critical comms

PUBLIC SAFETY | UTILITIES | MINING | TRANSPORT | DEFENCE

PP100007393

Versatility has a new name ...
KENWOOD NX-5000 series radio

IP-68

microSD

CB

NEXEDGE™

DMR
DIGITAL MOBILE RADIO ASSOCIATION

P25
DIGITAL WIRELESS · SANS FIL NUMÉRIQUE · INALÁMBRICO DIGITAL

comms critical

Inside

NOW in DIGITAL!

Your copy of *Critical Comms* is available as an online eMag.

www.CriticalComms.com.au/magazine

ON THE COVER

JVCKENWOOD'S NX-5000 Series offers interoperability for a wide variety of users as it supports three digital CAIs — NXDN, DMR and P25 (Phase 1 and 2) — plus FM analog (including CB) in a single radio. Best of all, a desired CAI can be selected at will, giving the user the freedom to migrate at their own pace — whether they are intent on going fully digital, undecided about which digital system to pick or just wanting to maintain both digital and analog for a while. An NX-5000 radio can simultaneously support two digital protocols plus analog, offering the following combinations: FM/DMR/NXDN, FM/NXDN/P25 and FM/DMR/P25. An NX-5000 Series radio automatically identifies a call signal — whether it's NXDN, DMR, P25 or FM analog — and transmits in the same mode received. Setting the radio to Mixed Mode enables it to wait for a call in both digital and analog modes in a digital/analog environment. Moreover, the Geographical Zone function enable these radios to operate in any mode — conventional or trunked — in the same zone.

Adding to this feature list, JVCKENWOOD will be releasing early in 2017 a full-featured, handheld controller microphone boosting the capabilities for the radio even further. Those capabilities already include Micro SD recording on TX/RX/GPS, Bluetooth, IP68, DSP noise cancelling and multideck/head options for mobiles.

See the NX-5000 Series JVCKENWOOD at Comms Connect Melbourne, Stand 68.

JVCKENWOOD Australia Pty Ltd
www.kenwood.com.au

Transmit

In our modern world there are any number of precious, scarce resources that are fought over by competing interests in order to get what each of them sees as its fair share. The radio spectrum is one of those resources. Like many others, it is also a finite resource — there's only so much of it to go around, particularly in congested areas such as major cities. This is a challenge that is only going to become more difficult to confront as our increasingly wireless society demands ever greater bandwidth for mobile and other devices.

As the spectrum regulator in Australia, the Australian Communications and Media Authority (ACMA) is tasked with carefully managing the spectrum and all those who use it. It's a tough job. Which is why it's good that the ACMA continually looks ahead to see what those future challenges might be, as our coverage of its latest five-year outlook explains (see the article in this issue). Five years used to be a fairly long time in the technology world, but not anymore — who knows what the ICT field will look like five years from now?

This issue of *Critical Comms* is being released shortly before the annual Comms Connect event in Melbourne. Comms Connect is celebrating its 10th birthday this year, so it's a big congratulations to Paul Davis and everyone in the WFevents and Action Brands teams for all they have achieved with this remarkable event — the Australasian critical communications field is all the richer for its presence. There are special celebrations planned for the November conference, so make sure you're there to be a part of it!

Jonathan Nally, Editor
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Calendar

November 2016
Comms Connect Melbourne
22–24 November
Melbourne Convention & Exhibition Centre
melbourne.comms-connect.com.au

December 2016
Critical Control Rooms
5–7 December
Vienna House Diplomat, Prague
tmt.knect365.com/critical-control-rooms

March 2017
International Wireless Communications Expo 2016
27–31 March
Las Vegas Convention Centre
iwceexpo.com/iwce17

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.orgV

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

Signals can run, but they can't hide.

Introducing Keysight FieldFox handheld analyzers with real-time spectrum analysis (RTSA) up to 50 GHz. Now you can capture every interfering signal in real time with one integrated, lightweight unit. FieldFox with RTSA empowers you to detect, locate and fix with benchtop accuracy. At only 3.2kg, it's also an all-in-one cable and antenna tester (CAT) + vector network analyzer (VNA) + spectrum alayzer + RTSA and more. This means you can forget about carrying separate devices for every function you need. Go out there, get the job done in real time, and carry the precision of one.

Keysight Fieldfox Handheld Analyzers with RTSA

Now 16 new models with RTSA from DC to 50 GHz

Detect pulses as narrow as 22 ns;
63 dB spurious-free dynamic range

CAT + VNA + spectrum analyzer + RTSA and more

Benchtop precision, MIL-Class 2 rugged

Download RTSA app note today.
www.keysight.com/find/FieldfoxRTSA

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KEYSIGHT
TECHNOLOGIES

Unlocking Measurement Insights

Agilent's Electronic Measurement Group is now **Keysight Technologies.**

TETRA IN
AUSTRALIA

Jonathan Nally

The TETRA digital trunked radio standard has had a rapid rise in the local marketplace.

In late 2015, the Australian chapter of the international TETRA and Critical Communications Association (TCCA) altered its name to the Australasian TETRA and Critical Communications Forum (ATCCF) — a subtle change, but one that reflects the new reality of a communications world that now is about more than just two-way radio.

As the ATCCF is celebrating its 15th birthday this November, we thought the time was right to sit down with representatives of the organisation to find out why TETRA has been so successful, and where the technology is heading next.

Developing the standard

TETRA began life in the mid-1990s as public safety operators saw a need to introduce a digital trunked standard to replace the analog systems that were dominant at the time. The new system would need to have standardisation on encryption, security, data transfer, air interfaces and equipment interfacing at the subscriber level. It was decided that the standard would be based on 4-slot TDMA with 25 kHz channel spacing. Other advantages would be the inclusion of a direct mode and allowance for gateway and repeater mode capability.

"I think you've also got to take into account that a lot of the government and other mission-critical organisations really wanted a multivendor aspect as well," said Anton Abrahams, chairman of the ATCCF. "Multiple vendors with interoperability would safeguard their new investments in their transition from analog to digital."

"What those standards also did was open up the third-party product and application development around voice, data and security services," said Kevin Graham, director of the ATCCF and managing director of Global Digital Solutions Consulting. "It's opened up the opportunities for suppliers to provide value-add solutions and applications and the interconnection of peripheral data equipment to subscriber product. And it also opened up command and control and other

subsystem development across a broader third-party industry."

The local market
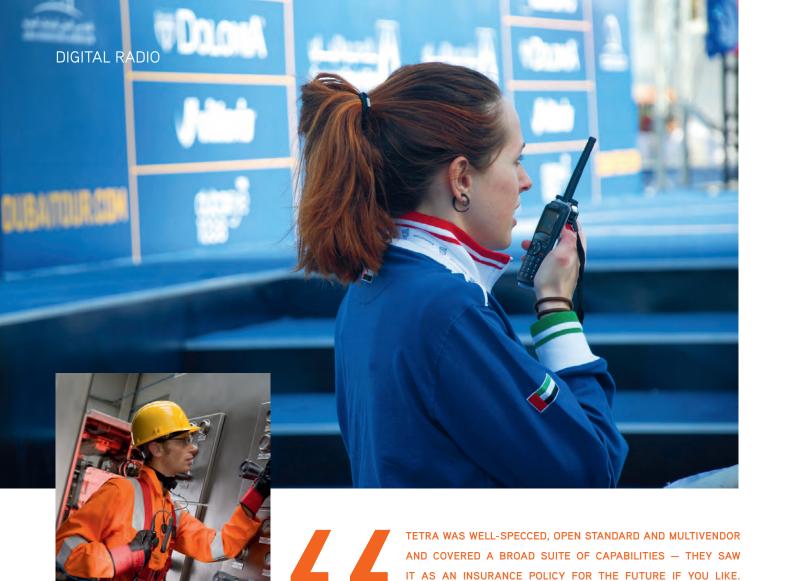
TETRA had a bit of a late start here in Australia.

"We were locked out of available spectrum pretty much until the mid-2000s," said Graham. "It was primarily because the available radio spectrum access in Australia and New Zealand didn't align to the international spectrum channel spacings. We had no 10 MHz channel spacing available; or if we did, it was fully encumbered in the high-density customer areas.

"The only other spectrum that was available that could comply was 800 MHz, but the 800 MHz development of product lagged the 380–470 MHz market, which was the much larger accessible market for the vendors than 800 MHz," added Graham. "But once the 800 MHz TETRA products were developed, we were in a position to offer those systems in the region, and that was one factor why it took until the mid-2000s to win local projects.

"We had a lot of a support from within the ACMA to look at ways in which they could replan the UHF spectrum, which they were looking at doing anyway from the point of view of narrowbanding, band replanning and government spectrum harmonisation," said Graham. "And essentially what's happened since is that the UHF bands have been replanned and there's alignment of spectrum matching internationally available TETRA products."

While that process was happening, the ACMA allowed 450–470 MHz channels to be allocated in rural areas on a 10 MHz channel spacing. The 380–400 MHz segment wasn't available in Australia and New Zealand because it was embargoed for defence. The other band, 403–420 MHz, didn't have a 10 MHz spacing and suffered from problems of congestion — quite a few of the MPT 1327 trunk radio networks were positioned in that segment of the band, as were railway operators and others.

> **"** TETRA WAS WELL-SPECCED, OPEN STANDARD AND MULTIVENDOR AND COVERED A BROAD SUITE OF CAPABILITIES — THEY SAW IT AS AN INSURANCE POLICY FOR THE FUTURE IF YOU LIKE. – KEVIN GRAHAM

"Of course, Motorola introduced the Zeon digital public access network, which is based on the TETRA standard, and that was on 800 MHz where they had existing spectrum in the band," said Abrahams. "Motorola and their partners have successfully migrated a diverse range of customers in local government, transport, security and construction to name a few."

"There were also a lot of oil and gas companies that had analog trunking systems from various suppliers in 800 MHz, and they were obviously targets for migration as those systems reached end of life," added Graham. "And they were the ones who were the catalyst for choosing TETRA in those implementations. There were a number of large primary customers who made that move, eg, Caltex, Shell and Rio Tinto."

More room to grow

So given that TETRA has really only been around in Australia for about 10 years, has

the ATCCF been surprised by the speed of the uptake?

"Given there is a still a lot of spectrum congestion in the major built-up areas, it's been extremely successful," said Graham. "Quite a few of the major customers were also embarking on similar programs within their organisations to standardise not just their radio systems, but their data networking, telephony and so on... and TETRA was one technology that came along that allowed them to provide a functionality to amalgamate those business operational requirements on one system and transition off ageing systems or obsolete technology.

"It was through these modernisation programs that BHP and Rio Tinto and Shell and the like had undertaken — not just here, but some of them globally — that they were really trying to harmonise their own business systems," added Graham. "TETRA was one that was well-specced, open standard and multivendor and covered a broad suite of capabilities — they saw it as an insurance policy for the future if you like."

Being vendor agnostic was another key selling point, said the ATCCF's Doug Bowden.

"I think the uptake of TETRA has surprised a few people. But I think the vendor agnostic side of it, the functionality, and once those first reference sites were put in place and people could be see the benefits that could be gained from putting a TETRA system in, it just gained momentum and the momentum has been very good," Bowden said. "Now we see TETRA operating in shopping complexes, hotel/casinos, universities, convention centres, manufacturing and transportation/rail and light rail in Australia.

So TETRA was really the right technology at the right time?

"Very much so," said Graham. "And one of the other things that I think the customer community recognised — and it stemmed from the broadening of the vendor community — was that it instilled a lot more competitiveness, and therefore the price/feature benefit power curve and innovation was much more intensive."

According to Bowden, who is also Sepura's local business development man-

> MOST OF THE VENDORS KNOW THAT LTE IS PART OF THE FUTURE. WE KNOW THAT ULTIMATELY IT WILL BECOME A KEY FUTURE TECHNOLOGY. – DOUG BOWDEN.
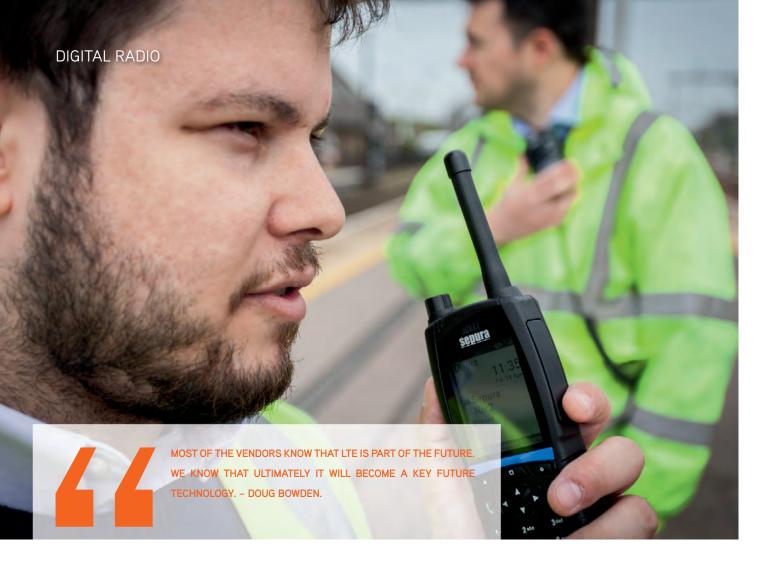
ager, they're selling terminals today at much the same price as five years ago, but with significantly greater functionality.

"Today, our customers are getting much more value for their money," he said.

Even though TETRA has been exposed to the Australian communications market for a decade or so, are there still potential customers who are unaware of its merits?

"There are still potential customers out there who still don't fully understand the possibilities of TETRA," said Bowden. "There are some who are hoping to manage with their old existing analog legacy systems and thinking that they'll skip a technology and jump straight into LTE, and unfortunately they don't realise how long it's going to take for PMR functionality to be standardised for LTE. For other standards, this process has taken about 10 years."

With the mining and exploration sectors being traditional TETRA users, and with the downturn in those sectors, it might be thought that the technology is entering a wilderness period. Not so, according to the ATCCF, which sees lots of potential for more TETRA systems in Australia.

"There's still a lot of investment going on," said Abrahams, particularly in public transport. "Looking at the vital transport investments governments are going to be making all over Australia, I think there are opportunities in most of the states."

The broadband future

Of course, the elephant (or maybe still just a calf) in the room of public safety communications is LTE and mobile broadband. Where will TETRA fit into this brave new world?

"LTE is still a long way away from having mission-critical PTT features as a standard product," said Bowden. "[The PTT that's out there] is currently all proprietary, but it's not in standardised mission-critical form yet. It doesn't give you encryption, it doesn't give you your priorities.

"Some of our engineers went to one vendor's presentation of an LTE PTT radio that had an emergency button on the top, and they asked, 'What happens when the emergency button is pushed — does the call go straight through if the network's busy?' And they were told, 'No, it's queued like any other call'," Bowden said. "So it's a long way from giving you all the mission-critical functions that TETRA now gives."

Yet everyone recognises that LTE is coming, and that standardisation of the mission-critical feature set will happen. The biggest barriers are the availability of spectrum, the availability of silicon to deliver this functionality and — last but not least — the cost versus benefit, which at the moment is significantly higher than that of a TETRA solution.

"Most of the vendors know that LTE is part of the future. We know that ultimately it will become a key future technology," said Bowden. "So most vendors are developing products that will enable mission-critical to talk over LTE. They're developing either PTT LTE products or they're multibearer products that ultimately could have LTE inside.

"For the foreseeable future, mission-critical comms will be serviced by TETRA complemented by LTE, and this is a model that's emerging throughout the world," he added.

"I think it's important to know that the TCCA, and we as the TCCA chapter in Australia, are very much involved in the future of radiocommunications through our involvement with ETSI and the 3GPP group, specifically with relation to driving the global development and the standardisation of critical mobile broadband functionality," added Abrahams.

The TCCC has released a series of 'Insights' — white papers, videos and podcasts — on how TETRA is benefiting a range of industry sectors. You can find them at bit.ly/2ed6gjM.

Swissphone presents the newest solutions for public safety

Swissphone is a leading provider of alerting and communication solutions for public safety organisations. Founded in 1969, the family-owned Swiss company has since set the standard in alerting and critical messaging. Over 250 employees throughout Europe and the rest of the world develop, produce and deploy POCSAG networks and pagers, as well as software solutions for resource management and critical messaging.

Disaster-proven paging

Swissphone is the number one supplier for digital paging solutions worldwide. The company has more than one million pagers in the field, running for many years due to their renowned high quality. DiCal is the digital paging system developed and manufactured by Swissphone. It is designed to meet the specific needs of public safety organisations.

DiCal is developed for anyone who cannot take the risk in having a single communication system which may fail in a crisis. That is, anyone who needs redundancy and a fallback scenario in case of a breakdown of IP backhauls or power supplies. For example, public safety, from regional up to nationwide alerting networks: firefighters, police, rescue services, organisations with many volunteer personnel, such as sea rescue, mountain rescue, industrial sites (with on-site paging) such as large production plants (food, automobile, logistics), hospitals, airports, oil platforms or cruise ships. DiCal systems are designed and engineered to provide maximum indoor paging coverage across an entire district. In a disaster situation, when one or several connections in a simulcast solution are disrupted or interrupted, the radio network automatically switches to fall back operating mode. Full functionality is preserved at all times.

State of the art pager

Swissphone offers high-quality pagers, very robust and waterproof. They have the best sensitivity in the industry, and battery autonomy of up to three months. First responders may choose between a smart s.QUAD pager, which is able to connect with a smartphone, the Hurricane DUO pager, the only digital pager that offers text-to-voice functionality, or the RES.Q with integrated GSM module which enables users to send a response, status message or status request.

Bluetooth technology makes it possible to connect the s.QUAD with a compatible smartphone, and ultimately with various s.ONE software solutions from Swissphone. Thanks to Bluetooth pairing, the s.QUAD combines the reliability of an independent paging system with the benefits of a commercial cellular network. Dispatched team members can respond back to the call, directly from the pager. The alert message is sent to the pager via paging and cellular at the same time. This hybrid solution makes the alert faster and even more secure.

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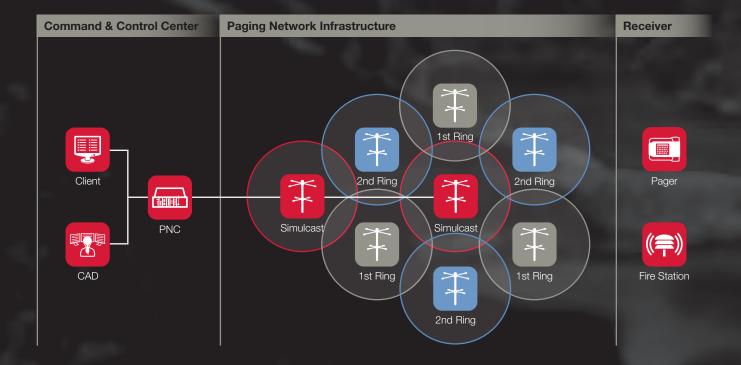
Or

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Oswin Slade
Tel: +61 3 9543 5144
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www.unicompl.com

To put it in a nutshell

Swissphone sets new standards in paging:

Paging Network
- It's much faster to send individual and stacked pages digitally than with analog voice.
- If you want better indoor coverage, you put sites closer together at lower heights.
- A self-healing system that also remains reliable in various disaster situations.
- Place base stations where you need them, without the usage of an expensive backhaul network.
- Protect victim confidentiality and prevent unauthorized use of public safety communications, with integrated encryption service.

Pager
- Reliable message reception, thanks to the best sensitivity in the industry.
- Ruggedized and waterproof, IP67 and 2 metre drop test-certified products.
- Battery autonomy of up to three months, with a standard AA battery.
- Bluetooth enables the new s.QUAD pager to respond back to the dispatch center or fire chief.

Dispatching
- Two-way CAD interfaces will make dispatching much easier.
- The new s.ONE solution enables the dispatcher or fire chiefs to view the availability of relief forces.
- A graphical screen shows how many of the dispatched team members have responded to the call.

DiCal – The Smart Network Architecture

DiCal is the digital paging system developed and manufactured by Swissphone. It is designed to meet the specific needs of public safety organizations. Now it is the time for digital paging! The Disaster-Proven Paging Solution (DiCal) from Swissphone offers improved coverage, higher reliability and flexibility beyond anything that traditional analog or digital paging system can provide.

Command & Control Center	Paging Network Infrastructure	Receiver

Client

PNC

CAD

1st Ring

2nd Ring

2nd Ring

Simulcast

Simulcast

1st Ring

1st Ring

2nd Ring

Pager

Fire Station

News

EWN TO USE OPTUS, SATSLEEVE

Optus Satellite has signed a relationship with Aeeris that will support remote worker solutions such as tracking of staff and delivery of communications services across Australia utilising Optus Satellite Services and the Thuraya SatSleeve+. Aeeris is the developer, operator and provider of the Early Warning Network (EWN). EWN maps live data from multiple sources relating to severe weather, fire, traffic and other geospatial hazards to support natural disaster awareness, personal and employee safety, asset protection and risk management. Customers will be able to use their mobile phone to make satellite calls and SMS using the Thuraya SatSleeve rather than via a satellite handset.

More info: bit.ly/2ez7Ugi

GME DONATES TO STORM RECOVERY

GME has donated $10,000 to support the SA State Emergency Services and the SA Country Fire Service, in the wake of severe South Australian storms. The storms caused widespread damage, with powerful winds, torrential rain and a statewide power outage just prior to the Adelaide launch of GME's XRS Connect. Group marketing manager Gavin Kadwell, who attended the event, said the storms affected both staff and customers. "After the SA Premier and Police Commissioner announced workers should leave work early, we were very concerned for the safety of those still planning on attending the event," said Kadwell.

More info: bit.ly/2emWbUs

Digital mobile radios

Simoco Xd 700 Series SDP760, SDP750 and SDM730 digital mobile radios provide full duplex calling. The SDP760 has digital and analog operating modes and an application partner interface (API) that enables customised apps to be delivered on the device and displayed on the large HD screen. The SDP750 includes all the same features for users who do not require an HD screen display.

The product also includes integrated dispatcher services and push-to-talk (PTT) smartphone functionality, ensuring an organisation's ability to bring together a wide range of communication methods.

The SDM730 features full duplex audio, multiple operating modes, a large high-definition screen and a customisable API. The unit is capable of high levels of transmission power to bring clear and reliable coverage to the edge of operational areas. The radio also features Bluetooth, which facilitates the connection of a wide range of accessories.

Simoco Australasia Pty Ltd
www.simocogroup.com

Wall-mount power system

The Eaton wall-mount power system is suitable for users in the industrial control, electrical switching and telecommunications industries who require the capability to access and monitor reliable battery-backed DC power.

The power system is packaged in a format that consumes minimal space. It has a form factor that better suits industrial control and electrical switching boards, as well as small service closets. It has good monitoring and control capabilities.

The product is able to be configured for either AC mains or solar PV power, providing the convenience of a single power system type for both scenarios.

Another key benefit is that the product's battery backup and redundancy can support the majority of process controls systems which use PLCs, valves, solenoids, switches and sensors that are powered from 24 or 48 VDC.

Key technical specs include AC supply of 100–240 V, 50–60 Hz (nominal); efficiency of APR48-ES, >96% peak; DC output power of 48 V, 2.00 kW (42 A); operating temperature range of -40 to +70°C; and communication features including USB direct, 10BaseT Ethernet, TCP/IP, SNMP, Modbus TCP, Modbus RTU and on board web server, RS232 to external PSTN or GSM modem.

The product is suitable for the oil and gas, mining, commercial buildings, rail and transportation industries, as well as system integrators and switchboard builders or any business that designs and manufactures large turnkey process control systems.

Eaton Industries Pty Ltd
www.eatonelectric.com.au

MORE 700 MHZ FOR AUCTION

The federal government has announced that it will auction 2 x 15 MHz of unallocated 700 MHz digital dividend spectrum "to support mobile broadband services across Australia". 700 MHz spectrum is highly suitable for 4G LTE mobile broadband services. Vodafone Hutchison Australia (VHA) had earlier expressed interest in acquiring 2 x 10 MHz of 700 MHz spectrum that remained unsold in the 2013 digital dividend auction. VHA proposed acquiring the spectrum by direct allocation. Following VHA's interest, the government opened a consultation process in May 2016 to gauge interest from other potential industry players. The consultation indicated strong market interest, with seven submissions received.

More info: bit.ly/2extmH1

WA FIRE VEHICLES GET AVL

The safety of Western Australia's fire crews is being enhanced with the installation of automatic vehicle location (AVL) technology. The project is part of the state government's $15.4 million crew protection program, designed to protect volunteer and career firefighters who work on the frontline. AVL will be installed on 700 Department of Fire and Emergency Services and local government firefighting appliances operating in high-risk bushfire areas by 1 December 2016. The Western Australian Government has announced that it will establish a new Rural Fire Service and Office of Emergency Management.

More info: bit.ly/2dCy8N5

Handheld analysers

Keysight Technologies handheld analysers have real-time spectrum analysis (RTSA) up to 50 GHz. FieldFox RTSA software, Option 350, is designed for engineers and technicians performing interference hunting and signal monitoring, specifically in surveillance and secure communications, radar, electronic warfare and commercial wireless markets.

The product is capable of capturing 'bursty' signals in real time, which significantly improves the ability to detect them. By capturing a range of signals, the product provides a composite view, allowing easy identification of the source of interference.
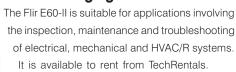
Users are able to measure from DC to 50 GHz in real time to capture every signal, small signals once masked by stronger signals and without gaps, due to gapless capturing techniques.

The product reveals and separates captured signals with more insight. It also provides narrow pulse detection <1 μs; 63 dB of spur-free dynamic range; one integrated, lightweight unit, so users can forget carrying multiple instruments; easy upgrades via software licence key; choice of 16 combination (combo) and spectrum analyser models from DC to 50 GHz; and combo models including spectrum analyser, VNA, CAT, RTSA and more.

Keysight Technologies Australia Pty Ltd
www.keysight.com

Thermal imaging camera

The Flir E60-II is suitable for applications involving the inspection, maintenance and troubleshooting of electrical, mechanical and HVAC/R systems. It is available to rent from TechRentals.

The product offers high performance and usability, with a temperature range of -20 to 650°C, 2x and 4x digital zoom, 3.1 MP visible light camera (with LED lamp), scalable IR picture-in-picture (PiP), laser pointer and multispectral dynamic imaging (MSX).

MSX provides real-time visible spectrum detail on infrared video and images. This results in detailed shots not normally attainable with thermal imaging. In many cases, reports no longer require accompanying digital photos.

The device also features a smartphone/tablet connection through a Wi-Fi application, MeterLink connectivity with compatible devices for collaboration of diagnostic data, Bluetooth support for voice annotations and automatic screen orientation based on camera positioning.

For more information, click here.

TechRentals
www.techrentals.com.au

Wireless Stocked in Victoria

Streakwave Australia

Streakwave is a global value added distributor of fixed wireless broadband products and solutions. Streakwave Australia operations are based in Melbourne. Streakwave specializes in wireless broadband networking equipment in both licensed and unlicensed frequencies, wired network applications, telecommunications solutions, routers, IP surveillance/security and remote power control technologies from leading manufacturers. Streakwave serves the mining, enterprise, education, government, healthcare, security, service provider, hospitality and telecommunications markets.

Streakwave provides:

WISPs, consultants, integrators,
dealers, self-service end-users,
service providers, and value-added
resellers with outstanding service and a
wide product offering.
Also, premier pricing programs,
partner programs, and technical support
helping clients achieve
success in their own businesses.

Cambium Networks

mimosa

MikroTik

Open Mesh

TYCON Power Systems

UBIQUITI NETWORKS

COMMS CONNECT 2016

10TH ANNIVERSARY
CONFERENCE & EXHIBITION

10 YEARS 2007–2016 MELBOURNE

The region's premier critical communications event features a packed program of first-class speakers, exhibits and workshops. Jonathan Nally

Since 2007, Comms Connect Melbourne has been the number one meeting place for Australasian critical communications users and industry. This year, as it celebrates its 10th anniversary, 80-plus expert speakers, 90-plus exhibitors and over 1400 professionals — from first responders to mining professionals, from utilities providers to enterprise end users, from manufacturers to developers — will take part in the highly targeted and energised event.

The conference will include concepts not previously included in the program and technologies on the show floor that are being displayed by exhibitors for the very first time. And for the first time the conference and exhibition will be located in the same space, with only the workshops remaining in the Convention Centre.

Topics to be covered cover the gamut of the business- and mission-critical communications sectors: public safety mobile broadband, body-worn video and biometrics, situational awareness, push-to-talk, defence comms, spectrum sharing, Next-Gen Triple Zero, government radio networks, research and development and security and cyber attacks.

Speaker sessions

Comms Connect always attracts a first-class list of speakers from industry, government and academia. This year's line-up will be no exception, with experts from home and abroad coming together to share their knowledge and insights.

Keynotes will be presented by:
- Kevin Vinsen, Research Associate Professor at the International Centre for Radio Astronomy Research in Perth, who will speak about the incredible radio and computer technology being developed for the Square Kilometre Array radio telescope.
- Bill Schrier, Senior Advisor, FirstNet, who will speak about challenges and opportunities in public safety mobile broadband communications.
- Station Officer Graham Tait, Systems Officer, Operational Communications, Fire & Rescue NSW, who will present on the topic of what happens when disasters occur and emergency responders converge to help the trapped and injured.
- Crispin Blackall, Director, Global Enterprise Product Engineering, Networks, Telstra Operations, who will speak about the mobile network evolution and 'unlocking new ways to connect'.

Comms Connect Melbourne

Workshops: Tuesday, 22 November (9.30 am–4.45pm)
Conference: Wednesday, 23 November (9.00 am–5.00 pm)
  and Thursday, 24 November (9.00 am–4.00 pm)
Exhibition: Wednesday, 23 November (9.00 am–5.00 pm)
  and Thursday, 24 November (9.00 am–3.30 pm)
Where: Melbourne Convention and Exhibition Centre
Who: 1400+ attendees, 80+ speakers and 90+ exhibitors
Web: melbourne.comms-connect.com.au

The full list of speakers and topics can be viewed on the Comms Connect website at melbourne.comms-connect.com.au/conference-program.

Workshops

With the rapid pace of technological change, it's all the more important that industry members keep up to date with the latest developments, which is why the Comms Connect preconference technical workshops are always very popular. This year there will be eight workshops, held on Tuesday, 22 November (the day prior to the conference beginning).

- **Workshop 1:** Understanding radio over IP.
- **Workshop 2:** Keeping the spectrum clean — ACMA activities and compliance priorities.
- **Workshop 3:** Implementation of location services within a radio dispatch environment.
- **Workshop 4:** Fleet management cradle to grave utilising OTAP (over-the-air programming).
- **Workshop 5:** Mission-critical communications redundancy: the future looks bright.
- **Workshop 6:** Integrated operations: beyond IT/OT convergence.
- **Workshop 7:** Critical communications, where to from here.
- **Workshop 8:** Building a radio network from the ground up — an independent workshop on planning required to deliver a private land mobile network.

Exhibitors

One of the best parts of Comms Connect is the opportunity to meet and greet with exhibitors. In particular, it's a great chance for equipment users and suppliers/manufacturers to compare notes, give feedback, get up-to-date information on the latest technologies (including, often, pre-release or developmental details) and generally build connections within the industry. You can see a full list of exhibitors at melbourne.comms-connect.com.au/whos-exhibiting.

Don't forget that you can get a FREE expo pass to visit the exhibition — see melbourne.comms-connect.com.au/pricing-and-registration for more details.

Panel sessions

Comms Connect Melbourne 2016 will feature three panel sessions that will be of great interest to everyone in the industry. The first session, 'Public safety information management: the art of the possible', will be held on Wednesday, 23 November and will include panel members Phil Kidner (TCCA), Inspector Trevor Gould (Queensland Police Service), Bill Schrier (Senior Advisor, FirstNet) and Ashley Van Amstel (NSW Rural Fire Service).

The second panel session, 'The role of critical communications in motorsport', will take place on Thursday, 24 November and will feature Dave Reynolds (V8 Supercar driver), Barry Ryan (Erebus Motorsport) and Jason Owen (Gearhouse Broadcast Australia). It's hoped that two different V8 supercars will be on display in the exhibition hall.

The final session, 'Public safety mobile broadband — the way forward for critical communications in Australia', will be held at the conclusion of the conference on Thursday, 24 November. This not-to-be-missed session will be led by ARCIA's Ian Miller and will feature input from Bill Schrier and Garry Kerr (Public Safety Business Agency).

ARCIA Gala Industry Dinner
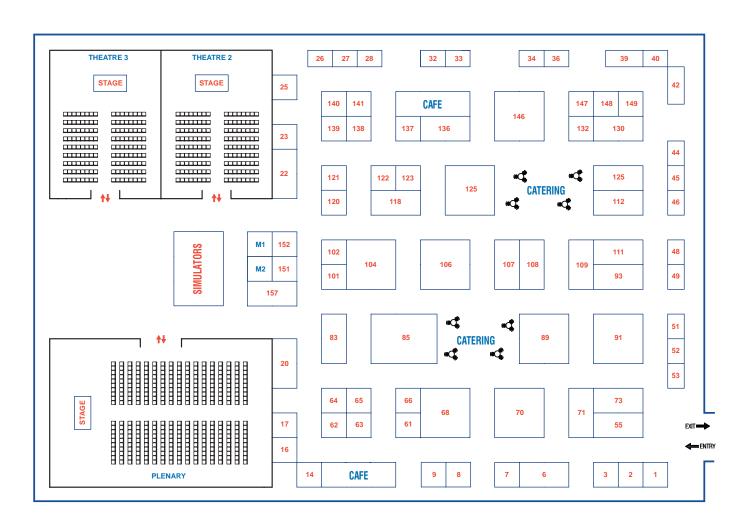
The annual ARCIA Gala Industry Dinner will be held on the evening of Wednesday, 23 November at the Convention Centre. The evening will include: networking over pre-dinner drinks and canapés; live entertainment; a three-course award winning dining and five-hour drinks package; a luxury corner featuring massage stations; and, most importantly, the presentation ceremony for the Industry Excellence Awards, which celebrate and recognise the achievement of outstanding individuals in our industry.

The dinner is always a fantastic opportunity to celebrate what makes the radiocommunications industry great with partners, clients, employees and colleagues. You can book your tickets through the Comms Connect website: melbourne.comms-connect.com.au.

In conclusion, Comms Connect sees hundreds of like-minded professionals — from government, the resources sector, first responders, transportation, utilities, enterprise and other sectors that use critical communications — gather to ensure that they have access to the very latest information and technology solutions. This year's 10th anniversary event promise to be one that's not to be missed. Make sure you're there to join in!

COMMS CONNECT MELBOURNE 2016

EXHIBITOR LIST

4RF Australia	118	GMG Solutions	6	SAT Pty	44
Airbus	71	Harris	55	Schneider Electric	8
Anritsu	49	Hytera	89	Sensear	152
ARCIA	53	ICOM	93	Sepura	91
AST Australia	149	ICS Industries	101	Silvertone	32
ATDI South Pacific	151	IPMobileNet	146	Simoco	125
Australasian TETRA + Critical Communications Forum (ATCCF)	34	Japan Radio Company	140	Spectrum Engineering Australia	40
Barrett Communications	66	JVCKenwood	68	Streakwave	138
Benelec	109	Keysight Technologies	111	Survey Technologies Inc (STI)	36
Cambium Networks	61	Logic Unlimited	132	Swissphone	157
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CISTECH Solutions	20	Metwide Group	48	Telstra	106
Codan Radio Communications	70	Midland	63	TPL Systèmes	52
CommSite	33	Motorola Solutions	108	TRBOnet	123
Cradlepoint	3	MTA Sales	102	UNICOM	157
Critical Comms	46	NEC Australia	130	Vertel	139
CRS Accessories	14	NICE	9	Vertex Standard	147
DMR Association	27	Omnitronics	112	Vicom	17
Duons	140	Open Spectrum	26	Wireless Data Solutions	16
Emona Instruments	120	Orion Network	122	Wireless Innovation	22
Excelerate Group	85	Panorama Antennas	65	Wireless Pacific	1
Frequency Plus	45	Polar Electronic Industries	51	Wireless Tech	23
Genesis & Kalibre	2	Radlink Communications	104	ZCG Scalar	121
GME	136	RF Technology	146	Zetron	73
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		Rohde & Schwarz	129		

THE BIG DATA CHALLENGE

WHY IT'S SO IMPORTANT FOR THE RADIO COMMUNICATIONS INDUSTRY

Applying data to improve business outcomes is a defining business challenge of our time.

Daniel Leppos, Channel Manager, Motorola Solutions

Despite the importance of data to business, new research has found that seven out of 10 IT leaders cannot quantify the potential cost savings or new revenue opportunities that making better use of big data will bring. Furthermore, the rapid pace of technological change and the rise of a new generation of hyperconnected millennial workers are contributing to further change while adding stress to the IT systems that IT leaders choose to help their people work safer and smarter.

As an industry we have a major opportunity to grow by demonstrating how a modern, digital radiocommunications system can deliver both critical voice and critical data capabilities to enhance the way businesses and employees perform every day.

In its 2015 Annual Report, ARCIA stated, "It is the radiocommunications industry that is moving into the IT world and leading the way with equipment that is IP connected."

Many in our industry have noticed a distinct market shift in recent years. IT leaders have always been the key decision-maker when choosing communications solutions. Increasingly, radiocommunications are part of their remit and can be considered as forming part of their ICT communications ecosystem. Radio devices, systems and applications are all essential components of the ICT landscape because they enable increased operational efficiency,

greater productivity, enhanced worker safety and improved customer satisfaction.

Motorola Solutions wants to better understand these IT leaders, the challenges they face and how we can serve them better. One challenge they face that we wanted to explore in greater detail is 'big data'.

New research, new opportunities

In early 2016 Motorola Solutions engaged EY Sweeney to conduct research among 130 senior IT leaders within Australia and New Zealand. The respondents were responsible for IT decision-making and procurement in areas including operations, supply chain, finance, compliance, administration or occupational health and safety. Respondents were drawn from manufacturing, construction, mining, utilities, hospitality, transport and logistics, security, retail or technology.

The research unveils how leading IT buyers are managing the complexity of big data to enable better business performance. What did we discover? The primary finding is that there is no single, dominant challenge that IT leaders face when it comes to managing big data.

In fact, there are many issues that IT buyers face when attempting to filter and adopt large amounts of data. The biggest

ryone in their business. With significant technology advancements in recent times, business systems are exposed to greater security risks as new and old systems are integrated with different levels of security.

How can radio communications help?

IT leaders say they are struggling with immense amounts of data, the costs and difficulties associated with sophisticated business intelligence systems and the level of expertise required to make sense of it all. Can a simpler approach be the answer?

Perhaps it is small, precise, real-time data which could be the real game changer for customers. Simple data — small streams of information — represents a more targeted and outcome-driven approach to realise operational goals.

The traditional two-way radio has evolved beyond just voice communications with devices, applications and network tools that are capable of integrating with wider ICT communications systems.

Businesses can use simple data to know where team members are at all times. Indoor and outdoor GPS tracking, integrated with interactive consoles, allows businesses to keep track of team member locations and have immediate beneficial effects on employee safety. For example, using geofencing, a worker can be notified via their radio if they've entered a prohibited zone. And administrators can be notified if a worker has fallen over or if an employee working alone is in trouble. For example, a lone worker application can raise an alarm if the radio user has not responded to a periodic request for interaction with his or her radio device.

Simple data can also be used to automate basic, but time-consuming, tasks that are traditionally completed manually. For example, workers clocking in and out and the monitoring of doors and lights or even keeping tanks full and measuring gauges can all be automated, reducing the need for manual checks. Furthermore, job ticketing applications enable businesses to delegate tasks to workers based on their availability and location, via their two-way radio. They can then accept and mark jobs as complete once finished, with all information fed back to system administrators to ensure efficient management of tasks. Reports from this application can also improve productivity tracking and improve business decisions.

Interoperability solutions, such as Motorola Solutions' WAVE Work Group Communication application, extend push-to-talk (PTT) capabilities to smartphones so that entire teams can remain connected via instant communications. Interoperability is essential in businesses where managers or administrative staff may not need PTT radios but often need to reach people in the field who do. By equipping all staff with PTT capability, no matter where team members are located, they can each be contacted at the push of a button. This keeps everyone better informed and allows for questions and incidents to be promptly resolved, which in turn enhances the experience for customers.

problems identified by respondents include the poor accuracy in data, restricted access to data, the tedious task of compiling and arranging data and the inability to maintain databases to keep them updated.

The overall consensus from respondents is that the nature of big data is overwhelming. Some IT buyers don't know where to start when interpreting data. It is clear that storing, managing and understanding data is a major challenge for most businesses, especially in tough economic conditions. The research has also made very clear which factors IT key decision-makers deem most important when assessing business needs.

Firstly, 91% of respondents want to monitor and communicate with employees to keep them safe while 87% need workers to communicate and raise an alarm wherever they are. IT leaders clearly understand that inadequate workplace safety can not only incur human cost, but can also threaten financial stability, customer loyalty and regulatory compliance.

Respondents also want increased efficiency and productivity, with 87% stating they want maximum efficiency for their operations through reduced bottlenecks and 73% wanting to automate repeated processes to simplify manual or complex tasks.

Finally, 93% of respondents said they wanted to share certain information with a defined set of people or team instead of eve-

Hear about it

At Comms Connect Melbourne 2016, Motorola Solutions Channel Manager Daniel Leppos will present on the topic '2017 and beyond: what do customers want from a communications solution?' Join the presentation on Wednesday, 23 November at 12.15 pm and visit Motorola Solutions at stand 107. You can also download the white paper 'Big data: Is it smaller than you think?' http://bit.ly/2eHOjxe

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AIRBORNE LTE

Flight trials of Verizon's Airborne LTE Operations initiative have demonstrated the promise of drones for communications relay.

Image courtesy Verizon

Verizon has announced its strategy to drive innovation and widespread adoption for in-flight wireless connectivity through its Airborne LTE Operations (ALO) initiative. Two years in the making, Verizon's plan includes:
• The successful completion of technical trials in various locations across the USA using a combination of unmanned and manned aircraft on Verizon's 4G LTE network.
• An early adopter simulation exercise in Cape May, New Jersey, using unmanned aircraft systems (UASs) to demonstrate how Verizon's 4G LTE network can help first responders and emergency management personnel enhance disaster recovery efforts.
• The launch of a new suite of services as early as 2017 on Verizon's ThingSpace IoT platform to help developers and businesses create and manage a wide range of ALO-enabled applications simply backed by secure cloud and analytics capabilities.
• A new device certification process, now available, that sets forth requirements to enable access to wireless connectivity for unmanned aerial vehicles (UAVs) and UASs on Verizon's 4G LTE network.
• Collaboration with partners such as American Aerospace (AATI) and Sierra Wireless to pave the way for aerial long-range applications beyond line of sight.

Commercial connectivity trials

Verizon's network team began work to develop the technology for in-flight LTE operations in 2014 and throughout 2015.

In 2016, Verizon evolved its Airborne LTE Operations even further by engaging AATI to test connectivity between aerial platforms and Verizon's 4G LTE network. The initial controlled trial was conducted with a 5-metre-wingspan unmanned aircraft system. The aerial platform tested advanced aerial inspection techniques that can be applied not just to the hundreds of miles of pipeline in rural Virginia, but also nationwide while connecting to Verizon's 4G LTE network.

"This latest trial demonstrated how emerging technology combined with wireless networks can improve safety and security,"

said Mike Haberman, vice president, Network Operations, Verizon. "A nationwide reliable 4G LTE network is the foundation for the future of mobile IoT in the air."

As a result of the successful trial, Verizon deemed its 4G LTE 700 MHz network safe for in-flight wireless connectivity, which led to the creation of device and service requirements as part of Verizon's ALO initiative.

Together with AATI, Verizon is also exploring next steps in in-flight cellular services for UAVs nationally on its 4G LTE network. Once federal regulations allow UAV operation beyond visual line of sight (BVLOS), new tests will focus on BVLOS command-and-control cellular network communications for long-distance UAVs.

Path forward for certification

Once Verizon certifies that the device has met Verizon's Open Development requirements for wireless connectivity and usage on Verizon's LTE network, aerial devices may be used for multiple applications by embedding the device on the UAV itself, as an add-on device to the UAV or even in conjunction with a low-altitude flying manned aircraft — in accordance with the operators' compliance with other applicable rules.

Devices certified by Verizon will be listed on the company's Open Development portal.

"In our view, no-one else in the industry has taken the kind of holistic approach of extending the reach of 4G LTE and IoT like Verizon," said Mike Lanman, senior vice president of Enterprise Products and IoT at Verizon.

"While other market participants are only just now getting into this space by launching trials within a limited geographical footprint, Verizon has taken a leadership role for the last two years.

"By scaling the systems required to connect UASs and UAVs to our LTE network nationwide through our ALO initiative, we've set the stage for a wide range of applicable solutions to be delivered via our ThingSpace open development platform across multiple sectors," Lanman added.

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Mingara Australasia wins innovation award

Mingara Australasia, a long-standing and leading provider of independent telecommunications and ICT consulting advice, was happy to have recently been announced as a joint recipient of the 2016 Queensland Premier's iAward for Public Sector Innovation for their work on the Government Wireless Network (GWN). Although proud that their technical capability was recognised, Mingara was equally excited that their management expertise, stakeholder engagement and innovative delivery approach was acknowledged with this prestigious award.

The iAward recognised and applauded the innovative project management and stakeholder engagement techniques adopted by DSITI and Mingara (who this year celebrated their 20th anniversary), as well as Mingara's hard work and commitment to excellence in their technical/ project assurance role.

Appointed as the technical adviser for the GWN by Projects Queensland in 2012, Mingara (in conjunction with the State and public safety agencies) prepared the technical specifications and associated tender schedule documents, and later reviewed tender responses and participated in contract negotiations.

Subsequent to the granting of the contract (to Telstra, valued at $457m over 15 years), the Queensland Government appointed Mingara the technical adviser for the implementation of the GWN.

DSITI's approach was to integrate Mingara into the project team and use them in a hands-on technical assurance role, from project commencement right through to the final commissioning of the GWN. This proved to be an insightful strategy, which assisted in driving project outcomes in a timely and cost efficient manner.

On discussing the GWN engagement with Mingara, it is evident that they thoroughly enjoyed working with DSITI and the team of dedicated Agency representatives on the implementation of the network. Mingara are excited to have since been granted the opportunity to continue to support the Queensland Government, and are now assisting with the development of the Business Case for Public Safety Regional Radio Communications in Queensland. Managing Director, Gerard Cusick, also expressed his pride in Mingara's team of advisers and support staff who played a key role in the GWN project's success.

It was this hard work and commitment which contributed to Mingara and DSITI being joint recipients of the Queensland Premier's iAward for Public Sector Innovation.

About Mingara

Over the past two decades, Mingara has applied its deep knowledge of critical communications to assist government, public safety agencies, utilities and the rail industry across a broad spectrum of assignments, some recent examples of which include:

- A review of the S.A. Government Radio Network (SAGRN) usage and performance during the Pinery Fire.
- Communications Design and Technology Adviser for the Victorian Regional Rail Link project, and more recently the Level Crossing Removal Project, providing expertise for the train radio systems and fibre optic cable sub-systems.
- Technical Adviser to the South Australian, Victorian and Tasmanian governments in consideration of their future public safety communication needs.

Mingara's key focus is on providing support and expertise to telecommunications projects of all guises and sizes. However, Mingara is also deeply committed to understanding the opportunities that technology innovation can provide, so that they can best advise their clients on how to reap the associated benefits.

Examples of this are the Next Generation Triple Zero (NG000) and the transition from Land Mobile Radio (LMR) solutions to LTE, which are now just around the corner.

Innovations such as these offer enormous potential, for example in the public safety and health sectors, and can unlock access to rich information and improve situational awareness and community outcomes. However, the rewards and risks can also be significant and require diligent, expert decision-making and planning to optimise the benefits, both technically and financially.

Whether a new, innovative technology is being considered, or the upgrade or audit of an existing telecommunications arrangement, Mingara prides itself on maintaining an experienced and dynamic team of advisers who can provide the necessary insight, guidance and technical experience.

It's a time of substantial change and innovation in the ICT and telecommunications industry and Mingara is excited to be a key part of it.

Mingara Australasia Pty Ltd
www.mingara.net.au

PUTTING HF TO THE TEST

Jonathan Nally

More than 250 military comms experts from over 20 countries converged in Brisbane for a crucial HF radio exercise.

Almost 250 military communication experts from more than 20 Indo-Pacific partner nations gathered at the Australian Defence Force's (ADF) Gallipoli Barracks in Brisbane recently for Exercise PACIFIC ENDEAVOUR, to test radio interoperability issues and exchange ideas.

An annual event, PACIFIC ENDEAVOUR is designed to test first-hand the importance of speed and interoperability of multinational communication assets when responding to a natural disaster.

An initiative of the Multinational Communications Interoperability Program (MCIP) — a US Pacific Command-sponsored humanitarian assistance and disaster relief information-sharing operation — this year's event, held from 22 August to 2 September, was co-hosted by the ADF.

PACIFIC ENDEAVOUR 2016's focus was on transmitting data via HF, with participants using other countries' radios to send not only voice, but also email and images of simulated natural disaster damage back to the control centre using IP over RF.

"This year, [we were] focusing on a new capability: internet protocol over radio frequency," said Scott Griffin, the MCIP's technical director. "That will give everyone, regardless of the type of radio you're using, the ability to tie into a backside network and link into the internet."

Scenario chairman, the Royal Australian Navy's Lieutenant Commander Andy Staker, said HF is still useful in the digital age.

"In typical disaster relief situations, telephone wires could be down and ground stations might be without power or destroyed," he said. "There have been significant advances in HF technology in recent years, which bring this communications method into the 21st century."

MCIP Australian lead Lieutenant Colonel Michael King said the exercise was intended to make sure different nations' radios were able to speak to each other.

"You can't do that without making sure you're realistically training for it," Lieutenant Colonel King said.

"For that you need to set up your full systems; you need to set up all the equipment, and doing it at Gallipoli Barracks allowed for that space."

Representatives from non-government organisations and the radio industry were on hand to provide input and advice.

According to an ADF report, most participating countries were able to establish contact with the control centre via IP using their latest HF radios.

"The fact we've managed to push images over the HF medium with a group of multinational representatives using their own radios has proven the success of the activity," Lieutenant Commander Staker said.

"Technology has grown exponentially," said US Army Colonel Jim McCallister, chief of multinational engagements at Pacific Command (Pacom). "We constantly have to strive to reach out to discover new toolsets and new technologies to support our common efforts… because we know that we will have some sort of disaster in the region."

"[That's why] you've always got to prepare for those eventualities; you've never going to have everything perfect," said Cpl. Daniel Stratton, a radio operator in the New Zealand Army.

As well as validating existing radio, cyber and satellite technologies, PACIFIC ENDEAVOUR 2016 put lessons learned from last year's exercise into hands-on practice during a field training

exercise using two simulated forward operating bases at Damascus Barracks (in Brisbane) and Victoria Barracks (Sydney), which were sufficiently far enough away from the Multinational Coordination Centre (at Gallipoli Barracks) to give radio operators a true test of their equipment.

Regional handshake

Apart from the technical aspects, perhaps the most important aspect of this and previous exercises is the opportunity to form a rapport with peers from different countries in the region through face-to-face interactions.

The nations taking part were Australia, Bangladesh, Brunei, Cambodia, Fiji, French Polynesia, India, Indonesia, Japan, Malaysia, Maldives, Mongolia, Nepal, New Zealand, Papua New Guinea, Philippines, South Korea, Samoa, Singapore, Sri Lanka, Thailand, Tonga, the United States and Vietnam.

"Far above the communications interoperability piece, it's just the relationship-building — the bonds that everybody creates and the contacts that you create — that can come in very useful," said Warrant Officer Nicole Heffernan of the Royal Australian Air Force, co-host for the exercise.

"It's an opportunity for small nations like Papa New Guinea to build a network of friends from other nations in the Indo-Asia Pacific Region. Should we need the assistance in the

> THE FACT WE'VE MANAGED TO PUSH IMAGES OVER THE HF MEDIUM WITH A GROUP OF MULTINATIONAL REPRESENTATIVES USING THEIR OWN RADIOS HAS PROVEN THE SUCCESS OF THE ACTIVITY." – LIEUTENANT COMMANDER ANDY STAKER

future, at least we know we have friends we can rely on," said Maj. Joe Mwawesi, of the Papua New Guinea Army.

"The knowledge sharing that helps us understand real-world situations has been fantastic," said Lieutenant Commander Staker, adding that in the event of a real disaster occurring, "we have already shaken hands with people we will need to work with from a communications perspective."

"It's really important to have everyone represented in PACIFIC ENDEAVOUR because it's really the only event of its type in the region for senior communicators to get together as equals and to share experiences, develop relationships and learn about trends, and at PACIFIC ENDEAVOUR, we're all partners," said US Rear Admiral Kathleen Creighton, Pacom Director for Command, Control, Communications and Cyber Directorate.

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Industry Talking

As we head towards the end of 2016 and Melbourne Comms Connect, I can reflect that this has been a very busy year for ARCIA. With events in Perth, Sydney, Brisbane, Adelaide and finally in Melbourne, plus all the others that members have supported, it seems like the year has flown by. Thank you to all the members, supporters and partners for the support that you all provide in one way or another.

The annual trek to Melbourne has arrived and I look forward to catching up with all the new technology on show and of course the ARCIA annual Gala Dinner. One of the highlights for me at the dinner is the peer recognition received by the award winners. It is important that we recognise the people in our industry who make things happen, often unseen in the back room. When you take the time to look around the industry and see what people are doing there is an incredible level of innovation and commitment to service. During critical public safety events such as the recent storms in South Australia, no doubt there were radio people working very hard behind the scenes to ensure the integrity of critical communications.

ARCIA has now released a white paper on the connection of LMR and airband services. For anyone involved in this part of the industry this is a must read and I would encourage you to head to the website and download a copy.

ARCIA continues to work on many areas, especially representing the industry to the ACMA and Department of Communications. As technology is moving quickly to hybrid networks and devices, it is important that our industry has a voice for all aspects of the critical communications industry.

Debate is raging in many nations about future public safety, mission-critical communications and the role of LMR versus LTE networks. As the UK and US versions of next-generation public safety communications take shape, ARCIA believes that Australia can learn many lessons from these countries. We need to build a consensus view between all stakeholders, including agencies, vendors and government, to reflect Australia's many unique challenges. Our public safety users deserve the best technology we can provide them and it is up to our industry to be part of the solution.

No doubt there will be plenty of discussions around all these issues in Melbourne but don't forget to celebrate our industry and those people that help make it all happen. From our ARCIA perspective we move straight into planning for the coming year, with our annual Committee Planning day due in mid-February and our session with our promotional partners the following day. Next year will be the 10th anniversary of the formation of ARCIA. It was back in February 2007 that a group of industry members met and decided that our industry needed to have a voice and a vision — I am sure they never thought we would achieve so much in such a short time.

If you have suggestions on what ARCIA should be working on over the next 12 months please talk to one of our committee members, but for the next few weeks enjoy the camaraderie and educational aspects of Comms Connect and the Gala Dinner, and have a safe and happy holiday season.

Hamish Duff, President
Australian Radio Communications
Industry Association

Digital oscilloscopes

The Rohde & Schwarz RTx-K76 CXPI digital oscilloscopes allow users to analyse the clock extension peripheral interface (CXPI). Users can decode all protocol details and isolate anomalies by triggering on the corresponding details. This accelerates design verification and implementation of CXPI interfaces.

The product was standardised under SAE J3076 as a communications bus for diverse automotive applications. It uses pulse width modulation to transmit data over a single wire at 20 Kbps. The characters used are based on UART.

When debugging CXPI interfaces during development, users can trigger on conditions such as start of frame, frame ID, data values and various error conditions. The instrument's search and navigation functions make it easy to detect relevant events in the data stream.

The oscilloscope displays decoded telegrams as colour-coded bus signals in a waveform diagram or as a table. As a result, developers can verify the quality of their products early during development.

The product allows users to simultaneously decode up to four serial buses from analog or logic signals. The oscilloscopes also deliver eye diagram mask tests using the standard mask test functionality.

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

Wi-Fi underground communications system

The Powertec Telecommunications Wi-Fi underground communications system is a portable, IP-rated, bespoke system which generates a closed loop IP network above and below ground. This allows users to take advantage of voice and data applications.

The product provides users with the ability to achieve voice and data underground connectivity, while at the same time reduce business costs, increase productivity and improve staff safety.

It removes the need for a whole team of consultants needed to be on-site. Organisations can reduce their on-site teams and still access information via video, photos, data and monitoring equipment.

The product uses job-specific configurations and comes in a high-impact pelican case. It is portable, scalable and easy to deploy across a range of below-ground operations across mining, energy, water, gas, high-rise building and marine.

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SEPURA, EASTCOM PARTNERSHIP

Sepura and its partner, Eastcom, have celebrated five years of collaboration by renewing their distribution and joint development agreement for Sepura products in the Chinese market. Eastcom designs, develops and manufactures TETRA systems and equipment and has a long history in China's mobile communications industry. It is an active player in wireless trunking, having developed eTRA, a digital communication system that supports both TETRA and the Chinese Police digital hybrid network. In 2012, the companies signed MoU, under which they agreed to share skills, insights and market experience relating to the manufacture, distribution and service of TETRA products.
More info: bit.ly/2enkYtV

OPTUS, NOKIA SIGN 5G MOU

Optus and Nokia have signed a memorandum of understanding to collaborate on the evolution of 5G technologies. A key part of the effort will be a 5G trial using Optus's 3500 MHz spectrum. The two companies will deploy an early 5G prototype in the band in Australia by 2017. Optus has conducted initial closed tests with Nokia at its Sydney headquarters on a new 5G radio test bed on Nokia's Airscale product. A separate trial demonstrated the capability of Narrow Band-Internet of Things (NB-IoT) to support the connectivity needs of IoT applications. The two companies have said they will collaborate on a range of issues.
More info: bit.ly/2enlhoF

Handheld radio

The Hytera PD98X handheld radio offers a good audio experience through noise cancellation technology. It also has full duplex calls, recording capability via Micro SD, Bluetooth 4.0 for audio or data and single frequency repeater mode to increase coverage.

Key features of the product include full duplex call, enabling frontline personnel to make calls between radios, telephones or mobiles; single frequency repeater mode, which enables the device 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; built-in Bluetooth 4.0, which supports audio transmit and allows programming; noise cancellation and 2.5 W audio output to ensure clear and loud voice communication; IP68 protection, which complies with the highest dust and waterproof standards and ensures the radio continues to function after submersion down to 2 m for up to 4 h; smart battery, which makes it easier to monitor the battery status and reduces charging time; and audio recording via micro SD card up to 32 GB, which can record up to 576 h of digital/analog audio.

Hytera Communications (Aust) P/L
www.hytera.com.au

Push-to-talk satellite

The Wireless Innovation push-to-talk (PTT) satellite integrates into existing and future networks. It uses L-Band satellite, 3G and 4G to provide unlimited coverage without the need for terrestrial infrastructure.

The product provides interoperability and cost control by implementing least cost routing and standards-based interoperability. Satellite PTT can be installed instantly with little maintenance cost with the advantage of global coverage. Integrating satellite PTT into an existing LMR radio network provides seamless communications for regional and remote areas for public safety.

With the ability to utilise multiple bearers including satellite and 3G/LTE type networks, the company uses a robust 'multipath protocol' which ensures the product can least cost route without switching between the individual bearers.

The product offers a 4-wire E&M interface to ensure users can integrate existing mobile radios to the satellite PTT, as well as integrate to the console if required. Also available is an ISSI gateway for the product, to ensure interoperability to existing P25 networks.

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AIRBAND CODE OF PRACTICE

ARCIA has released a code of practice for the "pairing of VHF aeronautical stations to VHF or UHF land mobile radios". The code has been developed in consultation with the ACMA and Airservices Australia and is "designed to provide information for regulators, airlines and communication industry members on a standard interface format for interconnection of radios". The code of practice outlines how operators can ensure the protection of airband frequencies and networks, and in particular the prevention of harmful interference. The document covers interconnect principles; interfacing requirements; common equipment requirements; antenna, antenna mounting and cabling issues; personnel and equipment security; and licensing issues.
More info: bit.ly/2f8oxTr

ERGON RE-SIGNS ETHERSTACK

Etherstack has signed a new $3.4 million contract with Queensland's Ergon Energy to provide support services for its P25 digital radio network for the next five years. The network was designed, manufactured and deployed by Etherstack in 2011 and is one of numerous large-scale electric utility and public safety radio networks that the company has deployed and supports around the world. "Etherstack has supported the network from the start, through floods and cyclones, and we are very pleased to be continuing to support our customer over the next 5 years," said David Deacon, Etherstack's CEO.
More info: bit.ly/2e3g3Je

Wireless access points

The Mimosa Networks A5/C5 wireless access points have client speeds capable of 500 Mbps+. The product has access point capacity up to 1.5 Gbps, delivering the speed consumers and business users require.

The A5 features quad-panel MIMO technology, delivering good performance for high-density, short-range multipoint broadband applications. The product provides four individual 90° panels that can transmit MIMO streams only in the direction of a desired client.

Integrated high-precision GPS sync technology allows every deployed device to be collaboratively synchronised across the network. This allows easy channel re-use to save valuable spectrum network-wide. It is simple to deploy and optimises network spectrum use and performance across all deployed devices.

The carrier-grade IP67 ultrarugged design allows the product to withstand harsh environmental conditions.

The multipoint solution is designed to instantly and securely add client devices to any access point on the user's network automatically with one-click authentication. The company has eliminated manual installation and pre-provisioning complexity, allowing users to focus on adding subscribers quickly.

Streakwave Pty Ltd
www.streakwave.com.au

Test receiver

The AFJ Instruments FFT3300 test receiver is a compact receiver with a fully digital IF for measurement of radiated electromagnetic interference from 30 MHz to 3 GHz.

The product is based on a PC integrated architecture with WINDOWS 7 embedded operating system (external remote control via a PC is also available), which means that the receiver is ready to operate with already loaded advanced software. This enables the operator to set all parameters and set up the receiver in accordance with CISPR 16-1-1 or alternatively to tailor the parameters according to specific user needs.

Measurements to commercial EMI international, European and product standards can easily be carried out by comparing the EMI spectrum with the associated limit lines and switching on the appropriate detectors. The product is fitted with pre-selectors that allow good dynamic range and precise radiated emission measurements. It is compliant to CISPR 16-3 and is applied to the wideband IF signal with the fast scan mode. It is also possible to use the equipment in the standard receiver modes (SWEEP and SMART SWEEP).

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Above and beyond

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AUSSIE TECH FOR
RADIO GIANT

The Five-hundred-metre Aperture Spherical Telescope (FAST) in the south-western province of Guizhou.

Image Credit: Prof. Andreas Wicenec/ICRAR

Handling the 3-petabyte-per-day tsunami of data from China's giant radio telescope.

The world's largest filled single-dish radio telescope was launched yesterday, and it relies on a piece of Western Australian innovation.

The telescope — known as FAST — uses a data system developed at the International Centre for Radio Astronomy (ICRAR) in Perth and the European Southern Observatory to manage the huge amounts of data it generates.

The software is called the Next Generation Archive System (NGAS), and it will help astronomers using the telescope to search for rotating neutron stars and look for signs of extraterrestrial life.

FAST, or the Five-hundred-metre Aperture Spherical Telescope, is so large it had to be built into a valley in the Guizhou province in south-west China.

The NGAS data system will help to collect, transport and store about three petabytes of information a year from the telescope.

"That's a hundred thousand 32 GB iPods filled every year," said Professor Andreas Wicenec, who heads up ICRAR's ICT program and helped design the data system.

"Getting that kind of capacity is not too hard anymore but the main challenge is transporting so much data and having the network bandwidth to move it around."

FAST will be one of the most sensitive telescopes ever built, and the huge amounts of data produced will allow astronomers to map hydrogen gas in the Milky Way, hunt for rotating neutron stars known as pulsars and look for signals from extraterrestrial intelligence.

It is an official pathfinder to the multibillion-dollar Square Kilometre Array (SKA) telescope, to be built in Western Australia and South Africa.

Professor Wicenec said China marks the latest conquest for the NGAS data system, which is already used on telescopes including the European Southern Observatory, the US National Radio Astronomy Observatory and the Murchison Widefield Array in outback Western Australia.

"For us it's quite exciting to install NGAS on yet another telescope because the system is now being used all around the world," he said.

"China is one of the few regions we hadn't covered yet."

The International Centre for Radio Astronomy Research (ICRAR) is a joint venture between Curtin University and The University of Western Australia with support and funding from the State Government of Western Australia.

ICRAR's Data Intensive Astronomy team, based at the University of Western Australia, is leading the international effort to address the challenges surrounding the flow of data within the SKA observatory.

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The PTT solution also provides a unique "least cost routing" option using Multi-Path Protocol (MPP) which essentially routes traffic at a packet level to ensure the least cost route whilst maintaining zero packet loss.

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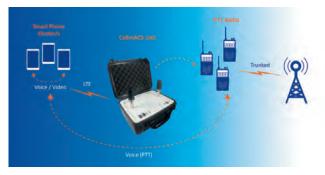
1 Full global coverage

2 3G / LTE Least Cost Routed

3 Integration to your existing radio network

4 P25 Integration via ISSI

5 Mobile Repeater Option

Wireless Innovation

COBHAM

Interoperability system

The CellmACS interoperability system, from Duons and JRC, is a rugged, portable and powerful RoIP gateway that empowers the user to quickly and efficiently establish mobile command posts in the field.

The product has compatibility with the full spectrum of commonly deployed radio networks including VHF, P25, TETRA and LTE, which facilitates reliable communications between different agencies across multiple locations, regardless of equipment disparaties.

With the ability to support hundreds of active users per unit, fast and simple activation, optional IP backhaul and much more, this product simplifies the once complex task of coordinating communications during critical events. This streamlines the flow of the right information to the right person at the right time, ultimately enhancing the operational response, minimising harm and increasing the likelihood of a successful mission.

Duons MCO Pty Ltd

www.duons.com

Long-range wireless radio

The Harris CapRock Communications OnePath long-range wireless radio offers a mode of connectivity that is complementary to very small aperture terminal (VSAT) technology, providing higher throughput and increased redundancy. It is designed for bandwidth demand in the cruise, energy and commercial maritime industries.

The radio enables a fully secure, localised wireless data/voice network complete with traffic management. It provides first/last mile connection and can close links in excess of 160 km with appropriate heights. Licensed or unlicensed spectrum options are available with throughputs of up to 400 Mbps. It is equipped with operating modes for point-to-point and point-to-multipoint applications.

It offers low latency to ensure rapid delivery of high bandwidth applications including VoIP, real-time video, teleconferencing and sensor traffic.

Harris CapRock

www.harriscaprock.com

RISKY RADIO?

Jonathan Nally

The UK's "inherently risky" new Emergency Services Network is running five months late.

The UK Government's plan to upgrade the radio system used by the emergency services with a system that is "not yet in use nationwide anywhere in the world … carries significant implementation risk," according to the National Audit Office (NAO).

In a recently released report, the NAO said that the current communication service, Airwave, has "served the emergency services effectively" and has averaged 99.9% availability since April 2010.

However, it is an expensive system, costing £1300 per handheld or vehicle-mounted device per year, and its data capabilities are poor.

A "deteriorating commercial relationship" with Airwave after 2010 meant that the government "did not believe an extension or re-procurement would offer value for money".

The government has been looking at options to replace Airwave when the contracts expire and has set up the Emergency Services Mobile Communications Programme to carry out this work.

The replacement for the Airwave system, known as the Emergency Services Network (ESN), is expected have lower operat-ing costs by virtue of using parts of an existing commercial 4G network run by EE.

The ESN is inherently high risk, according to the NAO. International comparison work, commissioned by the NAO, has concluded that "the proposed ESN solution is the most advanced in the world, with only one other country — South Korea — seeking to deploy a similar solution".

The NAO report said there are "significant technical challenges that the programme needs to overcome including working with EE to increase the coverage and resilience of its 4G network so that it at least matches Airwave and developing handheld and vehicle mounted devices as no devices currently exist that would work on ESN".

Yet NAO adds that the "ESN is the right direction strategically" and "the benefits of ESN should be substantial", but that the business case is "overly optimistic in its valuation of these".

"The programme's planned approach to delivery should maximise these benefits, if successful, but has also maximised the risk," said the NAO in a statement.

David Holt/Flickr

ESN by the numbers

70% — Percentage of Great Britain's landmass, as measured for ESN purposes, covered by EE's 4G network in July 2016. This needs to be increased to 97% to match Airwave's coverage.

£3.6bn — Estimated value of the quantified benefits over 17 years resulting from switching to the ESN.

£1.2bn — Estimated cost of ESN, April 2015 to March 2020. After March 2020 ESN is expected to save money compared to Airwave.

412 — Number of public organisations using Airwave in 2016, with an estimated 328,000 Airwave devices in use within these organisations.

99.9% — Average availability of the Airwave network between 2010 and 2016.

£500 — Estimated annual saving per device (handheld or vehicle mounted) used by the emergency services once the transition to ESN is complete.

5 months — The minimum length of time the programme is currently behind schedule compared to the full business case. The programme considers this will be recovered before the ESN goes fully operational.

£475 million — Estimated cost to the taxpayer of a 12-month nationwide delay in the time taken to transition to ESN.

The full report can be downloaded from nao.org.uk/wp-content/uploads/2016/09/Upgrading-emergency-service-communications-the-Emergency-services-Network.pdf. A summary report is available from nao.org.uk/wp-content/uploads/2016/09/Upgrading-emergency-service-communications-the-Emergency-services-Network-Summary.pdf.

More testing needed

It is expected that £1.2 billion will be spent setting up ESN by March 2020 before it starts to realise benefits.

After that time, according the NAO, ESN will "cost an estimated £500 less than Airwave per device per year and will have better data capabilities, allowing the emergency services to operate more effectively".

"The ESN programme has an energetic, delivery-focused culture that has helped it retain staff and manage issues as they have emerged," the NAO report said, adding, "Nevertheless, the programme is at least five months behind the schedule agreed a year ago and has responded by squeezing the time available rather than extending the overall timeframe."

"Its management of its key risks needs to improve if it is to deliver ESN successfully, including: the programme's approach to technical assurance and testing; user engagement and more clarity on the contingency arrangements for extending Airwave."

The programme is "not intending to force the emergency services to transition to ESN" but has instead assured them that they can stay on Airwave until ESN is "at least as good as Airwave".

According to the NAO, defining this is "complex and leaves room for disagreement".

"The need to save money and get out of a difficult commercial relationship has led the government to try and move to an approach that is not yet used nationwide anywhere in the world," said Amyas Morse, head of the NAO.

"The programme remains inherently high risk and while steps have been taken to manage these risks we are concerned that these are under-rated in the Home Office and elsewhere.

"The programme needs to put in place more independent testing and assurance regimes for its technical solution and urgently improve its approach to engaging with the emergency services."

David Holt/Flickr

Next Generation Mobile Intelligence: What does mobility really mean for public safety agencies?

**Steve Crutchfield, Managing Director, Australia
and New Zealand, Motorola Solutions**

Public safety agencies globally are investing in technologies to enable them to access essential information in a more mobile way — a concept often referred to as mobility.

Being able to access critical information while on the move is an important way of helping public safety agencies manage their daily workflows, while helping increase productivity and safety. As technologies shift to broadband-based solutions, public safety agencies are looking for more effective ways to share intelligence between first responders working either in the field or in vehicles with their colleagues in the command centre.

In response to this need, Motorola Solutions has developed its vision for smart public safety, Next Generation Mobile Intelligence (NGMI), which is designed to help public safety agencies reach their goals of greater safety and operational efficiency. This can be achieved by placing the right information into the hands of first responders using a choice of devices, the best available networks and purpose-built, public safety grade applications.

We have identified the combination of four key principles which help define how public safety agencies can achieve their goal of better performance through smart technology, and these principles are central to NGMI. They are mobility, connections, intelligence and partnerships. Let's look at the first principle of mobility in more detail.

In the context of public safety, mobility solutions enable agencies to integrate a choice of devices and applications to deliver information in a format that suits technology users in accordance with their roles.

A choice of devices

A vital element of mobility is having the ability to perform a role using a choice of devices. The challenge for public safety agencies is to ensure their teams' ability to communicate and coordinate responses is not compromised by the use of a mixed fleet of devices, networks and applications.

The range of devices available will naturally be more limited due to greater requirements for durability, security, reliability and accessibility to specific systems.

Nevertheless, working in public safety, as with any other work environment, involves completing a range of tasks which could mean using a selection of communications devices. This may include a combination of mission-critical devices, such as the rugged LEX L10 handheld, or consumer-grade devices like a smart phone or tablet. Some responders may need waterproof devices for their role. Others need rugged devices for harsher environments or a larger screen to manage data input tasks. Having the right device is essential. This frees responders from work they might otherwise need to do back at the station by placing the right device at their fingertips, bringing convenience and efficiency in managing their daily workflows.

Right information to the right person

Once the choice of device/s is determined, the right information must then be delivered to the right person in a format that is easy for them to consume. This enables improved collaboration, enhanced decision-making, more efficient use of resources and better outcomes for both agencies and the community.

So what does mobility look like in a practical sense?

Imagine a siege situation where an offender has taken a small group of people hostage in a public building, such as a library. With the right mobility principles in place, officers can collaborate on the best approach to the incident. Utilising a public safety grade mapping and whiteboard application can enable all responders to access a single, common operating picture of what is transpiring at all times.

Meanwhile, operators at the command and control centre can scan footage relayed back via the officer's body-worn camera. The control

Rugged LEX L10 LTE Handheld

centre can also monitor social media feeds for vital information.

The outcome is the ability to filter and analyse multiple information sources to identify 'actionable intelligence', meaning information that can be acted upon.

Summary

Mobility is a key principle in placing information into the hands of first responders. With access to superior intelligence delivered to the right people in the right format and on the right device, responders can make better decisions and deliver better outcomes, helping to keep the community safe.

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Fibre tester

The Anritsu Network Master Pro MT1000A fibre tester ensures the proper installation and operation of high-speed LTE networks. It has the CPRI RF module installed, providing a single handheld option for LTE CPRI testing and verification of the latest generation of tower-mounted radios.

The product has a fast sweep speed, allowing it to conduct measurements up to 10x faster than comparable handheld test solutions. The result is that users can capture all interfering signals, including intermittent or 'bursty' interferers missed by current alternatives. Incorporating a spectrum/spectrogram tune and zoom feature, the product allows users to zoom in on an area of interest to provide more detailed information for better identification of an interfering signal's origin.

The product conducts RF-based LTE measurements over a fibre-optic CPRI link at ground level, eliminating the time-consuming and costly process of climbing a tower. Designed with two SFP ports, the product allows CPRI spectrum, CPRI spectrogram, SFP data and CPRI Layer 2 alarms and optical power measurements to be made. Preconfigured network element manufacturer set-ups are included.

Compact, battery-powered and easy to use, the product provides everything needed to install and maintain communication networks in a rugged, field-portable package. It can be configured with support for OTDR and VIP (visual inspection probe) to test the complete CPRI infrastructure. It supports CPRI interface rates 1–8 to test current and future CPRI interfaces. It can identify problems in the mobile front haul rapidly, solve issues quickly, reduce system downtime and customer churn, and cut operating costs for mobile operators.

Anritsu Pty Ltd
www.anritsu.com

Tactical high-frequency and software-defined radio

The Codan Sentry-H tactical high-frequency (HF) and software-defined radio (SDR) provides tactical agencies with rugged and secure voice and data communications. It is affordable, ruggedised and simple to operate.

It delivers 150 W of RF power without the added cost, weight and complexity of an external amplifier. The product has an in-built power amplifier that provides full-duty cycle performance across the complete HF band for all supported modes. It is designed for efficiency and a wide range of DC input voltages, making it suitable for vehicle and other battery-based systems. The unit is made out of a high-grade metal cast chassis and meets or exceeds MIL-STD-810G.

Codan Limited
www.codan.com.au

DRONE
AND DROP

A drone delivers an F-cell to a rooftop. Once dropped off, the solar-powered F-cell automatically connected to the network.

Nokia Bell Labs has demonstrated a drone-delivered, self-activating F-cell system.

Image courtesy Nokia Bell Labs.

Nokia Bell Labs has announced what it calls "a breakthrough" in small cell technology that offers greater flexibility, efficiency and optimised deployment economics. The company said this will expedite the development of the high-capacity and low-latency network that will form the digital fabric of the future for humans and machines.

F-Cell technology eliminates the costly power and backhaul wires and fibres currently required for small cell installation to enable 'drop and forget' small cell deployments anywhere.

Bell Labs recently demonstrated the world's first drone-based delivery of an F-Cell to a Nokia office rooftop (see photo) in Sunnyvale, California. The F-Cell wirelessly self-powered, self-configured and auto-connected to the network and instantly began to stream high-definition video.

Underlying the F-Cell breakthrough is a re-imagining of the network architecture to place key functional elements in optimum locations.

The F-cell architecture comprises a closed-loop, 64-antenna massive MIMO system placed in a centralised location that is used to form eight beams to eight energy autonomous (solar powered) F-Cells.

Each of the cells has been redesigned to require minimum processing power so that the solar panel is no larger than the cell itself.

In this way, F-Cell technology sustainably solves today's small cell and backhaul cabling, deployment and expense challenges for service providers and enterprises.

The architecture supports non-line-of-sight wireless networking in frequency division duplex (FDD) or time division duplex (TDD) mode, and the parallel operation of up to eight individual 20 MHz channels allowing for a system throughput rate of approximately 1 Gbps over existing LTE networks.
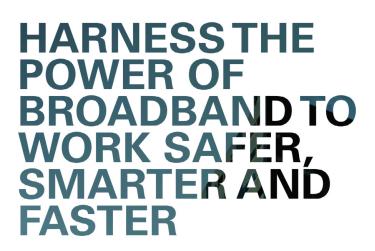
In future, this architecture will scale to enable up to tens of Gbps using higher spectral bandwidth, new spectral bands and a larger number antenna arrays.

"F-Cell is a key breakthrough in massively scalable and massively deployable technology that will allow networks to deliver seemingly infinite capacity, imperceptible latency and connectivity to trillions of things," said Marcus Weldon, president of Nokia Bell Labs and Nokia CTO.

"Nokia Bell Labs is again excited to reinvent the future and help drive what we believe will be a technological revolution, underpinned by the creation of a new digital network fabric that will transform human existence."

F-Cell advances Nokia's Future X Network vision of 100x capacity growth and 100x reduction in latency, with optimised, facile deployment economics to explore the human possibility of technology at speed and with the creation of new value.

F-Cell won the CTIA Emerging Technology (E-Tech) 2016 Award for cutting-edge mobile products and services transforming wide area networks (5G, 4G and LTE 4.5).

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MOTOROLA SOLUTIONS

VEHICLE COMMS

CONNECTED CARS
Jonathan Nally

The vehicle industry has formed a 5G connected-car communications consortium.

Car manufacturers and telecommunications companies have teamed up to form an association that aims to develop standards and solutions for future automotive communications systems.

The 5G Automotive Association comprises AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia and Qualcomm, with more companies expected to join.

In a statement released on 29 September, the association said it will "develop, test and promote communications solutions, support standardisation and accelerate commercial availability and global market penetration".

It added that the goal is to "address society's connected mobility and road safety needs with applications such as connected automated driving, ubiquitous access to services and integration into smart cities and intelligent transportation".

"For the automotive industry it is essential that 5G fulfils the challenges of the era of digitalisation and autonomous driving," said Dr Christoph Grote, senior VP Electronics, BMW Group.

"With the 5G Automotive Association we founded a cross-industry forum that allows us to shape the future 5G technology with leading ICT companies."

The new association was announced on the same day that an economic analysis released by Australia's peak driverless vehicle organisation — the Australian Driverless Vehicle Initiative (ADVI) — reported that Australia could "unlock $95 billion a year in economic value and generate 16,000 new jobs" by taking a more proactive 'NBN-style' approach to the introduction of autonomous vehicles in Australia.

Collaboration is key

According to Alfons Pfaller, head of Infotainment Development at AUDI AG, connected cars "will shape the future of individual mobility", and next-generation mobile networks will take car-to-everything connectivity to a new level.

"The key to success is in cross-industry collaboration," he said.

The 5G Automotive Association will address "key technical and regulatory issues, leveraging next-generation mobile networks and integrating vehicle platforms with connectivity, networking and computing solutions". Its main activities will be:

• Defining and harmonising use cases, technical requirements and implementation strategies.
• Supporting standardisation and regulatory bodies, certification and approval processes.
• Addressing vehicle-to-everything technology requirements, such as wireless connectivity, security, privacy, authentication and distributed cloud architectures.
• Running joint innovation and development projects leading to integrated solutions, interoperability testing, large-scale pilots and trial deployments.

"With the creation of this association we will leverage our latest technology, 5G, and work closely together with the car industry to jointly develop solutions as well as provide input to regulation, certification and standardisation," said Ulf Ewaldsson, chief technology officer, Ericsson.

"We are excited to be co-founder and to work with leading automotive companies shaping the connected car solutions for the future."

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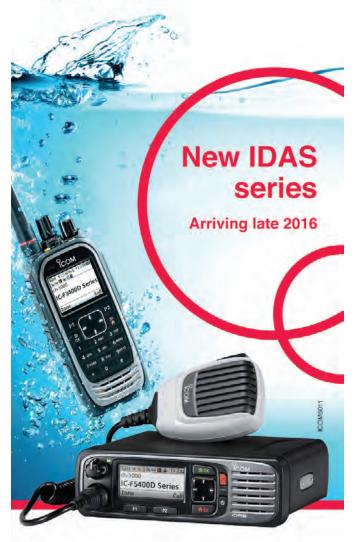
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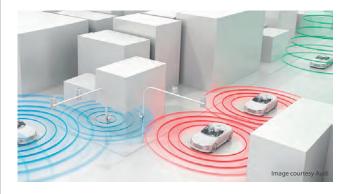
> **"CLOUD, COMMUNICATIONS AND NETWORKING TECHNOLOGIES AND INNOVATIONS HAVE THE POTENTIAL TO TRANSFORM THE CAR INTO A FULLY CONNECTED DEVICE." — MARC ROUANNE, NOKIA**

Image courtesy Audi

"Cloud, communications and networking technologies and innovations have the potential to transform the car into a fully connected device to revolutionise the driver experience and address society's mobility needs," added Dr Marc Rouanne, Nokia's chief innovation and operating officer.

Economic benefits

The ADVI report — authored by economist Brian Haratsis, executive chairman of ADVI's program partner MacroPlanDimasi — argues that a coordinated industry and government-led approach is needed to mitigate the risks of rapid uncontrolled autonomous vehicle adoption from 2020.

"We have the high-tech research, design, testing and manufacturing capabilities to make us a leading exporter of mobility services and technology across the APAC region," Haratsis said.

"By taking first mover advantage in this emerging global industry, we can not only mitigate the forecast 40,000 jobs to be lost in car manufacturing, but create a new specialised high-tech export market."

According to the report, if the average $2 billion in assistance to car manufacturers between 1997 and 2012 was invested in intelligent mobility, direct employment could be doubled from 7500 to 15,000.

"Add that to the estimated baseline $80 billion economic saving from improved road safety and congestion thanks to autonomous vehicle technology and the incentives for swift and decisive action are clear," said Haratsis.

The report found that growing Australia's stake in the global intelligent mobility sector from 0.25 to 1% would inject $15 billion into the economy and create 7500 direct jobs and an additional 8500 indirect jobs.

Haratsis said a prime example of the sector's growth potential was the more than 75 ADVI partner organisations collaborating on driverless technology, many of which were already leading the world in research and deployment.

ADVI is advocating for the development of a five-year funding and incentive package focused on research, development, demonstration and deployment similar to the $177 million (£100m) Intelligent Mobility Fund, which is predicted to fast track $1.6 trillion in productivity benefits.

Wireless adaptive ANC headset

The Sennheiser MB 660 Series wireless adaptive ANC headset is designed specifically for knowledge workers in noisy open offices. The business-grade product features adaptive ANC, providing active noise cancellation, UC certified communication abilities to ensure clear speech during voice calls and good audio quality for music and multimedia.

The product constantly monitors the background environment for ambient noises and adapts the level of noise reduction in the headset.

It is certified for Skype for Business and optimised for all major UC and softphone brands to ensure effortless collaboration in UC environments. With good microphone and noise filtering technologies, the headset is fully integrated and has a three digital microphone array.

Premium sound with a personal note offers personalised sound for speech, music and entertainment. The headset delivers high-quality stereo audio and CD-quality streaming. With a choice of preset sound effect modes — club, movie and speech — the audio experience can be suitable for different listening situations. The customisable director mode can be further individualised to meet personal preferences.

The headset connects wirelessly to a mobile phone or to a PC via the included UC certified BTD 800 USB dongle. An audio cable is also included, so it is possible to continue using the headset even if it runs out of battery. The foldable headset is supplied with all accessories in a carrying case.

A simple swipe or tap of the ear cup-mounted touch pad controls calls and media. Double tapping the right ear cup makes it possible to listen to colleagues or announcements without removing the headset. The product automatically powers down when the headset is folded for storage.

Sennheiser Australia Pty Ltd
en-au.sennheiser.com

Pager

The Swissphone s.QUAD pager is an integral part of DiCal, providing many benefits both for the user and operator.

The product has robustness, comfort and battery autonomy. The durability of the product is demonstrated by its 6.5′ drop test onto concrete. It is also waterproof with an IP67 rating. At the same time, it is slim, lightweight at only 4 oz and comfortable to wear. The s.QUAD remains operational up to three months without battery recharging. It also runs with one standard AA battery.

The product achieves a sensitivity of 2 μV/m. This high sensitivity means the pager will alert when others do not have enough signal. According to the company, no other pager has been able to duplicate this result.

The product comes with a standard Bluetooth low energy (BLE) connection, allowing it to connect to smartphones. This functionality enables the pager to respond back to an alert or change responder's status of availability, displayed and managed in the resource management platform.

It has an integrated speaker, which achieves a sound level greater than 95 dB at a distance of 30 cm. A further benefit of a speaker is that it can be used to output audio. It is therefore possible to program an audio file (WAV) as the alerting tone.

For more information: www.swissphone.com.

Unicom Pty Ltd
www.unicompl.com

Rugged computer

The DEWESoft SBOX computer is designed to be powerful, fast and rugged. The three available models are SBOXe, SBOXre and SBOXfe.

The product can run on EtherCAT interface and be connected in a daisy chain with one single cable for power, data and synchronisation. Instruments run on Intel Core i7 processor and have an integrated sync junction that enables the software to automatically recognise the device when connecting it.

The computers have either 4 x 2 GHz or 3517UE 2 x 1.7G Hz processors with a memory of up to 16 GB, removable SSD and maximum power consumption of up to 55 W. Depending on the model, the operating temperature is -20 to 50°C.

They are also compatible with many interfaces and contain 4 x USB3.0 at the front, 2 x USB2.0 at the rear, Ethernet 2 x GLAN, 1 x WLAN and 1 x DVI, which is VGA and HDMI compatible for video. It has optional 10 Hz, 100 Hz + RTK GPS.

Metromatics Pty Ltd
www.metromatics.com.au

PTT unified controller

The Press to Talk Unified Controller, or PTT-UC, is an innovation from Auria's parent company Etherstack. The device, when coupled with GME's P25 mobile radios, provides a single speaker microphone with OLED display and 2 W in-built speakers. This gives end users a cost-effective cross banding solution as well as the capability to least-cost route radio calls over P25, 3G/4G, Wi-Fi and/or satellite backhauls.

The palm-sized PTT-UC can be used to extend radio coverage without the need to add costly fixed site infrastructure, and seamlessly unifies different operating networks such as analog, conventional or trunked systems.

Auria Wireless Pty Ltd
www.auriawireless.com

LMR IN
US GOVERNMENT
SERVICE

Most US government departments report having a good or
excellent level of LMR interoperability with each other.

The US Government Accountability Office (GAO) has released a report into the use of land mobile radio (LMR) across government departments, including interoperability issues. It found that the federal agencies it surveyed generally use LMR equipment to meet their core missions, such as public safety, emergency management or firefighting.

The GAO had been asked to examine federal agencies' LMR interoperability and procurement practices. In particular, it examined:

• LMR equipment used by federal agencies and the state of LMR interoperability among these agencies;
• factors that help and hinder LMR interoperability among agencies; and
• agencies' LMR procurement practices.

The survey covered civilian federal agencies, identified through their membership in the Emergency Communications Preparedness Center (57 agencies fully responded to the survey and one agency, the FBI, provided a partial response).

The GAO also reviewed Department of Homeland Security planning documents related to interoperability and interviewed federal agency officials with responsibilities related to emergency communications and procurement of LMR equipment.

More than two-thirds of the 57 agencies surveyed reported using equipment from the same manufacturer because, for example, they believe doing so will help ensure compatibility of new LMR equipment with existing system requirements.

Most agencies surveyed were consistent in identifying each other as agencies with which they have or have not needed LMR interoperability over the past 5 years.

Of the agencies that identified the need to communicate with each other, about two-thirds reported generally having a good or excellent level of LMR interoperability.

The use of standards-based and multiband LMR equipment has helped to enhance interoperability among agencies, but the use of proprietary features and other factors continue to hinder interoperability.

Almost all of the agencies that GAO surveyed reported using LMR equipment that meets voluntary technical standards, which have improved interoperability.

Further, almost half of these agencies reported using multiband radios, which operate on multiple public safety radio bands, to enhance interoperability.

However, agencies reported several factors continue to limit their progress in achieving interoperability with other federal agencies.

These factors include the use of proprietary features and encryption in devices and limited investments in LMR systems and devices.

For example, about half of the agencies surveyed reported that the use of proprietary features within LMR devices has hindered interoperability.

Nearly half of the agencies GAO surveyed reported using pre-approved vendors with established prices to acquire LMR equipment, mainly through contracts sponsored by the Departments of Homeland Security and the Interior.

While this approach can facilitate cost savings and interoperability, many of the agencies reported purchasing equipment through multiple agreements, a practice that can reduce these benefits.

About 40% of agencies GAO surveyed reported using sole-source procurement or independent approaches.

According to the Office of Management and Budget (OMB), in general, agencies often purchase and manage items in a fragmented and inefficient manner.

This approach can result in duplication of effort, which imposes significant costs on federal agencies.

OMB has directed agencies to implement 'category management' as an improved way to manage spending across government for commonly purchased goods and services.

This approach enables the government to leverage its purchasing power and realise cost savings.

ALMOST HALF OF THE AGENCIES REPORTED USING MULTIBAND RADIOS, WHICH OPERATE ON MULTIPLE PUBLIC SAFETY RADIO BANDS, TO ENHANCE INTEROPERABILITY.

However, OMB's category management initiative does not include LMR equipment even though federal agencies spend millions of dollars annually purchasing such equipment.

GAO has recommended that OMB examine the feasibility of including LMR in its category management initiative.
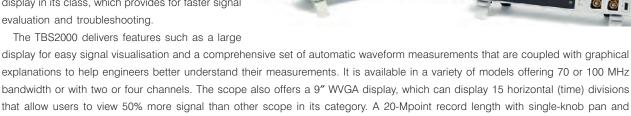
By including LMR equipment in OMB's category management initiative, the government could more fully leverage its aggregate buying power to obtain the most advantageous terms and conditions for LMR procurements.

OMB officials agreed that a category management approach to LMR procurement might save the government money while supporting the goal of enhanced interoperability among agencies that require it, but OMB has not examined the feasibility of applying this approach to the procurement of LMR equipment.

Digital storage oscilloscope

The Tektronix TBS2000 digital storage oscilloscope, available from RS Components, is a next-generation basic oscilloscope that features what the company claims is the longest record length and largest display in its class, which provides for faster signal evaluation and troubleshooting.

The TBS2000 delivers features such as a large display for easy signal visualisation and a comprehensive set of automatic waveform measurements that are coupled with graphical explanations to help engineers better understand their measurements. It is available in a variety of models offering 70 or 100 MHz bandwidth or with two or four channels. The scope also offers a 9″ WVGA display, which can display 15 horizontal (time) divisions that allow users to view 50% more signal than other scope in its category. A 20-Mpoint record length with single-knob pan and zoom enables users to capture long-time-duration signals and provides easy navigation to help users locate important details.

Other key features include support for the Tektronix VPI probe interface and a 'Help Everywhere' context-sensitive configurable help utility that provides on-screen tips for important settings. The unit's Wi-Fi dongle support provides wireless connectivity and allows educators to quickly and easily set up electronics engineering labs for students, as well as enabling engineers to take advantage of the instrument's LXI-compliant interface to conveniently control the oscilloscope remotely.

RS Components Pty Ltd
au.rs-online.com

Fibre composite 3D printer

The Markforged Mark X fibre composite 3D printer offers prototyping- and manufacturing-scale parts printing in mining, manufacturing, renewables, medical prosthetics and electronics/telecommunications applications. The product introduces a set of print capabilities that includes in-process laser inspection as well as a fine, 50 μm surface finish.

A laser sensor affixed to the print head will scan parts at any layer designated, in order to measure whether the most critical tolerances are met. The product includes a high-precision build plate, encoders on the print head, silent stepper motors and a high-stiffness Z-axis motor.

The build volume is 330 x 250 x 200 mm, while the footprint of 575 x 467 x 928 mm.

Emona Instruments Pty Ltd
www.emona.com.au

Portable electromagnetic field monitoring system

The Wavecontrol SMP2 portable electromagnetic field monitoring system delivers a combination of low-frequency spectrum analysis and high-frequency broadband measurements of RF radiated signals.

The product has been developed to meet demanding customer requirements in the RF safety measurements domain. Its versatility makes it a suitable measurement tool for many different industries, including railway, power, manufacturing, chemical, medical, defence, RFID and EAS and telecommunications.

The system offers spectrum analysis (FFT) and shaped time domain (STD) mode from 1 Hz to 400 kHz for the low-frequency electric and magnetic fields, and broadband measurements to 18 GHz for the high-frequency electromagnetic fields in a single unit.

It complies with the European Directive 2013/35/EU on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields).

The product is a suitable measurement system for analysing magnetic and electric fields in public spaces and workplaces. A variety of probes can be used.

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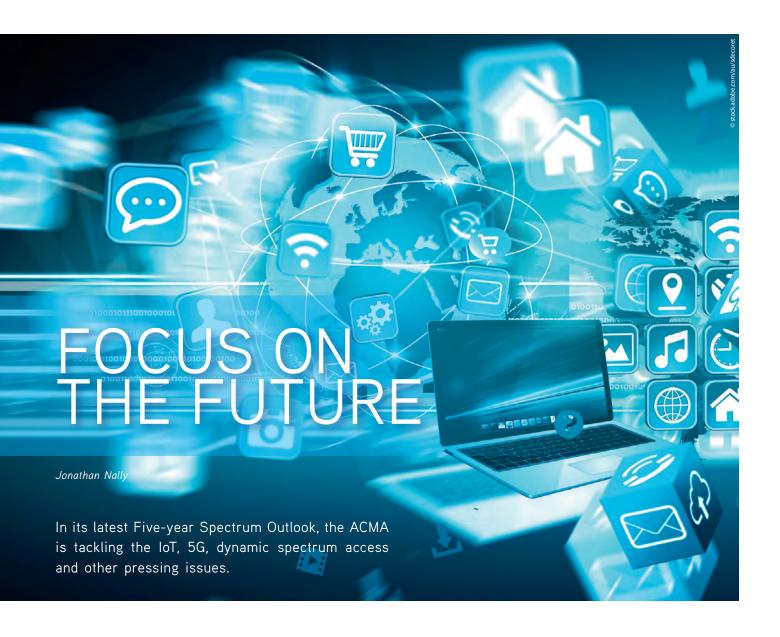**Please come and see us at Comms Connect in Melbourne, 23rd and 24th November on Stand 48**

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FOCUS ON THE FUTURE

Jonathan Nally

In its latest Five-year Spectrum Outlook, the ACMA is tackling the IoT, 5G, dynamic spectrum access and other pressing issues.

The Australian Communications and Media Authority (ACMA) has released its latest Five-year Spectrum Outlook (FYSO), covering the years 2016 to 2020, which outlines the areas it intends to work on over the next half decade and gives stakeholders an idea of what to expect.

"We have changed the FYSO this year to deepen engagement with industry and citizens on the ACMA's spectrum management priorities and work plan," said ACMA Acting Chairman Richard Bean. "They will find more information on what the ACMA is working on and why, and have more opportunity to comment, including on the format and detail of the work plan."

The FYSO includes a detailed update of the ACMA's mobile broadband work program (acma.gov.au/Industry/Spectrum/Spectrum-projects/Mobile-broadband/mobile-broadband-strategy-and-work-plan), which was released in February.

The ACMA has also released a discussion paper on planning issues for the 1.5 and 3.6 GHz bands (acma.gov.au/theACMA/future-use-of-the-15-ghz-and-36-ghz-bands). The regulator has brought forward consideration of the 3.6 GHz band by four months "in response to increasing worldwide interest in the band", which has been slated for possible use for 5G mobile.

"The changes we have made will make the ACMA's spectrum work program, and our accountability for it, clearer and increase the value and relevance of the FYSO to everyone with an interest in spectrum management," said Bean.

"It also highlights our planning for new technological develop-

ments: 5G, IoT and dynamic spectrum access (DSA)," he added.

"Getting the spectrum access settings for 5G and IoT right will be fundamental to the success of those technologies in Australia and the contribution they will make to productivity and economic growth."

Four focus areas

According to an ACMA statement, the FYSO "is an important component of the ACMA's consultation and planning framework for spectrum management. It provides information on demand pressures for spectrum and other significant challenges arising from the external environment. Publication of the FYSO supports consultation on specific spectrum issues, discussion papers and feedback through the ACMA's RadComms conferences and spectrum tune-ups."

The FYSO has four parts. Part 1 "sets out the ACMA's high-level approach to decision-making, how evidence is used to identify priorities and develop work programs, and information on external pressures that affect spectrum management. The key issue for the ACMA will be the extent to which implementation of the Spectrum Review recommendations will affect the ACMA's spectrum management priorities in the future."

Part 1 also includes a "discussion of the ACMA's response to the significant issues affecting current and future demand for spectrum with particular emphasis on the mobile broadband. It also discusses the ACMA's preparatory work to facilitate access to spectrum for 5G, IoT and DSA technologies."

Part 2 presents in detail the ACMA's work plan for the 2016–17 financial year, broken down into two parts. In the first part, key priority projects are grouped under three broad themes:

- Maximising the overall public benefit arising from the use of spectrum.
- Reducing the cost to business arising from regulation.
- Implementing reform outcomes.

In the second part, projects and activities are divided into in two sections:

- Band-by-band projects.
- Regulatory and service-planning projects.

The ACMA said it "welcomes the Spectrum Review recommendation that the ACMA should provide the minister with an annual work program, prepared in consultation with stakeholders, including key priorities over a three- to five-year time frame. The present measure does not, however, purport to anticipate or pre-empt implementation of this recommendation, which awaits passage of a new Act and any ministerial directions or requests."

It goes on to say, "In the interim (prior to implementation of the review) however, the Authority would welcome industry engagement and feedback on the format and the increased level of detail provided about each project."

The work plan has three broad themes: "maximising the overall public benefit arising from use of spectrum; reducing the cost to business arising from regulation; and implementing current reform priorities".

The first theme reflects the ACMA's Principles for Spectrum Management and provides information on projects and explains why they are priority areas of work:

- Implementation of the mobile broadband strategy and work program.
- Priority compliance areas (PCAs).
- Spectrum pricing initiatives.
- Spectrum allocations.
- Regional digital radio rollout.
- AM to FM conversions of commercial radio broadcasting services in selected regional licence areas.

The second theme — reducing the regulatory cost to business — reflects the government's 'better regulation' agenda and focuses on the ACMA's work to deliver spectrum management tools that will facilitate the capacity for customer self-service.

The third theme — implementing current reform priorities — recognises that the ACMA is responsible for implementing outcomes from major reforms:

- The government's review of spectrum management.
- Implementation of outcomes from the 400 MHz band review.
- Updates to the Australian Radiofrequency Spectrum Plan 2013 to take into account World Radiocommunications Conference 2015 (WRC–15) outcomes.

Part 3 is the ACMA's mobile broadband strategy update, being the first mobile broadband annual update to be included in an FYSO. The update outlines each of the projects in the program and includes details such as the project phase, work undertaken and next steps.

Part 4 sets out the ACMA's spectrum management work programs it expects to commence, or continue to progress. It represents the ACMA's "preliminary thinking on priorities and

> GETTING THE SPECTRUM ACCESS SETTINGS FOR 5G AND IOT RIGHT WILL BE FUNDAMENTAL TO THE SUCCESS OF THOSE TECHNOLOGIES IN AUSTRALIA." – RICHARD BEAN, ACTING CHAIRMAN, ACMA

provides an early opportunity for stakeholders to provide feedback on the ACMA's proposed planning framework".

Call for comments

The ACMA has invited stakeholders to comment on the issues set out in the FYSO, or indeed on any other issues relevant to spectrum demand analysis and strategic direction. The regulator has started the process off by suggesting a range of questions relevant to the different sections of the FYSO.

Starting off with 5G, and quoting directly from the ACMA document, the regulator wants to work out:

1. When, or under what circumstances, would it be appropriate for potential 5G millimetre wave (mmW) bands to progress beyond 'monitoring' in the ACMA's mobile broadband work program?
2. What is the relative priority of investigation of mmW bands versus other potential mobile broadband bands below 6 GHz?
3. What disposition should the ACMA adopt in progressing possible 5G mmW bands? Specifically, is a traditional approach appropriate, where Australia would wait until there were clear signs of a harmonised, widespread ecosystem developing in a band before it was seriously considered domestically? Or should a more proactive approach be adopted that would potentially make available bands very early in a more speculative manner? What are the benefits and risks to each approach?
4. What bands are the most mature in terms of possible early moves on 5G mmW bands?
5. What technical considerations are relevant to possible early moves on 5G mmW bands? For example, what is the minimum contiguous bandwidth considered suitable for individual licences and the industry as a whole? Are some of these considerations flexible in order to support an early move?
6. What spectrum sharing and incumbency considerations will be most relevant to 5G mmW bands (acknowledging that the answer will depend on the specific band under consideration)?
7. Do the mmW bands offer opportunities for new spectrum sharing and/or licensing approaches? If so, what opportunities should be investigated?

Moving on to the Internet of Things (IoT), the ACMA is seeking comment on:

1. Are there any spectrum bands that should be further investigated by the ACMA for potential future use for IoT applications? Why? The ACMA in particular seeks views on possible opportunities in the VHF band for IoT.
2. Are there any sectors of industry that require increased engagement from the ACMA regarding spectrum for IoT applications?

The issue of dynamic spectrum access is gaining more attention, and to that end the ACMA is asking:

1. When, or under what circumstances, would it be appropriate to move beyond monitoring international regulatory and technical developments and consider implementation of arrangements in Australia?
2. Are there specific industry sectors and applications where DSA is likely to be a candidate for early opportunity for adoption?
3. Are there simple changes that can be made to the regulatory framework that would better allow facilitation of trials of DSA approaches and development of implementation arrangements?
4. Are there any spectrum bands, services and/or applications, in particular, that will be, or should/shouldn't be, targeted in Australia for trials or initial implementation of DSA frameworks?

And overall, the ACMA would like to hear opinions on whether there are "any impediments or restrictions arising from the regulatory framework that would impact on the deployment of 5G, IOT and DSA?"

Spectrum and pricing reviews

In addition, ACMA has said that, "with implementation of the spectrum and pricing reviews being such a strong focus for the ACMA over the coming year", its research and analysis is "being directed towards supporting analysis for the reform of allocation, licensing and pricing arrangements associated with the reviews". The regulator says the intent of the research will be to assist it in its "implementation of the reviews and will also be used as a vehicle to engage spectrum users in the implementation process".

The ACMA will also be focusing hard on work to estimate the "highest value of use for spectrum bands that are identified as being under consideration for mobile broadband use". That includes determining the highest-value use of the 1.5 and 3.6 GHz bands, preliminary and/or comprehensive analyses of which the ACMA aims to release sometime in the 2016–17 financial year.

Personal alarm device

The Twig Com TWIG Embody 3G/GSM/GNSS personal alarm device is wearable and rechargeable. It is equipped with ergonomic and simple keys and is designed to adapt to multiple lone worker and personal safety needs.

Its light weight and pendant size, coupled with a choice of six wearing options, makes the product versatile. It can be worn on a pendant, wrist band, belt clip, belt-loop hook, ID name tag or embedded into clothing.

In a duress event, the product will SMS and voice call up to 10 numbers and is available as a duress button, or with additional features such as automatic man down recognition and GPS location sent to a smartphone as a Google map.

When entering a risky situation, enhanced monitoring can be requested with amber alert. Efficient deployment remote configuration makes the product fast to deploy and flexible to operate.

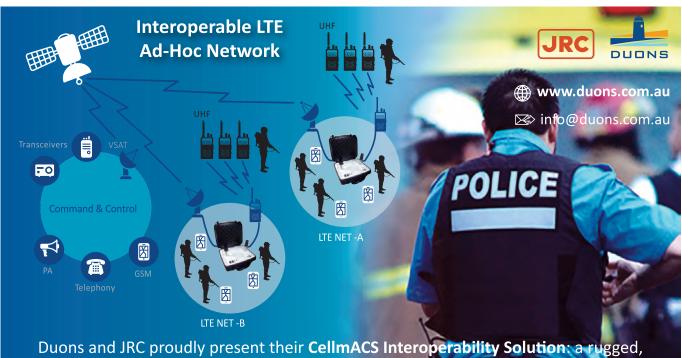Users can self-monitor, entering their own supervisor staff contact numbers. For more advanced help, WebFinder SP software provides a turnkey solution for testing or deployment.

For professional monitoring and tracking, the integrator kit resources enable the integration of devices with an alarm receiving centre (ARC) or a cloud-based TW.

Wired & Wireless Solutions International
www.wwsinternational.com.au

FAILURE IS NOT AN OPTION

Peter Davies, Technical Manager, Unicom

Time was of the essence when a critical communications system needing fixing and upgrading.

As Neil Young advises us, "Rust never sleeps". Such is the plight of many technology systems around the world. As soon as you take your new, shiny, state-of-the-art widget out of the box, its replacement is anywhere from a thought in a bright mind to a prototype on the test bench. It could even be available at the same supplier that you just purchased your new widget from!

Like rust, technology never sleeps. New widgets carry the promise of better capability, speed, reliability and redundancy. This enables the tech-savvy of our world to provide us with capabilities that enable us to be more productive and therefore drive better business outcomes.

However, as time progresses and systems continue to perform, upgrades are not on the agenda. And when 'If it ain't broke, don't fix it' applies, the 'rust' begins. And that rust can be undetectable until the structure gives way and you fall through the floor.

A Unicom client was recently presented with this unfortunate experience. A server installed and configured 10 years ago had started to become unreliable, degrading the client's Emergency Response Pager Messaging System. This system is used to coordinate maintenance and shift roster activities for a liquefied natural gas plant. The system also is a key component in the emergency evacuation process. So, due to the critical nature of this communications platform, it is easy to see that not having it reliably available was a major problem.

Our client's urgent initial request was for us to provide for the resurrection of their existing system. The problem was that ongoing software development for the pager messaging system ceased at Windows 7 — the software would not run on a machine configured with anything higher than that operating system. Added to this, the software was tied to the machine on which it was running via a software key — the company that owned this software was a

Image courtesy Bilfinger SE under CC

distant memory and therefore unable to provide solutions. In short, the client was in a pickle!

Being an agent for this software back in the day, our engineering staff was able to provide a Windows 7 licence to our client, who used it to configure a new machine. We then advised them on the installation process for a backup of their software configuration, including the software key, which we had made during the initial installation 10 years ago. Hey presto, the client was back in business. But it was now acutely aware of the risk it was faced with. So the client's next request was for us to develop and install a replacement pager messaging software system.

We had been working with the MobiCall product for some time and we viewed this as the solution. We just needed to develop a pager messaging platform within it that met the client's criteria of dual redundancy and failover between multiple transmitters, with alarm notification and hardware and software watchdogs and so

on… delivered and installed on-site immediately. There's nothing like a critical system delivery challenge to help you lose sleep!

So original plans were dusted off and the lens of possibility was overlaid. As with many reviews of legacy communications systems that we see, it quickly became very apparent that we could offer a superior solution than the existing single level of service by integrating a number of communications platforms into the proposed solution. This was of great interest to our client. It is also an area that Unicom has developed a great deal of expertise in — the integration of systems into one platform where command, control and interoperability become available.

After a number of urgent conversations and system modelling, we presented our client with our proposal. It comprise a staged approach as follows:

1. Replace the existing system to return to them reliable and supportable operations.
2. Integrate phones, email and SMS messaging into the paging messaging system.
3. Upgrade the hardware to include current technology offerings.
4. Deploy a system-wide support agreement to manage and maintain serviceability of the entire solution well into the future.

Their simple response was, "When can we have stage one?" This was quickly backed up by an order and, in that instant, we were at it! The next few days involved developing a hardware mirror system in the Unicom tech lab. This was used to test the evolution of the software pager messaging solution, which was developed on the MobiCall software messaging platform. In conjunction with this frenzy of activity, project management plans, server and client hardware criteria, factory acceptance test and site acceptance tests documents were drafted and submitted to our client for review and approval.

Once we had a working solution, we were off to the site for the installation. Did I mention that Unicom is located in Melbourne and that our client is in the Middle East? This, along with the requirement to have a remotely supportable solution, dictated the methodology of the solution.

We designed it to include a virtual machine which would run the new MobiCall pager messaging software. This way, Unicom could acquire real-time snapshots of the working system and diagnose any issues on our mirror image hardware. Once resolved, we would upload the new configuration to the client's site and from there they could run it and confirm. If any issues still remained, they could roll back to the previous known state and therefore suffer zero downtime and have a constant set of known-state backup configurations. This is just what you want if you intend to be serious about system support for a site on the other side of the planet.

The system proved to be a great success, and we are already working on adding features such as alarm emailing, sending pager messages to phones as text and as speech, and enabling pager messages to be sent via SIP using IP phones.

As with many of these deployments, once the client sees the bigger picture available through the full scope of an integrated messaging and workflow solution, they then start to see how they can coordinate their multiple disparate emergency communications systems and control the escalation of response to events through a single platform.

The customer now has a reliable, mission-critical emergency response alert system with dual redundancy and automatic failover, accessible from any customer web browser or telephone and supported 24/7 from Australia.

Unicom Pty Ltd
www.unicompl.com

Over-the-air power measurement solution

The Rohde and Schwarz NRPM OTA over-the-air power measurement solution for WLAN IEEE 802.11ad, IEEE 802.11ay and 5G will use higher carrier frequencies and higher signal bandwidths in order to achieve very high data rates. This requires the use of phased array antennas in wireless devices and base stations. These antennas use beamforming to control the direction of radiation of the transmit antenna, thus maximising the power level at the receiver. The 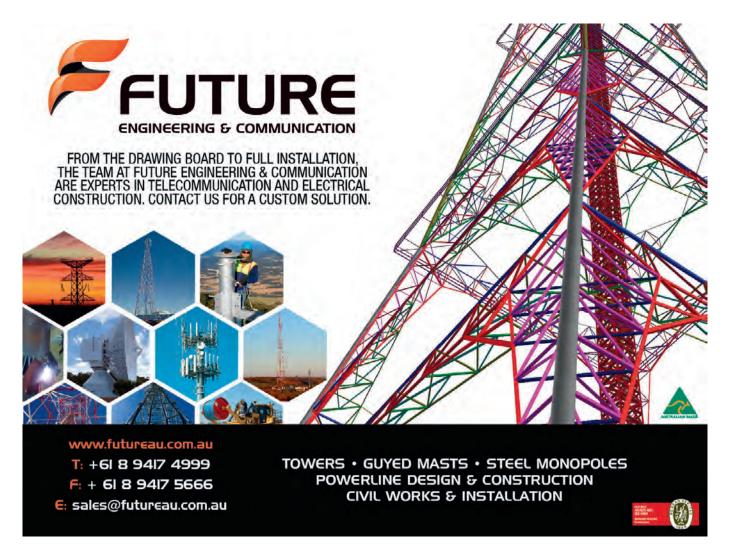power measurement solution is designed to calibrate the transmit antenna output power and test the beamforming function.

Free-space propagation loss and diffraction loss increase when data is transmitted at high frequencies. To counteract these physical effects and nevertheless achieve the desired data rates, beamforming is used to optimally direct the phased array antenna beam. Since this antenna (DUT) features high integration density and has no RF connectors, it is not possible to access its transmit signal via cable. The DUT transmit power is measured over the air during the production of wireless devices, base stations and RF modules. The antenna beamforming performance must also be verified. This is done using antennas that are spatially distributed.

The product is suitable for these measurements. It supports the frequency range from 27.5 to 75 GHz, covering the 28 GHz band for 5G and the 57 to 66 GHz band defined for WLAN IEEE 802.11ad, as well as frequencies >66 GHz for WLAN IEEE802.11ay.

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

MULTIPLATFORM PERFORMANCE

Jonathan Nally

Is a multiplatform, software-defined approach the way of the future for critical communications?

With the profusion of radio technologies available today, all of them with their good points and bad, it can sometimes be hard to find a single solution that fits every need. Enter multiplatform, software-defined radio (SDR), which promises to link multiple radio technologies together to provide operators the best of all worlds.

Denmark's DAMM is a world leader in this field, so to get some more insight into the progress of SDR, we spoke with the company's head of support and product management, Jochen Bösch.

There's been a lot of talk about devices becoming multiplatform and software defined, but is it actually happening?

There is still much confusion about the multiple technologies in use — DMR, TETRA, LTE and so on — all of which have their strengths and weaknesses. The market is calling for a combination of technologies with full integration. Software-defined radio offers customers the freedom and flexibility to configure their air interface with regards to the technology.

Integrating the customers' different existing technologies, and also accommodating for requests such as DMR simulcast, which can operate in VHF along a railway line, clearly calls for an integrated SDR solution.

Is it happening? Yes, DAMM has brought the new MultiTech Platform to the market, which integrates multiple technologies in one platform — and even in one box — by making a full interconnection and full transcoding at the core between the different technology modes.

SDR means that you can change the technology on the radio interface via software, so in the same hardware you can swap between DMR and TETRA with a simple click. Frequency and filters are hardware dependent, but carrier bandwidth is also software defined and goes along with the chosen technology.

Which kinds of customers demanding this sort of flexible infrastructure?

Different kinds of customers showed great interest in the Multi-Tech Platform that DAMM presented at Critical Comms World in Amsterdam this year. Customers in oil and gas have called for a combined infrastructure system of analog and TETRA, which is ideal for an oil platform. A DMR and TETRA combination has been requested by public safety customers to cater for coverage/capacity in rural as well as urban areas. And a TEDS and

Railway image courtesy Thomas Wolf under CC

"CONSIDER HOW QUICKLY AND UNPREDICTABLY TECHNOLOGIES ARE EVOLVING TODAY COMPARED TO CONVENTIONAL ANALOG RADIO SYSTEMS.

TETRA combination was in high demand from the utility sector, where SCADA is critical.

Not only is there a demand for flexible infrastructure, but also for the benefits of one interface for all technologies — TETRA, TEDS or DMR — which is of particular interest to the rail industry.

Does DAMM see SDR becoming dominant at some point in the future, or will it be restricted to certain applications, end-user sectors or niches?

We believe that the freedom and flexibility of SDR is the future. Consider how quickly and unpredictably technologies are evolving today compared to conventional analog radio systems, which lasted for 40 to 50 years. Disruptive technologies are creating a cautiousness in the market, where customers want to avoid a technology lock and also want to avoid a proprietary solution that could be very costly. With an SDR infrastructure, a simple upgrade of the software can enable you to cater to future technologies, which will reduce the TCO.

SDR will truly benefit a variety of industries and sectors, because it is so versatile. As for specific industries, I would nominate the oil and gas sector, and also utilities, where DMR is often chosen in order to keep down costs on the terminal side. However, DMR does not provide sufficient bandwidth in order to collect data. For data, you would run TETRA or TEDS, and in parallel you would run DMR, which would be sufficient for voice.

Your local dealer, GMG Solutions, will be exhibiting DAMM products and solutions at Comms Connect in Melbourne in November. What can visitors expect to see?

At Comms Connect visitors can expect to learn more about the BS422 MultiTech Platform and the proven track record of GMG in Australia. The success is built on the legacy of DAMM TETRA infrastructure, including the BS421 outdoor and the BS418 indoor base stations. The compact, rugged and power-efficient BS421 outdoor base station is ideal for the mining sector or trackside for rail. With a low power consumption it can even run on solar power, thereby reducing operational costs as well as installation costs significantly.

The integrated software solution with one interface for all applications, we feel, has great appeal. With the full integration of different technologies, it is easy to manage assets with built-in applications such as network management, dispatcher and voice and data logging.

GMG will also showcase the DAMM TetraFlex soft terminals for iOS, Android and Windows, which enables operators to use TETRA over LTE or Wi-Fi.

The Comms Connect Melbourne conference and exhibition will be at the Melbourne Conference and Exhibition Centre from 23–24 November.

GMG Solutions
www.gmgsolutions.com.au

Voice logging and call recording system

Total Recall VR LinX Altus is a professional, standalone and hybrid (combined IP/analog/digital) voice logging and call recording system, designed for mission-critical voice logging requirements.

Enterprises, governments, military and critical infrastructure worldwide use the product to log and create electronic records of many forms of audio communication, including telephone (analog and VoIP), two-way radio (analog, DMR and RoIP), broadcast radio (analog and AoIP), public address (analog and IP), intercoms (analog and IP), room microphones and more.

Offering high-density analog and IP recording channels per unit, the product is suited to hybrid analog, VoIP, RoIP, RTP and AoIP audio logging and call recording requirements.

Designed and manufactured in Australia for the purpose of hybrid audio logging and call recording, running on a Linux platform and offering optional RAID audio storage and hot-swap redundant power supply, the product is suitable for mission-critical applications. Voice analytics and event reconstruction software packages are also options for clients who require more advanced analysis of their call recordings.

The product works as a standalone audio recorder or integrated with business, infrastructure, government, military and cloud recording communications systems.

Prolancer Pty Ltd

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KEEPING OPERATIONS
ON TRACK

Zetron Acom dispatch systems are providing futureproof functionality for the world's largest tram network.

Yarra Trams has the largest tram network in the world, with more than 250 kilometres of double track and more than 200 million passenger trips each year. It takes considerable communication and coordination to ensure that its operations run with the precision and predictability required, which is why the company recently installed Zetron Acom integrated communications systems in its new unified operations centre (OC) and in its disaster recovery (DR) centre.
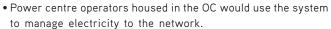
The Acom solution is not only able to support Yarra Trams' current operations, but with its IP-based digital architecture and high configurability, it is fully capable of supporting the emerging technologies, updates and expansion that are all part of the company's plans for the future.

"We'd been using an analog dispatch system to communicate with our trams via consoles and mobile portable radios," said Darren Young, Yarra Trams' operational control systems team manager. "But the system was approaching its end of life and could not be expanded or made futureproof."

Another factor was that Yarra Trams wanted to consolidate several key operations in its new OC, so it needed a system that would be able to support a range of new and existing functions, including:

• Radio and telephone communications between tram drivers, field operators, and the OC.
• Automatic vehicle monitoring communications that transfer operational data between the trams and the OC.

centre, and the system in the DR would have to be configured to function exactly like the one in the OC."

Yarra Trams initiated a competitive tender process in 2014. Zetron and several other dispatch system vendors responded, but Zetron and its Acom system were ultimately chosen for the project. "Zetron stood out for a number of reasons," said Young. "Their proposal did the best job of addressing our requirements and provided a configurable console user interface. It also came with high-quality support and maintenance and an attractive project timeline."

The solution settled on for Yarra Trams included:
- Two Acom systems — one installed at the primary data centre and one installed at the DR centre.
- 28 console positions — 16 at the new OC, 11 in the DR operations room that would replicate the consoles at the OC, and one administrator's console in the maintenance facility.
- A trigger radio solution installed at the DR that would support 14 channels and provide backup for communication between consoles and radios.

Implementation

"First, we installed the core system at the DR site. Next, the primary Acom core was installed in the primary data centre, and the consoles were installed in the new OC," said John Kitchen, Zetron Australasia project manager. "The old operations centre stayed up and running during this process, with all radio resources connected to both the new and the old systems."

Once the final cutover date was set, the operators were moved to the new OC and started using the new console system. Finally, the share connections to the radios were removed, leaving only the Acom systems connected to the radios.

Yarra Trams' Acom systems were designed to address the customer's needs. For instance, they were configured to integrate with a unified communications platform so users would be able to make phone calls over the internet from their consoles. They were also integrated with existing equipment, including voice loggers, intercoms and radio transceivers.

In addition, to make the new equipment as easy as possible for the operators to learn, the console screens were configured to use the same radio-channel naming conventions utilised on Yarra Trams' previous system.

The system has now been running successfully for just over a year.

"Our operators like the configurable, user-friendly console screens; the new instant-recall recorder; the monitor-chosen channels; and the intercom," said Young. "I like the Acom's IP architecture because it gives us the future-readiness we were seeking and will allow us to expand and upgrade easily when the time comes to support additional transceivers and digital radio technologies."

Zetron Australasia
www.zetron.com

- Power centre operators housed in the OC would use the system to manage electricity to the network.
- Customer service agents would use the system to communicate changes in tram services to customers.
- The rolling-stock team would use the system to manage routine and non-routine tram maintenance issues.

Rick Perks, Yarra Trams' principal project manager for automatic vehicle monitoring and passenger information applications, said the company was looking for additional features.

"It would have to be efficient, cost effective, scalable and of mission-critical quality," he said. "It would also have to be interoperable with other radio technologies and our existing transceivers. Finally, it would have to support our redundant disaster recovery

WHAT IF GPS GOES DOWN?

Researchers are working on ways to distribute time signals in the event that satellite-based systems stop working.

Precision time signals sent through the Global Positioning System (GPS) synchronise mobile phone calls, time-stamp financial transactions and support safe travel by aircraft, ship, train and car.

But what if GPS goes down? The US National Institute of Standards and Technology (NIST) and the US Naval Observatory (USNO), which operate US civilian and military time standards, respectively, have worked with two companies (Monroe, Louisiana-based CenturyLink and Aliso Viejo, California-based Microsemi) to identify a practical backup possibility — commercial fibre-optic telecommunications networks.

In GPS systems, transmissions can be disrupted unintentionally by radio interference or the weather in space. Various types of intentional interference are possible also. US federal agencies have long recognised the need to back up GPS, a collection of several dozen satellites that has provided users with time and position information since the 1970s.

To explore the possibility of using commercial telecom networks as a backup for time services, an ongoing experiment connects the NIST time scales in Boulder, Colorado, with the USNO alternate time scale at Schriever Air Force Base in Colorado Springs by means of CenturyLink's fibre-optic cables. The two federal time scales, 150 kilometres apart, are ensembles of clocks that generate versions of the international standard for time, Coordinated Universal Time (known as UTC), in real time.

In this experiment, time signals were sent at regular intervals in both directions between the two locations. Researchers measured the differences between the remote (transmitted) and local time.

The results, just presented at a conference, showed UTC could be transferred with a stability of under 100 nanoseconds — thus meeting the project's original goal for this metric — as long as the connection remained unbroken.

Stability refers to how well the remote and local clocks remain synchronised. Because the signals were forwarded by various pieces of equipment along each path, they experienced significant unequal delays in the two different directions. This reduced overall performance, resulting in an accuracy that did not meet the stated goal of one microsecond.

With the GPS available to calibrate (and thus correct for) the unequal delays, time transfer could be accomplished maintaining that calibration within 100 ns if GPS were to "disappear", the study suggests.

"The 100 ns stability level is good enough to meet a new telecommunications standard," said lead author Marc Weiss, a mathematical physicist at NIST. "We'll continue trying to meet the one microsecond accuracy level, which is needed by critical infrastructure such as the power industry."

The conference paper notes that if the fibre-optic network or its power source went down and had to be re-established, then GPS or some other alternative time reference would be needed to recalibrate the fibre-optic circuit.

The authors suggest the fibre network could serve as a partial backup to the GPS, and the GPS could be used for calibration to correct timing delays. Or, to provide a more reliable backup for the GPS, two independent telecom network paths could be used.

In the experiment, fibre-optic cables run from NIST and USNO to their respective nearby CenturyLink offices, where the signals are multiplexed into the network on a dedicated wavelength not shared with any other customers. The experiment began in April 2014 and will run through the end of 2016.

"It appears that there is at least one commercial transport mechanism that could serve to back up GPS for time transfer at the 100 ns level," the paper concludes. "We have some certainty that similar results will apply if this technique were used as a service across the country."

The need for precision timing backup has grown along with the importance of GPS. According to a 2013 study by the Government Accountability Office, "GPS is essential to US national security and is a key component in economic growth, safety, and national critical infrastructure sectors." An inability to mitigate GPS disruptions could result in billions of dollars in economic losses, the study found.

The NIST research is being carried out under a Cooperative Research and Development Agreement among NIST, CenturyLink and Microsemi, which, in addition to collaborating on the research, is providing equipment that transmits and receives timing signals. The project has been extended to January 2017, with the possibility of testing the technique in a time transfer experiment spanning the nation.

> THE FIBRE NETWORK COULD SERVE AS A PARTIAL BACKUP TO THE GPS, AND THE GPS COULD BE USED FOR CALIBRATION TO CORRECT TIMING DELAYS.

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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 December 1991/January 1992 issue of *What's New in Radio Communications* featured the Tait T2000 mobile radio, designed to be rugged and reliable for the harsh conditions often encountered in Australia, as well as compact for easy mounting in vehicles. Inside the magazine, we reported on Philips Mobile Communications Systems signing an agreement with OTC Trunked Radio Systems to become a major airtime reseller on the OTC public trunked wide-area radio network. Motorola shipped its 50,000th Syntrx FM two-way radio, destined for the Western Australian Police Department (which had around 1500 such units in operation). And Optus and two telecommunications unions (ATEA/APTOA and APTU) announced they had concluded preliminary negotiations covering the new telco's operations. This issue also had a special section announcing the introduction of the Motorola ASTRO radio system.

10 YEARS AGO. Sticking with the Tait theme, the cover of the November/December 2006 issue of *Radio Comms Asia-Pacific* featured the Simoco TSF2000 next-generation small base station, a key component of the company's Xfin Blade trunked radio system. Xfin combined MPT1327, telephony and IP onto a single platform. Elsewhere in the magazine we reported on EMC testing firm Compliance Engineering opening its doors in Melbourne; a new 288-channel voice recording system for the NSW Police, which Addcom designed, implemented and commissioned in just 15 days; and we had several articles on the challenges of implementing monitoring systems in tunnels and on towers. And in a very prescient opinion piece, Peter Baines, MD, Tait Oceania, wrote, "We are stepping into a converged future where radio and information technology will integrate to redefine the way public safety agencies communicate."

Spectrum

Keeping up with evolving wireless technology

The pace of change and innovation in wireless technology today is absolutely breathtaking. You likely remember receiving your first text message or downloading your first web page on a mobile phone. Today, a mobile phone can download high-resolution video in seconds and provide higher data throughput than your first laptop. However, the goal of tomorrow's wireless is much more than just giving you faster download speeds.

Within a decade, the number of connected devices will outnumber connected people 10 to 1. As a result, future wireless standards are evolving to address new use cases for connecting things instead of merely people. Future devices will not only use new wireless technologies but also require new instrumentation and carry a lower price tag. To enable new mission-critical applications such as self-driving cars and remote telemedicine, we need wireless technologies we would trust with our lives. These devices demand a different approach to wireless testing.

The requirements of tomorrow's wireless technology are not only driving new wireless standards such as NB-IoT, 5G and 802.11ax, they are also changing the way engineers design and test mobile devices. For example, wider bandwidths in future standards such as 5G require wider bandwidth RF instruments. In addition, multi-antenna technologies like MIMO and beamforming produce a need for modular and flexible instrumentation that can scale from testing single-antenna devices to 8x8 MIMO devices and beyond. Finally, lower cost radios also require lower cost approaches to wireless test. In a scenario where wireless radios will cost just 20% of today's prices, next-generation test equipment must be capable of faster and more parallel test approaches.

Today, the evolution of wireless technology demands a new approach to RF design and test, and that demand is forcing vendors to innovate. Users are asking for test instruments that combine wider bandwidth and extended frequency range, along with user-programmable FPGAs. These kinds of instruments serve applications from R&D to manufacturing test, with FPGA-enabled applications enabling measurement acceleration, channel emulation and more. In other words, providing solutions that address some of today's most challenging wireless test requirements while offering the flexibility to address tomorrow's test needs.

Although the next wave of wireless technologies, from 5G to 802.11ax to wideband radar, will introduce significant design and test challenges, the next generation of test instrumentation will meet those requirements and enable engineers and scientists to meet the challenges of tomorrow, today.

David Hall is Principal Product Marketing Manager, RF, for National Instruments. He is a prolific author of articles, conference proceedings and technical application notes. His areas of expertise range from the subtle nuances of specific RF measurements to the trends and technologies driving the future of test and measurement equipment.

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