolved from 20, to 40, to 160 MHz in the latest 802.11ax standard. Mobile communication channels have evolved from 200 kHz in GSM to 100 MHz in current LTE-Advanced technology.

The module's 3 GHz of instantaneous bandwidth can also be used for digital predistortion (DPD) test and wideband signals such as radar, LTE-Advanced Pro and 5G. Multiple channel synchronisation will allow for up to eight-channel multiple output (MO) configuration in a small, 6-slot PXIe chassis.

Scientific Devices Australia
www.scientific-devices.com.au

Uninterruptible power supply

Schneider Electric has announced the availability of Gutor PXC, a standardised, fully industrial uninterruptible power supply (UPS) for harsh environments.

Suitable for rugged and outdoor settings such as oil and gas exploration and production sites, marine and offshore environments and climates with extreme temperatures, the Gutor PXC protects critical equipment and industrial applications from damage due to power outages, surges and spikes while providing short-term battery power during an outage. Due to the solution's standardised and flexible design, users including facility managers, engineers and contractors now have the ability to deploy a reliable and turnkey solution in a dramatically shorter time frame and at a lower cost.

Features include: operating temperature up to 55°C, all-steel enclosures to meet vibrations up to 1G, embedded dust filter reinforcement of ambience protection (native IP42), small footprint (600 mm width for 10 to 80 kVA without transformers) and lifetime management of 20+ years.

Schneider Electric
www.schneider-electric.com.au

omnitronics

Radio dispatch that promotes safety and efficiency

What if you could see exactly where your personnel were and contact them via radio with one easy to use application?

RediTALK-Flex is the new VoIP dispatch system from Omnitronics that gives you the ability to do this, with a choice of GPS functionality to meet your needs:

- ☑ **GPS Essentials** enables you to see where your personnel are, and quickly contact them;
- ☑ **Geofencing & Historical Tracking** allows you to maintain a level of control over where your users can freely move, potentially eliminating the chances of an incident before it can happen;
- ☑ **Advanced Location Services** offers administrators greater insight into user movements, both real-time and historical, whilst enabling all of your dispatch operators to work more efficiently through shared resources.

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News

NEC GETS NSW CCEP CONTRACT

As part of the NSW Telco Authority's Critical Communication Enhancement Program (CCEP), NEC Australia will deliver wireless backhaul technology, professional services, network management systems and ongoing support. The program represents the first step in the NSW Government's Operational Communications Strategy, which seeks to provide better coverage and service to essential services agencies. NEC's agreement includes around-the-clock helpdesk support and advanced logistics services from its Australian technical service centres. The first phase of its contribution is part of the CCEP Pilot Project covering 25 sites in NSW's northwest region, using NEC's iPASOLINK VRultra-compact communications system and network management system to facilitate interconnectivity of sites.

More info: bit.ly/2m3hGuU

BARRETT HELPS KEEP THE PEACE

African peacekeeping missions will now be supported by Barrett Communications HF communications devices installed in armoured mobile air traffic control towers. The tower cabins provide 360˚ visibility and a full communications package has been fitted. This includes UHF, VHF, HF and ground-to-ground links, audio recording for post-action debriefing purposes, meteorological sensors and displays, and ancillary air traffic control items. Barrett has supplied the HF radio communications equipment, including a Barrett 2050 HF Transceiver and a 2019 HF Automatic tuning antenna for the tower.

More info: bit.ly/2kPAGLm

Surge protection device

The Valvetrab-Safe Energy Control (SEC) Type 2 surge protection device is a high-performing arrester.

From just 12 mm wide per module, the device is highly compact and reduces the need for installation space to a minimum. It can be housed in any miniature distribution system.

The device protects against lightning strikes and surges to deliver maximum reliability for installations in need of continuous power. It features SEC technology, while the high discharge capacity and small width of the device ensure protection is available in the most compact of space.

The pluggable nature of the arrester allows for quick installation and maintenance. The base element and plug can be rotated by 180° for easy alignment. This also enables a connection with shorter cable lengths with markings facing upright that are clearly legible.

Built using only quality components, the product is both vibration- and shock-proof. It is monitored by an easy-to-read status indicator and a remote signalling contact. The device has been independently tested to the latest IEC 61643-11 standards and has GL shipping approval.

The product is part of a portfolio of protection devices that ensure high availability of power. The range also includes protection devices for data networks, radiocommunications and pipelines. The SEC Type 1, 2 and 3 arresters all offer the latest design and technology benefits.

The product is rated for voltages up to 690 V and independently certified for discharge currents up to 50 kA limp or 100 kA Imax. It delivers durability and performance due to the combination of safe energy control features and Spark Gap technology which prevents any line follow current. This reduces stress on the entire installation while helping to ensure the long-term durability of the MOV based Type 2 protection. Sensitive downstream components are reliably protected due to the device's low-voltage protection level.

The product is suitable for use in infrastructure, transport, wind energy, telecommunications and the building sector.

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www.phoenixcontact.com.au

Software platform

The Cambium Networks ePMP Elevate software platform allows outdoor wireless broadband networks to gain the capabilities of the ePMP platform, including frequency re-use enabled by GPS synchronisation and smart beamforming, even on non-Cambium Networks 802.11n-based hardware.

Network operators simply need a single ePMP access point and to load their deployed subscriber modules with the software. Their hardware investment is protected.

Additionally, network operators are able to extend high-speed connectivity and increase density to meet customer demand without the time and expense of dispatching technicians to each subscriber location.

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HB-225 Series

FREQUENCY RANGE

VHF: 136-174MHz (HB-225V2)
UHF: 400-440MHz (HB-225U1)
UHF: 450-490MHz (HB-225U2)

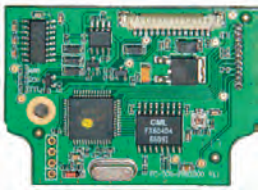
PRODUCT INFORMATION

The HB-225 Series are PLL synthesized 5-watt FM transceiver modules, which are designed for data transmission and voice communication. They can support pre-emphasis, squelch, CTCSS/DCS and audio amplifier. Two-point modulation technology makes good low frequency response and POCSAG application possible. The HB-225 radio has fast start-up time and makes it a competitive choice for 1200-19200bps rate data application. Compact dimension and wide range DC support make it flexible to use.

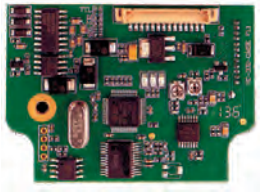
KEY FEATURES

- Programmable 1W~5W Output Power
- 6.25KHz/12.5KHz/25KHz Channel Spacing
- Programmable 16 channels
- Fast start-up time: 5ms
- CTCSS/DCS Encode/Decode
- Pocsag Encode/Decode
- Digital SQ programmable via PC
- LED Status Indicator
- Time out timer
- Power Supply 9.5V-16V DC, 12V DC (Nominal)

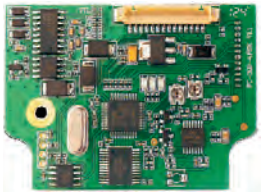
MODEM OPTIONS (FOR HB-225)



HB-225-FSK Modulation:
FSK Data Rate:1200bps



HB-225-GMSK Modulation:
GMSK Data Rate:9600bps



HB-225-4FSK Modulation:
GMSK Data Rate:9600/19200bps

- Serial Interface: TTL/RS-232/RS-485(8N1)
- Supply Voltage: DC +12.5V
- Data Transmission Mode: Transparent

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NETWORK WOES

Jonathan Nally

A UK government report has slammed the implementation of the country's new Emergency Services Network.

A UK government Select Committee tasked with appraising the progress of, and the likelihood of success of, the country's new Emergency Services Network (ESN) has issued a report that criticises almost every aspect of the system and its implementation.

The ESN system, based on broadband technology and communications backbones provided by commercial operators, is intended to replace the Airwave private network that has been in operation for many years.

The committee noted that the type of system being implemented "is not yet in use nationwide anywhere in the world", noting that the ESN "is an ambitious programme to provide a critical national service, using technology that is still being developed, to a challenging timescale …"

"While the Department has ensured stability in the senior team managing the project, notably through the Senior Responsible Owner who has been in post since 2011, it looks as if the current target date for delivering ESN will not be met," says the report's executive summary.

"Emergency services will not use ESN until they are firmly convinced that it works, which may require more testing and assurance work than the current December 2019 delivery date seems to allow for.

"Despite the prospect of delay the Department has not budgeted for an extended transition period or put in place detailed contingency arrangements to manage this risk.

"The Department did not manage to maintain competitive pressure in letting either of the two main ESN contracts and when these contracts are recompleted the incumbent suppliers will be in a very strong position."

Following are the committee's conclusions and recommendations, reproduced verbatim from the report (the full version of which is available at publications.parliament.uk/pa/cm201617/cmselect/cmpubacc/770/77002.htm):

1. It seems unlikely that the ambitious target date for delivering the Emergency Services Network will be met.

Any further compression of the timetable will increase the risk to successful delivery of this critical programme. The National Audit Office estimated that the programme was between five and ten months behind target and representatives of the 105 police, fire and ambulance services in Great Britain (the emergency services) are less than 50% confident that the Emergency Services Network (ESN) will be delivered on time. The Home Office (the Department) confirmed to us that some slippage would occur.

The time pressure is compounded by the need to provide emergency services with sufficient assurance that ESN is at least as good as Airwave. However, the time available for the region by region transition to the new system has been cut from 30 to 27 months, leaving many regions with little time for contingency and parallel running of ESN with Airwave, with the South West region, the worst placed, having no time for either.

The Department told us it would not force emergency services to switch to ESN unless they were happy with it. We have observed previously that convincing local bodies to use new services can be a difficult process and believe it will be challenging to get all

George Rex/Flickr

Christophe Maximin/Flickr

> WHILE THE DEPARTMENT HAS ENSURED STABILITY IN THE SENIOR TEAM MANAGING THE PROJECT... IT LOOKS AS IF THE CURRENT TARGET DATE FOR DELIVERING ESN WILL NOT BE MET.

emergency services to collectively agree ESN is ready so that Airwave can be turned off as planned in 2019.
Recommendation: The Department should reassess the business case timescales, update milestones for delivery and work with emergency services to update transition plans so all parties agree they are deliverable. It must take responsibility for convincing services to switch to ESN but also be clear at what point it will mandate the switchover. We expect the Department to report to us on progress by September 2017.

2. Despite the prospect of delay the Department has not budgeted for an extended transition period or put in place detailed contingency arrangements to manage this risk.

The current Airwave contracts expire in December 2019 and the only contingency if ESN is not functional by then is to extend them, which would cost an estimated £475 million for a year's delay nationwide.

The Department has negotiated a fixed price with Airwave's new owner, Motorola, to extend Airwave if needed on a regional and monthly basis but detailed contingency plans to manage any such extensions have not been prepared. These are crucial as Motorola requires notification by December 2018 at the latest in order to make the preparations needed to run the Airwave service past December 2019.

The Department, which has not yet agreed budgetary provisions for any delay, confirmed that the cost of delay would not be borne by individual regions as any additional payments would be made centrally from the grant to the police. The cost of any delay caused by a supplier should be recovered from the responsible party but, with the Department acting as prime contractor, identifying those responsible will not be straightforward.
Recommendation: The Department should budget for the cost of an extended timeframe and put in place arrangements for Airwave contract extensions as required. The Department should update us on these provisions by September 2017.

3. Good communications can make the difference between life and death for both emergency services personnel and the public but the technology ESN will rely on is not yet proven.

The ESN system is intended to save money by avoiding the capital costs of building a dedicated network by running on EE's existing commercial 4G mobile data network. But only one other country in the world, South Korea, has attempted to do this and its approach is less risky than that proposed here as dedicated mobile spectrum is available to the emergency services.

In Great Britain, new technology to prioritise the emergency services over commercial users needs to be developed. In addition, devices with the required robustness, voice and dual-mode capabilities are being developed, while work is ongoing to expand coverage of the EE network in remote areas and the London Underground.

The Department told us that it expected an announcement on the London Underground in the next couple of months but it is not clear whether this will include plans for other underground systems in the UK, such as Glasgow. Currently national coverage is at 74% but EE is confident that it would reach the 97% target (equivalent to the existing coverage provided by Airwave) by

Ray Forster/Flickr

(Mick Baker) Rooster/Flickr

September 2017 and that technical options exist to close gaps in remote areas, such as the use of portable masts.

The Department recognised that bringing together all the different elements to form an end-to-end system and scaling up these solutions and testing them adequately will be very challenging. The need for robust testing was a particular concern raised by a number of stakeholders across industry and the emergency services. *Recommendation: The Department should put in place adequate and independent testing of the technology required for ESN to make sure it works under pressure in a live environment. The Department must also address the real security concerns about communications on the London Underground and other underground systems and update the Committee on the outcome.*

4. The Department did not manage to maintain competitive pressure in letting either of the two main ESN contracts.

Initially there was strong market interest in both the main ESN contracts. For the user services contract, won by Motorola, the Department received 17 expressions of interest but not all these resulted in bids due to demanding technical requirements. The Department narrowed the competition down to five bidders with two invited to submit a best and final offer.

For the network contract, won by EE, despite the fact there are only four mobile network operators in Great Britain the Department again only invited best and final offers from two suppliers. In both cases, one of the final two suppliers withdrew leaving the Department exposed to a potentially uncompetitive single-supplier situation.

The Department told us that in one of these cases supplier withdrawal came so late that the winning bid, submitted by Motorola, was effectively prepared under competitive pressure, while for the other a "should-cost model" was developed to ensure the remaining bid from EE was competitively priced.

Recommendation: The Department should review its tender arrangements to ensure it does not rule out potential bidders too quickly, to avoid future single supplier situations.

5. We are concerned that the incumbent suppliers will be in a very strong position when the ESN contracts are re-competed.

ESN was designed to:

- allow the contracts to be re-competed easily and frequently;
- ensure costs are kept low; and
- enable the technology used to be regularly updated.

But the current suppliers could acquire a significant competitive advantage. EE is being paid to roll out its network across Great Britain and into remote areas, with 250 new sites funded directly by the Department. The low numbers of public users in remote areas may mean that competing network operators have limited incentive to invest, placing them at a disadvantage to EE when the contract is re-let. According to the Department, to comply with state-aid rules, other network operators will be able to use masts in remote areas.

However, other mobile network operators maintain that they have not been given details of the location and specification of proposed ESN sites and that no framework has been established for sharing masts. Without these it will be difficult for other operators to plan their own network expansion efforts.

Separately, Motorola are responsible for setting the specification for ESN devices but are also a potential supplier of the devices, raising the risk that it sets specifications so as to favour its own products. The Department told us that it would be very careful to make sure device specifications are standardised and not bespoke to any single supplier.

Recommendation: The Department should, working with Ofcom, ensure other network operators have sufficient and timely information to enable them to make use of the ESN infrastructure and should report back to this committee in 2017 on take-up. For devices, the Department should engage with suppliers and ensure that specifications are standardised and do not favour any individual supplier.

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THE ROAD TO BROADBAND

Ged Griffin, Manager, Centre for Disaster Management and Public Safety, University of Melbourne

When it comes to public safety mobile broadband, it's vital that Australia learns from other countries' experiences.

I recently attended the TETRA and Critical Communications Association's (TCCA) fourth Critical Communications Middle East and North African (MENA) 2016 conference in Dubai. This was an excellent conference and both TCCA and the event organising team led by Jackson Szabo should be congratulated on its success.

Mobile broadband was a key topic during the conference, and it was apparent from the discussions that, along with the rest of the world, Australia shares common challenges in conceptualising an appropriate ecosystem to support the needs of our society. Speakers and delegates discussed the implementation of the full range of broadband network options, be they totally commercial networks, hybrid networks or dedicated networks. These networks have the potential to provide mobility, integration, seamless connectivity, security and priority communications.

However, there is no single solution or model that can be applied. Kable's September 2016 report ('First Responder Solutions in the UK and Internationally') on first responder communications solutions made just such a finding. This absence of a standard model for a broadband network underscores the challenges faced by the ACMA as it advances the latest version of the Five-year Spectrum Outlook (FYSO).

In terms of the public safety communications ecosystem, the discussions also supported the broad outcomes of the Productivity Commission's research report in relation to public safety mobile broadband in that "on first principles — the most efficient, effective and economical way of delivering a public safety mobile broadband capability is by relying on commercial mobile networks (and spectrum)".

It was interesting listening to Stephen Greenslade and Dr Barbara Held as they compared and contrasted the approaches taken by the United Kingdom and Germany in the transition to different public safety mobile broadband models. Greenslade is the Principal Solutions Architect for EE and is involved in rolling out the UK's new Emergency Services Network (ESN) as it replaces the current Airwave TETRA Network. This is a solution based on a totally commercial network and will include the use of Voice over LTE for emergency services. Held is the director of operations for the Federal Agency for Digital Radio of Emergency Service (BDBOS). The German approach is based on a hybrid model using TETRA and mobile broadband.

The conversations focused on the networks themselves rather than the entry point through an emergency call-taking centre such as Australia's Triple Zero system, or, more appropriately, the next-generation system that will integrate into this environment. Indeed, Australian authorities have the opportunity to learn from both the

> REGARDLESS OF THE APPROACH TAKEN THERE WILL BE A NEED TO DEVELOP A ROBUST AND EFFECTIVE BUSINESS CONTINUITY PLAN, SINCE ALL TECHNOLOGIES AND ALL NETWORKS ARE AT RISK OF FAILURE.

Images courtesy Motorola Solutions.

UK and German approaches and from our other international colleagues before investment and policy decisions are made regarding public safety mobile broadband in Australia.

To some extent the approach taken towards development of broadband networks depends on the availability of funding. A key benefit in leveraging a public or commercial network is that it can be delivered earlier and at lower cost. Some speakers highlighted concerns about commercial networks in the wake of recent network outages during key events in Europe.

For example, the March 2016 terrorist attack on the Brussels airport resulted in the perceived localised failure of the ASTRID communications network used by emergency services. Although further investigations have identified that the ASTRID network suffered from capacity-related problems rather than a failure, this event highlighted the value of Wi-Fi hotspots and the use of DMO options for local communications when there is a network capacity problem during a major event. To counter these concerns, an additional benefit of using a commercial network — or at least elements of it — is that the public will quickly detect problems regarding coverage and capacity.

Regardless of the approach taken there will be a need to develop a robust and effective business continuity plan, since all technologies and all networks are at risk of failure. For instance, Victoria's Emergency Management Operational Communications Program seeks to lever additional value out of existing state-owned infrastructure. Perhaps these types of strategies could also look at how existing assets can be used to reinforce the business continuity arrangements for public safety communications — for instance, where a commercial mobile network based on a 'first principles' approach could be used to develop an Australian Public Safety Broadband Network in line with the Productivity Commission's analysis.

Next generation

There was also some debate on 4G versus 5G and the timing of when mobile broadband network investments should be implemented. While there was no final answer agreed upon, there was a general agreement that the 5G standard will emerge in stages. During this evolution, elements of the 4G standard will still be used in the 5G standard, just as earlier standards were used during the development of the 4G standard. Based on this concept there was strong support for commencing investment without delay using today's existing standards, but allowing for the gradual upgrade to new and emerging 5G standards.

What remained unspoken in these discussions was a more detailed consideration of the actual technical assumptions for those standards. For example, 2G, 3G and 4G standards have been

Images courtesy Motorola Solutions.

designed by Europeans for densely populated European countries, but Telstra has had to adapt these technologies to suit the conditions of Australia's vast, sparsely populated environment.

It is essential that all stakeholders within the Australian radiocommunications sector, including the ACMA, ARCIA and vendors, lobby to ensure that decisions on standardisation by groups such as the International Telecommunications Union (ITU) Study Group 13, and decisions made at the World Radiocommunications Conference in 2019, provide solutions and outcomes that are appropriate for Australia's conditions as well as those of the European environment.

It was interesting to note that the area of least discussion during the conference related to the actual applications and data that would be supported by the new and emerging networks. Timo Harju from Airbus Defence and Space gave an excellent presentation on communications within the healthcare sector, and it helped contextualise some of the discussions on the technical design and business model options.

For me, the key take-home message is that, in terms of public safety communications, we need to develop an innovative and holistic business model to guarantee that we can take advantage of new and emerging technologies to ensure that we enhance our service delivery to the Australian community. While the total investment in Australia's public safety communications ecosystem is unknown, analysis by the University of Melbourne has shown that the combined value of that investment across the nation is approximately $2 billion. At a jurisdictional level there is also a significant ongoing expenditure. For example, Victoria's Emergency Management Operational Communications Program outlines an annual cost of more than $150 million in operational communications systems to support emergency management activities.

So the new business model will involve significant capital and operational expenditure at a national and jurisdictional level.

> WE NEED TO DEVELOP AN INNOVATIVE AND HOLISTIC BUSINESS MODEL TO GUARANTEE THAT WE CAN TAKE ADVANTAGE OF NEW AND EMERGING TECHNOLOGIES.

Unfortunately, there is no common solution or model, so we need to learn from each other as we ask, "What is the 'best fit' to meet the contextual needs of our own public safety communications ecosystem within Australia?" During this process there is a critical need for stakeholders to be highly engaged in the discussions and developments underway here in Australia and overseas. Being actively involved with the ACMA, including responding to its various reviews and papers, is a vital step in this engagement. Similarly, the participation in industry associations like ARCIA and attendance at communications conferences are essential strategies to help in this journey.

By doing this, vendors and decision-makers can keep abreast of the latest trends, developments and opportunities occurring at both a national and an international level.

Ged Griffin is an Inspector in the State Emergencies and Security Command of Victoria Police. He is also Manager of the Centre for Disaster Management and Public Safety at the University of Melbourne.

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It's time for next generation PTT

Kevin Noonan, Lead Analyst, Government, Ovum

Telstra LANES® offers a robust, ready-made solution to public safety's need for a national mission-critical data service.

Two-way radio has been a core part of emergency services operations since its first use in the world by Australia's Victorian Police Force in 1923. Over time, Land Mobile Radio (LMR) has been a transformational technology for the sector. It has not only helped drive numerous productivity improvements, but it has also been pivotal in saving lives.

However, LMR is not without its shortcomings. It is physically constrained by bandwidth and by the restrictive assignment of radio channels. In times of emergency, individual radio channels can become overcrowded, and when this happens important messages can be lost.

Today, LMR is just one technology in an increasing array of digital capabilities. Officers in the field now need data… and lots of it. It is common for first responders to use mobile phones, tablets, cameras and IoT devices for a variety of advanced services such as mapping, video streaming, data analytics, personal health management and office automation.

Recently released global industry standards have significantly bolstered the value proposition for advanced push-to-talk (PTT) technologies. These standards lay a common framework and agreed performance requirements to meet the stringent requirements of mission critical systems.

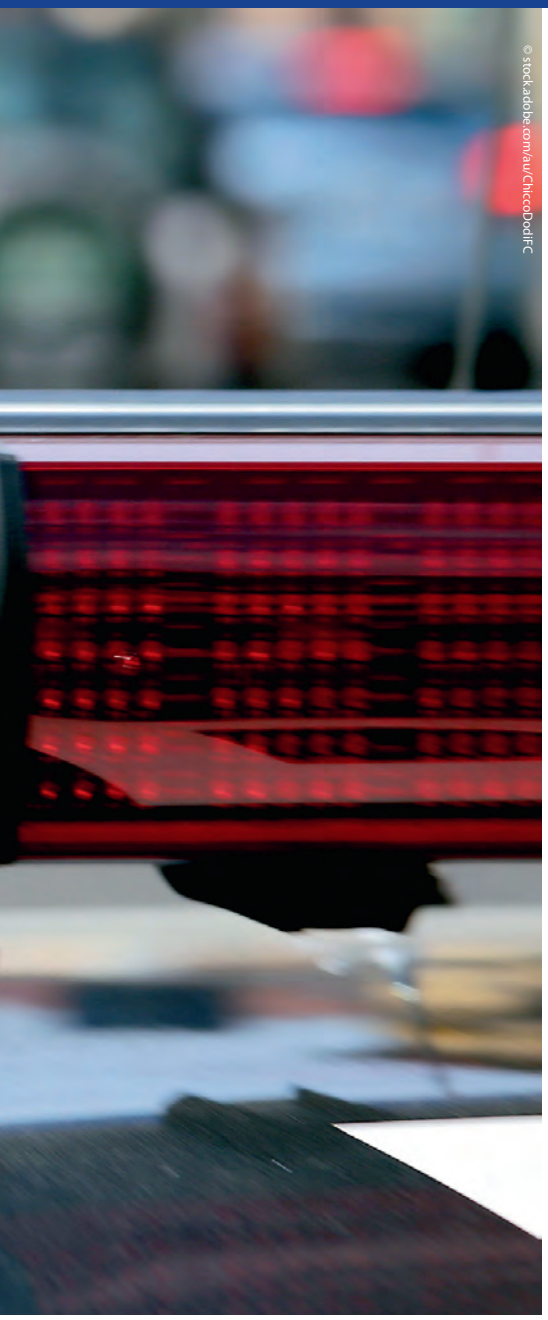
The standards have targeted Mission Critical Push-To-Talk (MCPTT) as a specific use case. (Other standards 3GPP is developing include targeting Mission Critical Video and Mission Critical Data.) There is also another project (Mission Critical Core) to recognise the common standards that need to exist across a converged data, video and PTT market.

With the majority of MCPTT standards now well defined, it is time for an industry response, using these standards to create common and strategic solutions.

Achieving mobile broadband

In 2015, the Australian Productivity Commission was tasked with undertaking a 'first principles' analysis of the best way to obtain a mobile broadband capability to meet the long term needs of public safety agencies.

The Commission considered three delivery options — dedicated, commercial and hybrid — in detail, and found "a commercial approach is the most cost-effective way of delivering a [public safety mobile broadband] capability". The Commission went on to find that "a dedicated network is nearly three times more expensive than a commercial option. The cost difference between a hybrid and commercial option is lower and narrows as the size of the dedicated network component decreases."



Join Alex Stefan (Public Safety Industry Executive, Telstra) and Kevin Noonan (Global Lead Analyst for Government, Ovum) for an online discussion on "Transitioning to Public Safety Mobile Broadband" to be held 11am, Thursday 11 May 2017.

Register now at the "Virtual Event" tab in the link below.
www.telstra.com.au/business-enterprise

Since the time the Commission delivered its report, one particular risk factor has increased in importance. There is a growing opportunity risk that arises through inaction and delay. Public safety mobile broadband (PSMB) is one critical piece of the infrastructure necessary for delivering the next generation of hardware and software services for the sector. Without an operational PSMB solution, it will be extremely difficult if not impossible, to guarantee the performance and quality of service requirements set in the MCPTT international standard.

The need for LTE

In times of emergency, network performance is crucial. Network congestion at public events, such as New Year's Eve celebrations, creates big headaches for network planners. Such congestion has essentially become a question of economics. Each provider needs to make a business decision about how much spare capacity it should build into its architecture to cater for peak loads in known locations.

However, most providers would understandably struggle to deal with unexpected peaks of unknown magnitude in unknown locations. This is exactly what happens in times of disaster.

If emergency workers are sharing the same mobile network as the general public, all their carefully procured advanced capabilities slowly grind to a stop if there are no Quality of Service mechanisms in place to provide emergency workers with a prioritised service. Consider the problems during 9/11 in New York, the London bombings, New Zealand's earthquake, or Australia's summer bushfires and floods. In these cases, it is impossible to predict the location and severity of the disaster. It is not commercially viable for telecommunications operators to purchase and configure sufficient mobile spectrum to cope with an event that may happen in that location once every hundred years.

But an example of a technology that can provide the core network infrastructure necessary for the development of mission critical broadband is Telstra's LANES® solution.

After a long period of testing, Telstra has launched a commercial release of Telstra LANES®, which can address PSMB requirements as outlined in the Productivity Commission's report. Moreover, the Telstra LTE network has the added flexibility to deliver a commercial option or a hybrid option, depending on a customer's particular needs.

Telstra has already trialled Telstra LANES® in conjunction with public safety organisations in a range of situations, such as the G20 Leaders' Summit in Brisbane (2014) and an AFL grand final with 100,000 people (2015).

The Telstra LANES® approach is conceptually similar to the move toward cloud-based as-a-service solutions that are becoming increasingly popular in other parts of the IT industry. Indeed, many governments are now mandating a 'cloud first' policy as a lever for driving change. The advantages of adopting Telstra LANES® include:

- A significantly smaller investment is required due to the reuse of existing infrastructure;
- Avoiding the allocation of excess spectrum for public safety services, which would be underutilised for most of the year;
- A coverage footprint equal to today's commercial LTE networks is available immediately;
- Public safety will benefit from technology upgrades deployed for the commercial network, such as Video over LTE, 5G, IoT support and additional spectrum bands.

Future directions

Since there will be clear benefits for public safety agencies from delivering next generation PTT, it is now time to chart a path forward. Over the past year, there has been a perfect convergence of development in core infrastructure: international standards for MCPTT are largely well defined, Telstra LANES® has been launched, a new generation of ruggedised LTE devices have come onto the market.

It is encouraging to see that key industry players are already coming together to focus on operationalising these solutions. In March 2016, Telstra, Motorola and Ericsson announced a collaboration to develop next generation PTT facilities for the public safety market. The partner companies will work to progress the PTT technology through concept testing in Australia, and will collaborate in standards forums globally.

In conclusion, the days of big budgets, big assets, slow procurement and silos of public sector infrastructure are long gone. Legacy equipment such as LMR will continue to play an important role, but it is time consider a much broader transition strategy to converged mission critical voice, data and video.

The challenge for public safety agencies is to find better ways to engage with industry partners to facilitate a planned and orderly transition to these next-generation solutions.

Industry Talking

To all ARCIA members out there supporting public safety communications through floods and fire, we thank you. A recent report from local government in South Australia highlighted the importance of communications during major storms, including how people are able to communicate during the subsequent loss of the power grid. While it is easy to get excited about complex new solutions and the benefits they offer, when all the systems fail and you are back to simplex as the only option, you can really see the value that LMR provides. Local government has a critical role to play in major events such as the storms in SA, and our industry is ideally placed to provide real-world solutions.

ARCIA kicked off 2017 with a planning day in Melbourne, followed the next day with our industry partners' day. The planning day brings together the committee and other key stakeholders to plan the focus for the association over the year. We also welcomed two members from the RFUANZ so that we could share ideas about the industry. We spent the day on many familiar topics such as events and membership value, and we think that we have some new ideas for 2017 that we will progress through the year.

This year will mark 10 years of ARCIA, which is a great milestone and we hope to be able to have suitable celebrations during 2017 — watch this space. As we review what the association has achieved over 10 years, we have a lot to be proud of. One of the goals that we have discussed is to make the association more relevant across the country… and we are getting there, especially with the help of our dedicated committee members from all over Australia. However, we recognise that as a group that we have a huge amount of work to do for those members of our industry who do not engage as regularly.

The partner meetings demonstrated that our industry is changing before our eyes, with the arrival of new technologies such as IoT and LTE. So you will see ARCIA broaden its horizons and look to promote RF/wireless professionals as technologies merge. The membership of ARCIA encompasses vast and relevant experience which, we believe, will continue to evolve with technology. Therefore, the association should encourage all forms of wireless capabilities.

In February we met with the ACMA in relation to opportunity cost pricing for high-density UHF spectrum, and we would like to thank the ACMA for listening to our concerns. We welcome the ACMA's decision to defer the proposed implementation of the increase in licence fees in order to better fine-tune the spectrum data, so that we can understand where demand is coming from. By deferring the increase the ACMA is acknowledging that the ARCIA submission is relevant and must be considered, an indication that the developing relationship with the ACMA is good for all in the industry.

Hamish Duff, President
Australian Radio Communications Industry Association

Images courtesy Lockheed Martin and Harris Corporation.

LOCATION, LOCATION, LOCATION

Research using a satellite-based augmentation system will lead to more accurate positioning services in Australasia.

The Australia and New Zealand CRC for Spatial Information (CRCSI) will lead an industry program that evaluates applications on a recently announced satellite-based augmentation system (SBAS) testbed. CRCSI partners Geoscience Australia and Land Information New Zealand (LINZ), together with three companies — GMV, Inmarsat and Lockheed Martin, will implement the SBAS testbed through a two-year project to evaluate three positioning signals for improved accuracy and integrity over Australia and New Zealand.

"The SBAS testbed will trial a range of SBAS signals for the first time in Australia, one of which has never been tested before. The SBAS signals provide an opportunity for many users to more readily access higher accuracy satellite positioning over Australia and New Zealand," said Dr Peter Woodgate, CEO of the CRCSI.

"The SBAS testbed is Australia's first exploratory step to joining countries such as the United States, Europe, China, Russia, India and Japan, which are already using the technology on a daily basis," added Gary Johnston, head of Geoscience Australia's geodesy and seismic monitoring section.

"This technology hasn't been widely tested in Australia before; however, GMV, Inmarsat and Lockheed Martin have experience implementing it around the world," Johnston added.

"The testing of SBAS technology in Australia offers a number of potential safety, productivity, efficiency and environmental benefits to many local industries, including transport, agriculture, construction and resources.

"Research has shown that the widespread adoption of improved positioning technology has the potential to generate upwards of $73 billion of value to Australia by 2030," said Johnston.

In January 2017, the Australian Government announced $12 million in funding for the trial of SBAS technology.

Johnston said Geoscience Australia will be collaborating closely with GMV, Inmarsat and Lockheed Martin on the technical components of the testbed.

"We'll be testing two new satellite positioning technologies — next-generation SBAS and Precise Point Positioning — which provide positioning accuracies of several decimetres and five centimetres respectively."

Australia currently relies on the Global Navigation Satellite Systems (GNSS) of other countries, including the United States' GPS. These international systems typically give Australians positioning accuracy of five to 10 metres.

The three signals to be tested are:

- The current offering provided in Europe and the US (L1 Legacy signal).
- A new dual-frequency signal to be tested for the first time in both Australia and New Zealand (L5 Dual-Frequency and Multi-Constellation Signal).
- High-precision, Precise Point Positioning (PPP) navigation corrections where decimetre-level accuracies at user level are expected.

In simple terms, the SBAS satellite provides a cost-effective way to improve GPS signals from around 5 metres in accuracy to less than 1 metre.

In March, Geoscience Australia and the CRCSI will call for organisations from a number of industries including agriculture, aviation, construction, mining, maritime, rail, road, spatial and utilities to participate in the testbed.

SBAS is expected to improve air navigation, smartphone-based services, asset management and precision agriculture, and is expected to be needed for the deployment of connected and autonomous vehicles.

The New Zealand and Australian Governments will be partners in the two-year SBAS trial.

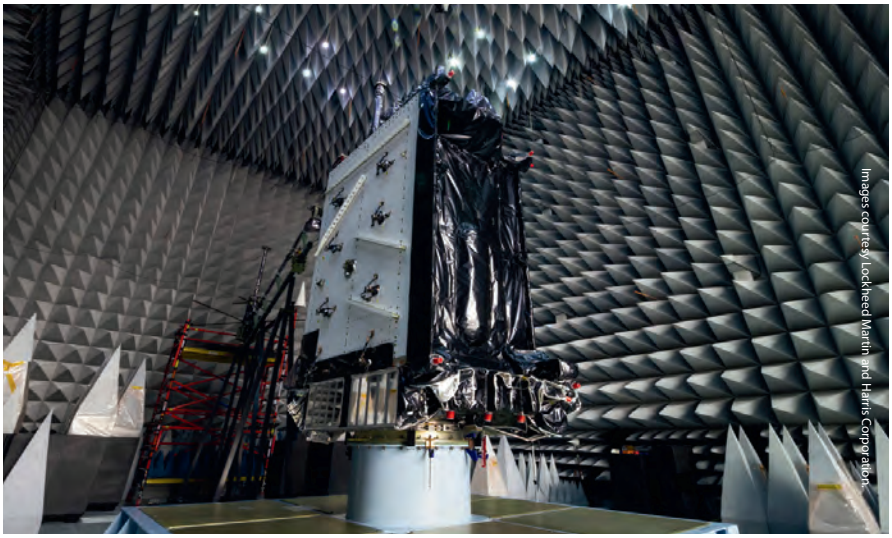
"Australian and New Zealand industry will be able to assess new and innovative positioning applications and build the case for further investment," said the CRCSI's Dr Woodgate.

"This is a world-leading trial that will allow us to investigate how New Zealand might benefit from the added precision SBAS adds to current and future global navigation satellite systems such as the widely used Global Positioning System (GPS)," said New Zealand's Transport Minister, Simon Bridges.

"Essentially, SBAS is expected to help ready us for technologies that need more precise and reliable positioning data.

"While current GPS locations are accurate to within 5–10 metres, the SBAS testbed could improve positioning to within as little as 10 centimetres," the minister added. "This means that a vehicle will recognise the road it is travelling on, but also which lane it is in and its distance from surrounding objects.

"The testbed and trials will be the first in the world to utilise next-generation SBAS technology, putting Australasia ahead of other parts of the world, and showing again why New Zealand is an ideal place to test new technologies."



Images courtesy Lockheed Martin and Harris Corporation.

The New Zealand Government will contribute $2 million towards the testbed and trial program.

The SBAS testbed will contribute to the initial work program of the Australia–New Zealand Science, Research and Innovation Cooperation Agreement signed in Queenstown, New Zealand, on 17 February.

Industry involvement

The SBAS research project will see Inmarsat using a transponder aboard its L-band Asia Pacific Region satellite, Inmarsat-4 F1 (I-4 F1), to provide the space component of the SBAS Testbed.

GNSS signals are critical tools for industries requiring exact precision and high confidence. For the first time anywhere in the world, this project will demonstrate how the use of signals from multiple GNSS, ie, GPS and Galileo, and SBAS signals broadcast on dual frequencies (GPS L1 and L5), can achieve enhanced navigation performance in terms of user positioning integrity and accuracy.

The navigation payload on Inmarsat's I-4 F1 satellite is a dual-channel bent-pipe transponder, which provides mobile users with two SBAS navigation signals at both GPS L1 and L5 frequencies. The I-4 F1 satellite was the first in the world to be launched carrying a transponder capable of broadcasting SBAS signals at both GPS L1 and L5 frequencies.

"Being part of this innovative research project is testament to our important heritage on satellite navigation matters," said Claudio Soddu, Inmarsat VP for Navigation and Special Projects.

"A second-generation SBAS testbed is a natural continuation of the concept of augmenting satellite navigation systems with a separate satellite data and ranging channel that we helped pioneer.

"Having previously been involved in testbeds and operational systems in other regions of the world, this collaboration showcases our capabilities in the Asia–Pacific region and potentially opens the door to further research and development projects in the future."

"Many industries rely on GNSS signals for accurate, safe navigation. Users must be confident in the position solutions calculated by GNSS receivers," said Lockheed Martin Australia and New Zealand Chief Executive Vince Di Pietro.

"The term 'integrity' defines the confidence in the position solutions provided by GNSS. Industries where safety-of-life navigation is crucial want assured GNSS integrity."

Ultimately, the second-generation SBAS testbed will broaden understanding of how this technology can benefit safety, productivity, efficiency and innovation in Australia's industrial and research sectors.

"We are excited to have an opportunity to work with Geoscience Australia and Australian industry to demonstrate the best possible GNSS performance and proud that Australia will be leading the way to enhance space-based navigation and industry safety," added Di Pietro.

Basic GNSS signals are accurate enough for many civil positioning, navigation and timing users. However, these signals require augmentation to meet higher safety-of-life navigation requirements. The second-generation SBAS will mitigate that issue.

Once the SBAS testbed is operational, basic GNSS signals will be monitored by widely distributed reference stations operated by Geoscience Australia. An SBAS testbed master station, installed by GMV, of Spain, will collect that reference station data, compute corrections and integrity bounds for each GNSS satellite signal, and generate augmentation messages.

"A Lockheed Martin uplink antenna at Uralla, New South Wales, will send these augmentation messages to an SBAS payload hosted aboard a geostationary Earth orbit satellite, owned by Inmarsat," said Rod Drury, director, International Strategy and Business Development for Lockheed Martin Space Systems Company.

"This satellite rebroadcasts the augmentation messages containing corrections and integrity data to the end users. The whole process takes less than six seconds."

By augmenting signals from multiple GNSS constellations — both Galileo and GPS — second-generation SBAS is not dependent on just one GNSS. It will also use signals on two frequencies — the L1 and L5 GPS signals, and their companion E1 and E5a Galileo signals — to provide integrity data and enhanced accuracy for industries that need it the most.

Lockheed Martin will provide systems integration expertise in addition to the Uralla radiofrequency uplink. GMV-Spain will provide its 'magicGNSS' processors.

Lockheed Martin has significant experience with space-based navigation systems. The company developed and produced 20 GPS IIR and IIR-M satellites. It also maintains the GPS Architecture Evolution Plan ground control system, which operates the entire 31-satellite constellation.

Radio interfaces

Zetron Pathway+ radio interfaces allow communication and control with legacy radios, via 4-wire analog, Motorola Quantar base station though the v.24 interface or modern DFSI enable radio devices.

The product acts as a DFSI proxy providing arbitration and control of a radio and the multiple console systems, sharing a single resource. It directs appropriate messages and handles message conflicts, overcoming the point-to-point limitations of the DFSI protocol and allowing it to act as a multipoint communication device.

The product is suitable for applications that may include system migration, disaster recovery, backup centre operation and multi-agency control, while maintaining use of legacy fixed stations. This allows the same base station resource to be accessed by multiple agencies or jurisdictions. Transmissions made from any one of the console systems are passed to the connected fixed station interface and onto any other connected console system or controller.

When connected to P25 radio systems, the product supports packet data transmissions, allowing features such as key management to be implemented.

Product features include support for communication and control of P25 DFSI base stations, analog 4-wire E&M radios and Motorola V.24 Quantar base stations and infrastructure; connections between modern IP command and control faculties and legacy radio infrastructure; uses the TIA P25 digital fixed station interface protocol standard, as well as providing connection and arbitration of up to four DFSI console systems, and shared connections with two radio channels; and an easy-to-use local or remote web-based configuration.

Zetron Australasia

www.zetron.com

Fuel cell generator

The EFOY Pro 12000 Duo fuel cell generator can provide back-up power for remote, weather-affected telecommunications sites. Suitable for New Zealand service providers in the upcoming winter months, the product can provide a reliable alternative to increased site battery capacity, larger solar arrays or diesel generators.

Designed for the telecommunications market, the 19″ rack mount EFOY Pro 12000 Duo is a 24 V/48 V DC 500 W direct methanol fuel cell (DMFC) that provides 100% reliable off-grid and backup power.

The fuel cell generator is a smart energy producer that can be used to continuously and automatically recharge a site's battery bank. To do this, the fuel cell is connected directly to the site's batteries that provide the load, while continually monitoring the batteries' state of charge. The fuel cell recharges the battery automatically and then switches to standby, without the need for maintenance or user intervention.

Very long periods of site autonomy are achievable by pairing multiple M28 (28 L) methanol fuel cartridges or the MT60 (60 L) methanol cartridge.

With an operating temperature range of -20 to +50°C, the product is able to meet the environmental challenges faced by remote telecommunications sites across New Zealand.

Powerbox Pacific Ltd
www.powerbox.co.nz

Steel monopoles

International Telco Poles' steel monopoles are designed for the communications market. The standard range starts from 15 to 45 m above ground level. Poles can be direct buried or base plate mounted with anchor bolts and templates.

Non-standard designs are available to suit site specification, taking into consideration the type and quantity of antennas and specific wind regions in Australia and New Zealand.

All poles are tapered and sections are assembled via slip fit method. Poles are manufactured to the highest quality standard using ASTM 450 MPa steel with low silicon content to produce a uniform hot dip galvanised finish.

Additional attachments to the poles are also available, including head frames, antenna mounts and climbing systems.

International Telco Poles
www.ipoles.com.au/

TETRA digital radio system

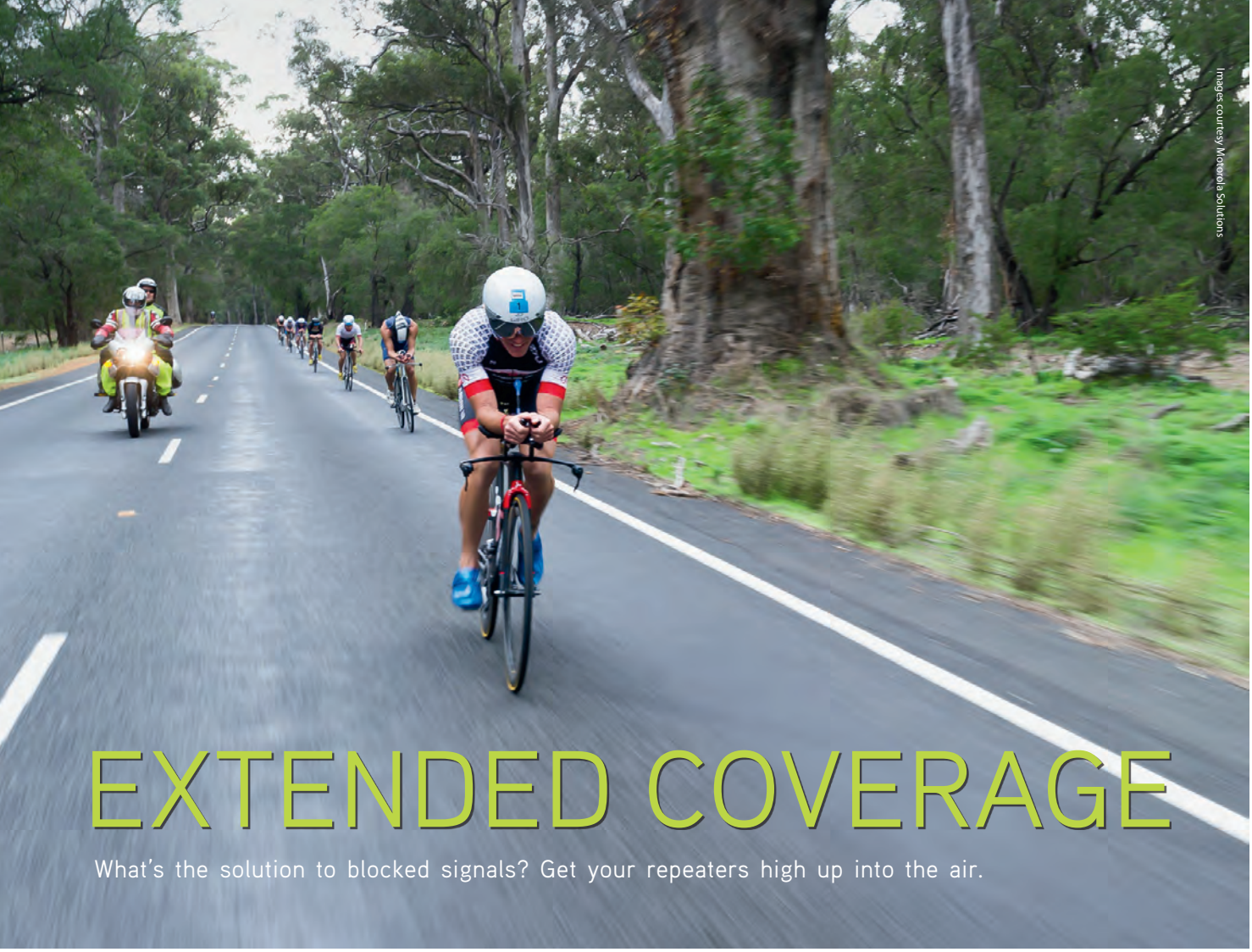
The Motorola Solutions DIMETRA Express expandable single-site TETRA digital radio system can be deployed within 15 min.

The 'one-box' system integrates base radios and a switch, and is suitable for smaller organisations from sectors such as manufacturing, public transport, hospitality, events and oil and gas.

The product is a fully integrated TETRA system and provides all the voice, short data services (SDS) and telephony services users require in a small physical footprint. The system is both lightweight and energy efficient, allowing quick, easy deployment and cost-effective communications. It can be set up and configured by a Windows or Android laptop or tablet. The system is then managed and operated through intuitive web-based applications and tools.

It also requires just a single IP address reducing set-up and ongoing maintenance costs and making it easier to integrate into the user's IT network.

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



Images courtesy Motorola Solutions

EXTENDED COVERAGE

What's the solution to blocked signals? Get your repeaters high up into the air.

The Ironman 70.3 Busselton is a long-distance triathlon race held annually in Busselton, Western Australia. As one of the flattest courses in the global Ironman circuit, the site is renowned worldwide for its capacity for athletes to achieve personal bests.

Being such a high-profile event, it is imperative that organisers provide the best possible communications in order for the race to proceed safely and without any hitches.

Motorola Rental Solutions has been a longstanding partner of the Ironman 70.3, and has provided digital communications solutions for various events. The solution for the most recent race, however, turned out to be more than a simple matter of supplying equipment.

One of the event's courses covers at least 50 km, including the swim, bike and run legs. The bike leg takes athletes 30 km out of Busselton, through Tuart Forest National Park. The tuart (eucalyptus) forest is so incredibly dense that radio signals cannot penetrate adequately through the area.

Nevertheless, coverage is "paramount" for the safety of all participants and staff, so a solution had to be found, said Paul Groeneveld, operations manager for the event.

"We needed to make sure coverage extended over the whole course, even where the densely forested tuart area affected coverage … so Motorola Rental Solutions came up with the solution — an elevated work platform (EWP)," he said.

The EWP is almost 40 m high and is designed to extend above the trees, providing a radio footprint larger than necessary and delivering a greater coverage span. The platform has two repeaters operating in Capacity Plus mode, supplying a scalable, single-site, digital trunking solution. Capacity Plus expands the capacity of a MOTOTRBO communication system — more than 1000 users can quickly and efficiently share critical voice and data communication on the same system without having to add new frequencies.

Other equipment provided by Motorola Rental Solutions included MOTOTRBO digital mobile and portable radios, which were used by the events operation centre, traffic management teams, marshals and medical staff. All parties involved could easily and quickly contact each other, especially in case of an incident. Having such reliable coverage and effective communication has thus improved safety for athletes, staff and volunteers.

Airborne airwaves

Another challenge was solved by Motorola Rental Solutions when two events ran back-to-back two years ago. The Ironman 70.3 preceded the second event, Wings for Life; therefore, much of the existing infrastructure could be re-used. However, the Wings for Life course extended even further into the densely forested area, where coverage was still unreliable and unattainable even with an EWP.

"Our Rentals architect came up with the idea of utilising two planes, which worked perfectly," said Groeneveld.

Motorola Rental Solutions partnered with Blacktree Technology to install and commission one Capacity Plus repeater in each aircraft. One aircraft could stay in the air for four hours before running low on fuel, so just prior to that point being reached, the second aircraft launched and flew nearby. The repeater in the first aircraft was switched off while simultaneously the repeater in the second aircraft was switched on. This innovative approach achieved a seamless changeover and ensured continual coverage.

For an event with such long duty times, solid battery life is essential. "At most events we can use a radio for the whole day

> THE EWP IS ALMOST 40 METRES HIGH, AND IS DESIGNED TO PROVIDE A RADIO FOOTPRINT LARGER THAN NECESSARY AND DELIVERING A GREATER COVERAGE SPAN.

with one battery — especially important for those on the road who don't have the opportunity to switch over. I am very confident that the batteries will last for a day," said Groeneveld.

Another useful feature is transmission interrupt, whereby an operator in the operations centre can remotely de-key a radio in order to take a priority call. This ensures the event operator can always communicate with those whose radios who are on the same talk group.

"We have worked with Motorola Rental Solutions for a long time, which is testament to the team and their work," said Groeneveld. "Their customer service is second to none, and I am looking forward to continuing to work with them."

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

The elevated work platform (EWP) used during the Ironman 70.3 Busselton event.

CHINA'S PDT NETWORK ROLLS OUT

Johnny Jian, Marketing Manager, Overseas Marketing, Hytera

Networks based on China's indigenously developed Police Digital Trunking standard are being deployed across the country.

The history of China Police's mission-critical communications dates back to the 1990s. Back then, the agency trialled various technologies including conventional analog, MPT1327 analog trunking and TETRA, in an attempt to set up a nationwide standard across different provinces and cities using the police force's proprietary 350 MHz frequency range. However, after 20 years of trials and practice, the overall development of the 350 MHz communication network was not even and uniform. MPT1327 had been adopted by majority county-level cities as a mainstream technology, while TETRA had been adopted by a number of province-level municipalities, provincial capitals and developed coastal cities. In addition, an IP-based analog trunking system was used by a few provinces as an experiment.

During those years, analog trunking played a major role and greatly enhanced the capability of China Police's mission-critical communications. But with drawbacks such as the low efficiency of spectrum usage, low capacity, inadequate functionality and weak encryption, the development of analog trunking was very limited and finally abandoned. On the other hand, Euro-American developed countries had begun to upgrade their technology from analog to digital trunking. TETRA attracted extensive attention from a number of cities in China and since 2006 was successfully brought in by Beijing, Shanghai, Shenzhen and Jinan. Compared with analog trunking, TETRA has a series of excellent features such as high-quality clear voice, high efficiency of spectrum usage and fast data transmission. This advanced digital trunking technology was put to good use by security agencies during the 2008 Beijing Olympics and 2010 Shanghai World Expo.

Nevertheless, TETRA was still not a perfect option for China's police. TETRA began in Europe, where the population density, especially in the cities, is much higher, producing high traffic within comparatively small regions. In China, the majority of population is scattered over vast regions... where radio coverage must be wide but where traffic is expected to be much lower than in big cities such as Beijing and Shanghai. To have a nationwide network, China's police wanted to have much wider coverage but with the same amount of investment. A self-developed encryption algorithm was also a major consideration. TETRA was terminated as an official digital trunking standard for China Police in May 2014. However, TETRA is vibrant in mass transit rail, ports and airports in China.

The birth of PDT

The Information and Telecommunication Bureau of the Chinese Ministry of Public Security (ITBMPS) made the decision to undertake research with the aim of developing a Chinese-owned trunking standard. "The actual conditions in China are different from other countries. Neither analog trunking nor TETRA is the answer to the national standard for China Police. It is the only and inevitable option for us to develop our own digital trunking standard," said an ex-chief official of ITBMPS.

In April 2008, ITBMPS initiated research into a Police Digital Trunking (PDT) standard. In August 2008, the Chinese Police Wireless Telecom Technology Specialist Panel was established and called for a meeting with Chinese manufacturers to formulate the standard. At this meeting, Shenzhen-based Hytera, one of the top five global PMR enterprises at that time, was designated as the leader of the group to drive the entire development.

In October 2011, ITBMPS released the trial version of the General Specification of the PDT standard to kick off the testing. In 2013, ITBMPS released the final version of the General Specification and certified the planning for construction of a nationwide PDT network. At this point, the first Chinese digital trunking standard with independent intellectual property rights came into reality. Development is led by the PDT Association, which has a membership comprising both Chinese and international entities.

The PDT Standard meets the specific needs of China's public safety sector and seamlessly interfaces with the current police geographic information system (GIS) dispatching platform. In addition, it is intended to provide features such as wide coverage, flexible networking, efficient dispatching, high-quality voice and data transmission, and secure encryption. "The invention of PDT will greatly improve the development pace and strength of the Chinese police telecom industry. It will also provide a solution that is more suitable for Chinese police operation," the official added.

In fact, the whole concept is forward-looking. "The PDT standard is compatible with international standards. This could help Chinese PMR enterprises explore international markets and attract foreign PMR enterprises to join the PDT competition in China market, which would be beneficial in bringing down the manufacturing costs and improving product performance as well as elevating product competitiveness," said Yelin Jiang, vice president of Hytera.

> THE INVENTION OF PDT WILL GREATLY IMPROVE THE DEVELOPMENT PACE AND STRENGTH OF THE CHINESE POLICE TELECOM INDUSTRY.

Implementation

As the leader of the PDT Standard development master group, Hytera has achieved a number of important milestones, such as: the first PDT application for China Police (for the Shenzhen Immigration Inspection Station); the first PDT application for a provincial capital (Harbin Traffic Police); the first multiple city connection (Xinjiang Province); and the first application for a province-level municipality (Chongqing City).

According to figures from the PDT Association, as of November 2016, 30 provinces, cities and municipalities had begun construction of PDT networks. More than 280 PDT systems and 6000 sets of PDT base stations, as well as 400,000 PDT terminal units, have been deployed by China Police. According to forecasts, the total value of PDT network construction in China will be between US$2–3 billion, with construction to peak during 2017–19. And even as that rollout takes place, the PDT Association has begun formulating the next-generation broadband trunking standard for China Police.

Hytera Communications Co. Ltd
www.hytera.com.au

Images courtesy Hytera.

SATELLITE TAXES REDUCED

Jonathan Nally

Image courtesy NBN.

The ACMA has agreed to reduce Ka band satellite licence taxes by between 30% and 100% in response to industry calls.

The ACMA has announced reduced taxes for a variety of satellite communications licences, following a review in which it received submissions from the communications industry.

The review concentrated on the Ka band (which the ACMA took to be 17.3–51.4 GHz), although some other non-Ka band services were also considered.

According to the ACMA, "Given the evidence that current taxes are high compared with international standards, the band is currently underutilised, and tax reductions are likely to encourage more efficient use of the spectrum, the ACMA has decided to implement the tax reductions proposed in the consultation paper for satellite services in the 17.3–51.4 GHz frequency range."

Those reductions are:

- 30% tax reductions for Australia-wide and high density area (HDA) licences.
- 50% tax reductions for medium density area (MDA) and low density area (LDA) licences.
- 100% tax reductions for remote density area (RDA) licences so that licensees are subject to the minimum annual tax in these areas.

In its report, the ACMA said that submissions "generally supported these tax reductions, but argued for larger reductions for licences in HDAs and Australia-wide licences".

The regulator also noted that "the level of tax reduction balances the need to promote more satellite investment in Australia in these high frequency bands, while managing the risk of spectrum congestion occurring in the near future".

"Due to these reasons, the ACMA has decided not to proceed with larger tax reductions suggested by some submitters.

It added that parts of this spectrum range "are being considered for 5G services by the International Telecommunication Union (ITU), and so the ACMA believes that more moderate tax reductions are prudent at this time as it assesses any relationships between 5G spectrum demand and satellite services in the Ka band".

Responding to the announcement, the Communications Alliance said that it "welcomes the new tax arrangements for satellite apparatus licences... a move that industry agrees should encourage more efficient use of spectrum and encourage greater investment in the satellite sector in Australia".

In a statement, the Alliance said that the announcement "comes more than three years after the Satellite Services Working Group (SSWG) within Communications Alliance began discussions with the regulator for a review of satellite spectrum pricing methodologies — particularly in the Ka frequency band".

"The SSWG had identified that some satellite spectrum prices in effect in Australia were high in comparison with international standards — a finding that was endorsed by the ACMA review — and that this was hampering investment in the sector in Australia."

"The ACMA has acknowledged that making Australia's pricing structure more aligned with international norms should mean that Australia can derive greater value from the space sector, which already contributes more than $4 billion per annum to Australia's GDP," said SSWG Chair and Communications Alliance CEO John Stanton.

The SSWG represents more than 15 different satellite-related operators active in Australia.

"[The] announcement — although a long time coming — is a welcome recognition that industry and regulators can work together to achieve rational and nationally beneficial economic outcomes," Stanton said.

Field radiation monitor

The Narda RadMan Personal RF field radiation monitor provides safe and timely warning of electromagnetic fields directly threatening humans in their presence. It is available for rent at TechRentals.

As 50% of the maximum permissible exposure limit is exceeded, a warning buzzer sounds.

For noisy environments, earphones are included. As an added feature, the monitor also has LEDs displaying field strength measurements of approximately 12.5, 25, 50 and 100%.

Features include wide frequency monitoring from 1 MHz to 40 GHz; shaped frequency response matched to national and international standards; simultaneous E and H field monitoring for near field use; and detachable absorber cap to provide isotropic response for simple measurement tasks and leak detection.

TechRentals

www.techrentals.com.au

Test receiver

The AFJ Instruments FFT3010 test receiver is a compact receiver designed and manufactured compliant to CISPR 16 International Standard. The product uses an FFT scan mode for fast measurements of conducted electromagnetic interference in accordance with the requirements of international, European and product EMI standards. The receiver incorporates pre-selectors and advanced software for EMC testing.

Based on a PC integrated architecture with WINDOWS 7 embedded OS, the product is ready to operate with software for EMC testing. It is fitted with pre-selectors that allow good dynamic range and precise conducted emission measurements covering the frequency range from 9 kHz to 30 MHz. Remote control with an external PC is also possible.

The response of the product quasi-peak detector in terms of both absolute calibration and relative calibration falls within the tolerances of CISPR 16-1-1. The pulse weighting conformity is compliant down to the minimum value of the pulse repetition frequency (PRF) coming from the DUT of 1 Hz. The scan mode is compliant to CISPR 16-3.

EMC and RF Solutions

www.emcrf.com.au

Handheld cable and antenna analyser

The Rohde & Schwarz Cable Rider ZPH handheld cable and antenna analyser enables network operators and service providers to perform one-port measurements quickly and correctly the first time.

With its fast measurement speed, intuitive operation and long battery life, it is suitable for use in the field.

The product helps infrastructure manufacturers and network operators efficiently install and maintain the steadily increasing number of mobile communications antenna systems. It has a measurement speed of 0.3 ms per data point.

The analyser allows users to start taking fast measurements just over a minute after switching on. There is no requirement for calibration due to temperature and frequency changes, which saves time.

Another time-saving feature is the use of the wizard function that guides users through measurements in easy-to-follow steps. All settings and measurement steps can be preconfigured. Field technicians only need to execute the test sequences as shown on the display. The wizard helps inexperienced field technicians to avoid operating mistakes when performing antenna and cable measurements. Since there is no need to change settings manually for different measurements, the analyser reduces test time during installation and maintenance.

The product is suitable for use in the field. Due to its light weight of only 2.5 kg and a battery life of 9 h, users can handle a full day's work without interruption. Users will not be delayed due to the battery running down in the middle of a measurement.

The analyser has a large colour touchscreen with familiar smartphone-like operation. It can also be operated via the extra-large, widely spaced keys that allow easy handling even when the user wears heavy-duty work gloves.

The product's base unit covers a frequency range from 2 MHz to 3 GHz. Extending the frequency range to 4 GHz is straightforward with the ZPH-B4 option, which is enabled via a key code.

Rohde & Schwarz (Australia) Pty Ltd

www.rohde-schwarz.com.au

Waveform generator

The RIGOL DG1022Z waveform generator enables makers, educators and IoT designers working with both electrical and RF applications to build long complex arbitrary waves, generate 8th order harmonics, create advanced modulations and inject random noise.

The product has 25 MHz max sine wave and square wave frequency, two full function independent channels, long Arb memory length, and 160+ built-in waveforms.

Features include 25 MHz sine/25 MHz square; 2 full function independent channels; 8 order harmonic generator, AM, FM, PM, ASK, FSK, PSK and PWM modulation; 2 Mpts standard memory (16 M optional); SiFi sampling technology for improved signal fidelity; built-in 7-digit counter; and +160 standard waveforms.

Emona Instruments Pty Ltd

www.emona.com.au

Digital radio

The Hytera PD982 digital radio has noise-cancellation technology, full duplex calls, recording capability via Micro SD, Bluetooth 4.0 for audio or data and single frequency repeater mode to increase coverage.

The product enables frontline personnel to make telephone calls between other PD98X and telephones or mobile phones.

Based on interference cancellation technology, the radio is able to use one slot to receive a signal and another slot to transmit it in the same frequency using DMO mode to extend the communication distance.

With integrated Bluetooth 4.0, the radio not only supports audio transmit, but also allows programming via Bluetooth.

Maximum 2.5 W output speaker and new noise-cancelling technology ensure clear and loud voice communication.

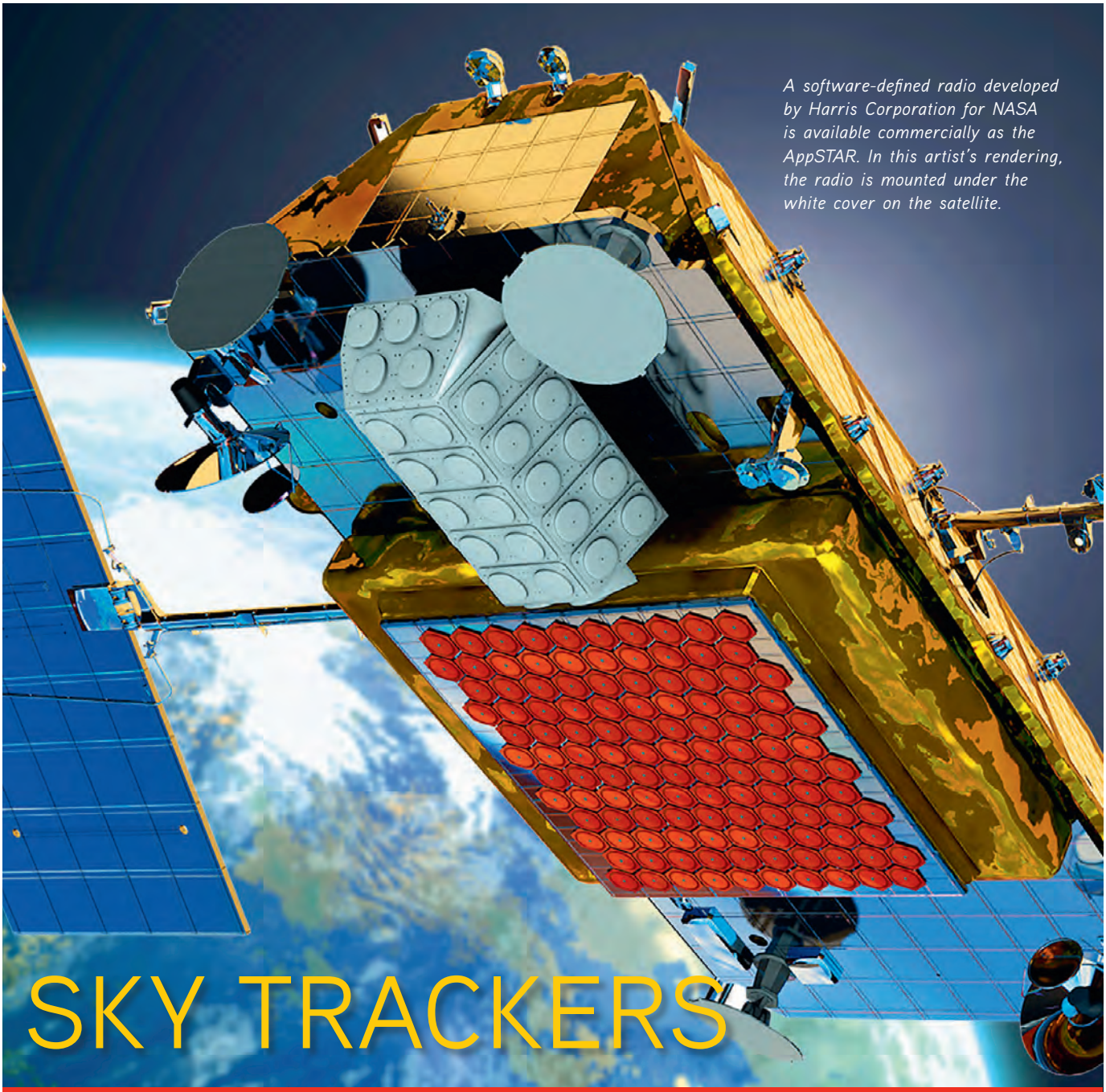
The product complies with the highest dust and waterproof standards to operate in the harshest of environments. The radio continues to function after submersion down to 2 m for up to 4 h.

The smart battery feature makes it easier to monitor the battery status, such as battery life time and charging time, therefore reducing charging time dramatically.

The product supports up to a 32 GB Micro SD card, to record up to 576 h in digital or analog audio.

Hytera Communications Co. Ltd

www.hytera.com.au



A software-defined radio developed by Harris Corporation for NASA is available commercially as the AppSTAR. In this artist's rendering, the radio is mounted under the white cover on the satellite.

SKY TRACKERS

No aircraft will ever have to be off the grid, thanks in part to a software-defined radio developed for NASA.

NASA's powerful radiocommunications network can receive pictures of cryovolcanoes on Pluto or tweets from astronauts aboard the International Space Station. But to send larger quantities of data back and forth faster, NASA engineers wanted higher-frequency radios that can be reprogrammed from a distance using software updates.

"A reconfigurable radio lets engineers change how the radio works throughout the life of [any space mission]," said Thomas Kacpura, advanced communications program manager at NASA's Glenn Research Center. "It can also be upgraded to work better with future missions or to enhance performance, just by adding new software."

In the past, Kacpura said, engineers were reluctant to build reconfigurable devices for space, because it's harder to guarantee performance — after all, how do you test for functions you don't even know you'll be using?

However, NASA has recently been allotting more resources to reconfigurable devices, and the agency worked with Harris Corporation to design and develop a new software-defined, higher-bandwidth radio.

The radio has been put through its paces through exhaustive testing both on the ground and in space and, in 2013, it was honoured with an R&D 100 Award as one of the year's 100 most significant innovations.

The biggest selling point of the device, which Harris markets as the AppSTAR, turned out to be its flexibility. With hardware and software both fully reconfigurable, the company could quickly and cheaply redesign the radio to fit any customer's needs.

One of the biggest contracts so far is with Aireon LLC, a joint venture that will use the radios to create the first space-based global air traffic control system.

Reliance on land-based radar stations is set to change when a constellation of 66 satellites, owned by Iridium Communications, goes into orbit equipped with AppSTAR radios. The radios are programmed to receive signals from aircraft ADS-B transceivers, which automatically send out a flight's number, location, heading and other details.

"Within seconds you can keep track of all the aircraft in the world," said Harris systems engineer Jeff Anderson. Aireon has already signed contracts with a number of air traffic control agencies to

integrate the space-based system into their flight tracking when the system goes live in 2018. Nav Canada, a founding partner in Aireon, was one of the first.

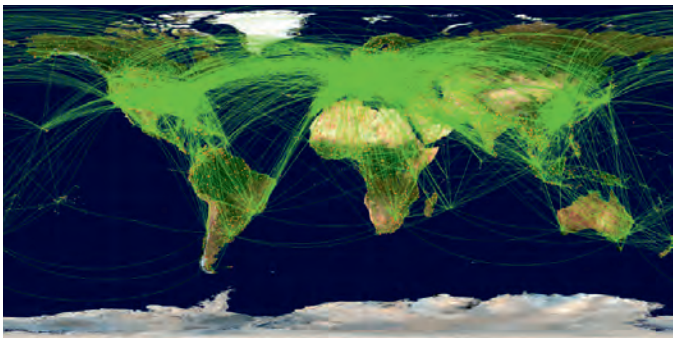
With real-time global tracking, aircraft can fly with less space between them and take more direct routes. "It tremendously improves public safety and potentially saves a lot of fuel costs, because you no longer have to remain in the particular airline traffic lanes," Anderson said.

And if something does go wrong, search and rescue teams will have detailed information on where the aircraft was last spotted through a free service called Aireon ALERT.

Using an extra card slot on the radio, Harris was also able to add global tracking for ships, which the company markets as exactAIS RealTime, powered by Harris with its partner exactEarth.

AppSTAR features include:

- a Space Telecommunications Radio System (STRS)-compatible software operating environment that promotes waveform and application portability and re-use;
- third-party programmability that provides flexibility for customers to develop and maintain platform mission applications with a mission developer's kit;
- third-party development resources that include a mission developer's kit, a remote developer system and a multimission test bed;
- a remote developer system that provides third-party developers with secure network access to the fully instrumented AppSTAR multimission test bed;
- standard processing engines, such as FPGAs, DSPs and power PC CPUs, which enable use of standard development tools and libraries;
- compact PCI and VPX standards-based hardware that support re-use; and
- a configurable portfolio of space-proven digital, RF and power supply reference designs that optimise responsiveness.



With Aireon flight tracking, powered by the AppSTAR radio, air traffic control agencies will be able to see in real time the location and heading of every aircraft.

Because AppSTAR software can be reconfigured remotely, both the Aireon and exactAIS systems can be updated well after launch. And it all started with the same box, processor and power supply cards as the NASA radio.

Information courtesy NASA and Harris Corporation. Images courtesy Iridium Communications, Harris Corporation and Jpatokal (Wikipedia/CC BY-SA 3.0).

TDRS-M undergoes vibration testing. Note the furled main antenna.

Engineers deploy TDRS-M's antennas during a routine test at Boeing's plant in El Segundo, California.

SATELLITE NETWORK

Ashley Hume, NASA/Goddard Space Flight Center

NASA's TDRS-M satellite will give the agency the ability to support space communications for 15 more years.

The Tracking and Data Relay Satellite (TDRS) project has begun final testing on a new satellite that will replenish NASA's Space Network. The spacecraft is scheduled to launch from NASA's Kennedy Space Center in Cape Canaveral, Florida, on 3 August 2017 on an Atlas V rocket.

The addition of TDRS-M to the fleet will provide the Space Network with the ability to support space communications for an additional 15 years.

The TDRS satellites transmit data to and from ground stations for NASA missions and expendable launch vehicles.

Without the Space Network, scientists, engineers and mission control staff would be unable to readily access data from missions like the Hubble Space Telescope and the International Space Station.

"The Space Network is critical to numerous NASA missions that are fundamentally changing the way we think about science," said Bill Marinelli, TDRS development manager with the Space Communications and Navigation (SCaN) program office at NASA Headquarters, which provides programmatic oversight to the TDRS mission.

"By expanding the fleet of satellites that support communications from these missions, TDRS-M will enable NASA to continue scientific exploration and discovery for years to come."

Designed, built and environmentally tested at Boeing's satellite development centre in El Segundo, California, the spacecraft is currently undergoing a final series of tests to ensure it is flight-ready.

TDRS-M will continue to undergo electronics, compatibility and deployment tests throughout autumn as the team prepares to ship the spacecraft to Kennedy Space Center for its launch.

NASA developed the idea for the Space Network in the 1970s to improve upon the ground-based space communications networks the agency had used since its inception.

Those ground stations could only connect with spacecraft for short periods of time while they were in sight of the ground terminal.

In coming months, engineers will test TDRS-M to ensure it connects with the Space Network's various ground stations.

NASA built the initial White Sands Ground Terminal (WSGT) in Las Cruces, New Mexico, in the 1970s and launched the first TDRS in 1983. In the 1980s, NASA identified the need for and built the Second TDRS Ground Terminal (STGT) at White Sands, forming the White Sands Complex.

Today the network has added two more ground terminals in Guam and Blossom Point, Maryland, and currently has nine TDRS in orbit around Earth. Two of the original spacecraft have now been retired.

The two most recent satellites, TDRS-K and TDRS-L, were launched from Kennedy Space Center to replenish the fleet in January 2013 and January 2014, respectively. After the scheduled TDRS-M launch later this year, the TDRS project will have successfully launched 12 satellites in support of the Space Network.

Information and images courtesy NASA and Boeing

COMMS 2017 CONNECT

Events for critical communications users and industry

Important dates for your diary ...

Sydney
7-8 June 2017
Sydney Showground

Melbourne
21-23 November 2017
Melbourne Convention and Exhibition Centre

Comms Connect WELLINGTON

11-12 April — Te Papa Museum

In association with the *Radio Frequency Users Association of New Zealand* (RFUANZ), Comms Connect Wellington, a two-day conference and exhibition, returns to Te Papa Museum on 11-12 April, 2017.

A series of case studies, technical presentations and workshops are supported by an extensive exhibition of local and international suppliers and manufacturers. Day one sees networking drinks on the exhibition floor followed by the very popular annual RFUANZ Gala dinner and awards night.

By registering to attend this year's conference and exhibition in Wellington, you'll hear what the experts have to say, advance your understanding of critical communications and the land mobile unique industry event — do not miss this once-a-year opportunity!

Registration Open — visit www.comms-connect.co.nz to register or for more information.

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In conjunction with the RFUANZ Gala Dinner and Awards Night
11April – Te Papa Museum, Wellington

Book your tickets with your conference package or visit www.rfuanz.org.nz

For further information regarding speaking or sponsorship at Comms Connect events in 2017 please

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FASTER WIRELESS

Terahertz wireless could make spaceborne satellite communications as fast as fibre-optic links.

Researchers at Hiroshima University, Japan's National Institute of Information and Communications Technology and Panasonic has announced the development of a terahertz (THz) transmitter capable of transmitting digital data at a rate exceeding 100 gigabits per second over a single channel in the 300 GHz band.

This technology enables data rates 10 or more times faster than those that will offered by 5G networks; the latter is expected to appear around 2020.

Details of the technology were presented at the International Solid-State Circuits Conference (ISSCC) 2017, held in San Francisco in February.

The THz band is a new and vast-frequency resource expected to be used for future ultrahigh-speed wireless communications.

The research group has developed a transmitter that achieves a communication speed of 105 Gbps using the frequency range from 290 GHz to 315 GHz.

This range of frequencies is currently unallocated but falls within the frequency range from 275 GHz to 450 GHz, the usage of which is to be discussed at the World Radiocommunication Conference (WRC) 2019 under the International Telecommunication Union Radiocommunication Section (ITU-R).

Last year, the researchers demonstrated that the speed of a wireless link in the 300 GHz band could be greatly enhanced by using quadrature amplitude modulation (QAM).

This year, they showed data rates six times higher per channel, exceeding 100 Gbps for the first time with an integrated circuit-based transmitter.

At this data rate, the whole content of a DVD could be transferred in a fraction of a second.

"This year, we developed a transmitter with 10 times higher transmission power than the previous version's. This made the per-channel data rate above 100 Gbps at 300 GHz possible," said Professor Minoru Fujishima, Graduate School of Advanced Sciences of Matter, Hiroshima University.

"We usually talk about wireless data rates in megabits per second or gigabits per second," said Professor Fujishima. "But we are now approaching terabits per second using a plain, simple, single communication channel."

Although fibre-optic technology has already achieved ultrahigh-speed wired links, wireless links have been left far behind.

Terahertz could offer ultrahigh-speed links to satellites as well, which could in turn significantly boost inflight network connection speeds, for example.

Other possible applications include fast download from content servers to mobile devices and ultrafast wireless links between base stations.

"Another completely new possibility offered by terahertz wireless is high-data-rate, minimum-latency communications," said Professor Fujishima.

Optical fibres are made of glass, which slows down the speed of light. This makes fibre optics inadequate for applications requiring real-time responses.

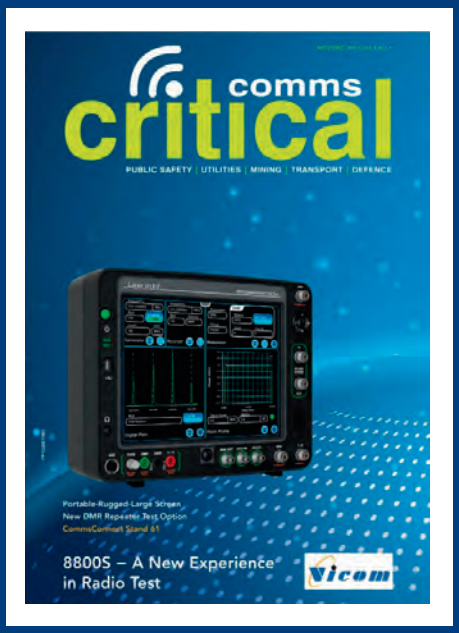
"Today, you must make a choice between 'high data rate' (fibre optics) and 'minimum latency' (microwave links). You can't have both," said Professor Fujishima.

"But with terahertz wireless, we could have light-speed, minimum-latency links supporting fibre-optic data rates."

The research group plans to further develop 300 GHz ultrahigh-speed wireless circuits.

FREE

to industry and business professionals



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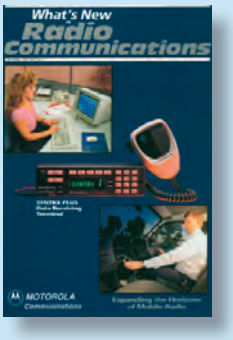
Backhaul

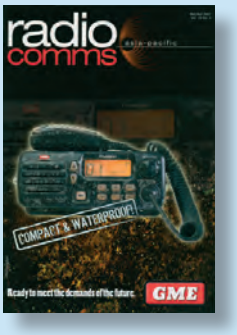
Backhaul takes you on a trip down memory lane as we look at what was happening in the comms field of yesteryear.

25 YEARS AGO. The cover of the April/May 1992 issue of *What's New in Radio Communications* featured the Motorola Syntrx Data Receiving Terminal, fully designed in Australia for use with the 50,000-plus Syntrx units then in service.



The DRT had an 8-character alphanumeric display and could store 400 characters of text and 20 numbers in its telephone directory. Inside this issue, Dean Brookes, the then product manager for Nokia Telecommunications, gave an outline of the MPT1327 trunking system; and David Cooke, the then national sales and marketing manager for Radio Frequency Systems, outlined the company's newly developed bandplan trunking receive preselector technology. We also reported on Motorola Australia being awarded ISO 9001 (AS 3901) status, with the then Victorian premier, Joan Kirner, presenting the certificate of registration to the company's then MD, Chris Barter. OTC was working on a scrambler to improve privacy for Seaphone calls, and Qantas was set to become one of the first airlines to introduce telephones for passengers on international flights.

10 YEARS AGO. The cover of the March/April 2007 issue of *Radio Comms Asia-Pacific* featured the GME TX4800, 25 W VHR waterproof commercial radio; at just 70 mm deep, it was claimed to be one of the smallest such radios in Australia. The 124-channel units covered a frequency range from 148 to 1784 MHz. Also in this issue: Radio Frequency Systems' Stéphane Klajzyngiers opined about privacy and security in an increasingly virtual world; we published a case study on the introduction of Zetron's Acom dispatch solution at Sydney Airport; we covered the move towards multiband antennas and IP over radio; and we also covered the 2007 industry dinner, at which ARCIA was launched. Ben Czerniewicz (Polar Electronics) was presented with the Jonathan Livingston Award, Steve Reining (JRD) received the Technical Excellence Award and Ross Terranova (Crosscom) was given the Sales Professional Award.



Spectrum

It's time to rethink the UK's ESN

A growing number of experts have been watching with horror as the UK Government, led by HM Treasury, Cabinet Office and Home Office, has attempted to deliver a next-generation communications network for public safety and emergency services personnel.

At times it has been painful — at other times, almost comical — to listen to the arguments justifying the radical course that has been taken: to switch off the existing, highly reliable, trusted and dependable Airwave TETRA solution and jump straight to an unproven, pre-standards, commercial solution shared with the public and not reaching the same geographical coverage as its predecessor.

To many of us, therefore, it has been a scandal that it took an NAO report in September 2016 and then a parliamentary inquiry in November 2016 to bring to light the serious shortcomings of the Emergency Services Network (ESN)/Emergency Services Mobile Communications Programme (ESMCP) process and to open up the possibility of the government at least considering an alternate, more sensible approach.

The conclusions and recommendations from November's parliamentary inquiry have just been published: ESN will not be ready by its original target date; no budget or detailed contingency plans exist for a protracted transition period; it is based on unproven technology; no serious competition existed for two main contracts; incumbents will have a clear advantage when the ESN is re-competed.

The UK Government made a brave attempt around five years ago to drive forward a radical new vision that would place the most advanced, powerful mobile broadband technology in the hands of emergency services for the next decade and beyond. It is clear that this vision is no longer viable. So what should be done?

Processes need to be updated to make it harder for procurement teams to hide behind the blanket use/abuse of NDAs, hidden or false assumptions/biases, abuses of power and so on, and force them to engage more openly with those directly affected by their decisions. The current secrecy surrounding ESN is ridiculous, totally unnecessary and damaging to the whole process.

The mission-critical voice component must be separated from the mobile high-speed data/video component. One day, these two complementary services may be combined in a single solution, but this was never going to happen by the end of 2019.

The existing TETRA solution needs to be maintained, renewed and fully funded through at least 2025. The sooner this is accepted, the better the deal the UK Government will be able to get. This also will allow users to undertake one more complete refresh of TETRA or TETRA+LTE terminals without fear of obsolescence.

Most police forces and many other emergency services agencies already have existing contracts in place for separate mobile broadband service from network operators, which could also be renewed for a similar period.

Over the coming years, emergency services would be able to continue to test out the new fully standardised, mission-critical functions as they become available, gradually building up capabilities and resilience before declaring them mission critical at some stage during the 2020s. And by the mid-2020s, spectrum should also be available for mission-critical services, following recent rulings at ITU's WRC-15.

As we look out towards the brave new world of 2030 where everything is connected and everything is smart, the path being followed by ESN is already looking horrendously outdated, obsolete and heading down a proprietary, pre-standards cul-de-sac.

It's time to accept that significant changes must be made now to ESN. It's time to futureproof UK emergency services communications and build a best-practice critical communications system of systems, aligned with global markets, fully integrated with existing/future solutions, fully backwards/forwards compatible and fit for purpose for all emergency services.

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

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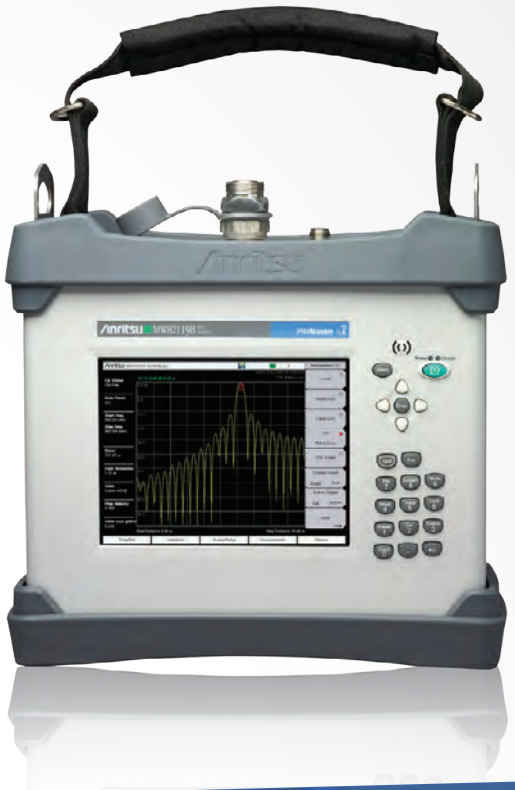

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