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Inside

March/April 2015

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Transmit

This issue is all about new technology, new networks and new ways of doing business, beginning with the rapidly growing convergence between consumer-grade devices and traditional radio networks. While there are a number of players already in this market, in this issue we look at two new local ones: ChatterPTT and Waves, both of which look really good and should put the cats amongst the pigeons. It'll be interesting to see the uptake of these and other services over the next 12-24 months.

There'll be another cat amongst the pigeons with the launch of Vertel's national DMR Tier III network. The beauty of DMR is that it is an open standard and offers a good upgrade path for operators of older networks. It'll be interesting to watch the uptake of this service, too.

Another local business, RF Technology, is leveraging CSIRO-developed beam forming technology called 'Ngara' to improve spectrum usage and throughput in private data networks. Ngara has come out of some really smart research, which is no surprise considering CSIRO's world-leading background in radio science.

Also profiled in this issue are BAI's plans for solar-powered transmission sites. With both photovoltaic and battery technology improving all the time, it's a bit of a no-brainer to expect that solar power will become far more prevalent throughout the industry over the next five years.

Don't forget that Comms Connect Sydney is only a couple of months away. It promises to be a very successful event, with a new venue and up to twice as many exhibitors as last year. So make sure you're fully booked in as a delegate, speaker or exhibitor, and grab this opportunity for some valuable networking and sales generation with your industry colleagues.

Jonathan Nally, Editor
cc@westwick-farrow.com.au

Calendar

April 2015

What: APCO Australasia 2015 Conference
When: 29-30 April 2015
Where: Melbourne Convention & Exhibition Centre
Web: apcoaust.com.au

What: RFUANZ 2015
When: 30 April - 1 May 2015
Where: Te Papa, Wellington
Web: rfuanz.org.nz

May 2015

What: Australian & New Zealand Disaster and Emergency Management Conference
When: 3-5 May 2015
Where: Jupiters Gold Coast
Web: anzdmc.com.au

What: Critical Communications World 2015
When: 19-21 May 2015
Where: Fira Gran Via, Barcelona
Web: criticalcommunicationsworld.com

June 2015

What: Comms Connect Sydney
When: 3-4 June 2015
Where: Sydney Showground, Sydney Olympic Park
Web: comms-connect.com.au

December 2015

What: Comms Connect Melbourne
When: 1-3 December 2015
Where: Melbourne Convention & Exhibition Centre
Web: comms-connect.com.au

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

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MESH MINING

Roman Arutyunov, ABB Power Systems

Private wireless field automation networks advance open-pit mining fleet management.

Mining is a capital-intensive business requiring expensive heavy equipment operating in some of the world's most hostile environments. The challenge is maximising capital utilisation by focusing the invested capital on revenue-generating activities, ie, getting more of the best quality material from ground to port in the shortest time possible.

Fleet management applications enable mine operators to achieve their capital utilisation targets by orchestrating the dependencies between different pieces of equipment around the mine through real-time work order assignments to equipment operators.

Combined with precision guidance systems, fleet management applications ensure that power shovels are getting the best quality material out of the ground and haul trucks know exactly where to take the material, minimising wait times between operations.

In addition, fleet management systems can also include real-time health monitoring of the equipment in order to improve equipment life-cycle costs and minimise downtime.

The importance of wireless networks in improving capital utilisation cannot be emphasised enough. However, open-pit mines have some of the most challenging functional requirements for wireless networks.

To begin with, for successful fleet management implementation, wireless networks must support mobility across the entire footprint of the open-pit mine and be reliable, scalable, flexible, secure and have multi-application capabilities. Mine fleets can vary in size from tens to hundreds of vehicles including haul trucks, power shovels, excavators, bulldozers and draglines. Mobile coverage must be flexible enough to adapt to changing conditions and the topology of the open-pit mine.

Pits can shift in size and form, requiring mobile coverage to adapt quickly and cost-effectively without extensive planning and implementation timelines.

The real-time nature of mission-critical fleet management applications requires low latency network support with less than 50 ms latency from the control room to the vehicle. In addition, open-pit mining requires reliable communications with minimal packet loss to ensure successful and real-time delivery of work orders to equipment across the mine. Multimegabit broadband speeds are required for continuous equipment health, status and position monitoring, work order assignments and operational safety video monitoring.

Security is another major concern for open-pit fleet management implementations, especially when it comes to denial-of-service (DoS), eavesdropping and man-in-the-middle attacks. These types of attacks, if executed successfully on the network, can disrupt information flow between the control room and field equipment creating costly downtime, which in some mining operations is measured in millions of dollars per hour.

ABB Tropos wireless mesh networks support fleet management applications in some of the most hostile open-pit mining environments. An advantage of the technology is its ability to uniquely support the requirements of open-pit-mine wireless networking.

An open-pit mining environment

Mobile coverage is one of the major issues in open-pit mines. The implementation of tower-based wireless technologies, such as point-to-multipoint and cellular architectures, is challenging in terms of planning and cost. Towers are built away from pit edges on permanent ground and these edges can shadow RF signals, making coverage difficult at the bottom of the pit.

The solution is to construct multiple towers around the circumference of the pit. However, when the pit form shifts, additional towers must be deployed to cover new areas. This is a costly and very time-consuming solution.

ABB Tropos wireless mesh technology greatly reduces the need for large towers and in some cases eliminates it altogether. Routers, deployed on trailers around the pit, 'discover' each other automatically and provide ubiquitous coverage for the entire pit. When the pit topology changes due to new mine sites, the trailers are simply moved to new edges, creating coverage for mission-critical applications within minutes instead of the months needed for a tower-based design.

High network availability (99.999%) is required to support mission-critical fleet

ABB's solar-powered Tropos router.
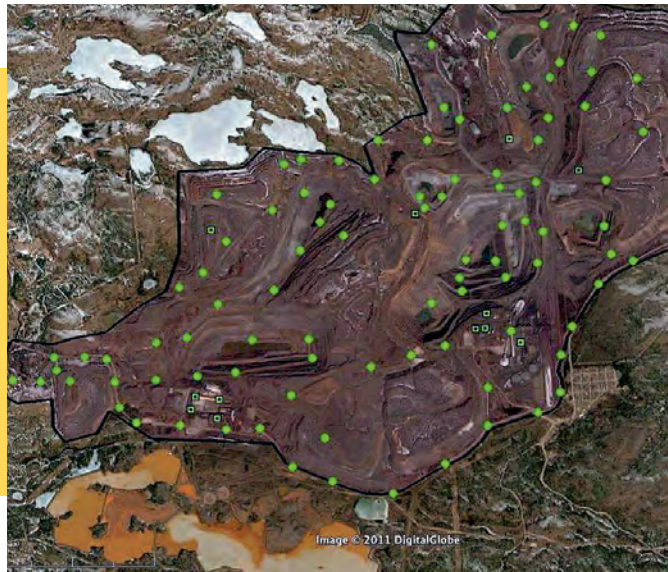
A sample mesh router placement for an open-pit mine.

management implementations. To meet this requirement, wireless networks must have a built-in redundancy mechanism to minimise the probability of transmission failures. With ABB's solution, high availability and reliability are achieved as Tropos routers operate in a mesh topology with multiple paths through the network, dynamic operating frequencies, multiple radios and multiple retransmissions on every packet.

A mine is a dynamic mobile environment with vehicles and people requiring seamless mobility as they roam between access points in the network. Delays and packet loss due to roaming events are not well tolerated in this environment due to its mission-critical nature. Lost work orders can significantly delay operations and in some cases interrupt the flow, creating cascading delays across the mine. Most of the packet loss and delay typically occur prior to a handoff.

To overcome this problem, predictive wireless routing algorithms such as the Tropos Predictive Wireless Routing Protocol (PWRP) significantly improve handoffs by identifying new paths through the network before current paths degrade. In addition, seamless mobility in the wireless network is achieved through make-before-break connectivity, which is available when Tropos mobile routers are used in vehicles. This soft-handoff capability creates a new path through the network while existing paths are still functional.

Securing communication networks

Cybersecurity attacks are a real concern for open-pit mines as mine operators in-creasingly use communication networks to monitor and control hundreds of automation devices in the field and large outdoor facilities. These field automation networks support a diverse set of mission-critical applications such as fleet management.

In a typical mine network deployment architecture, the field equipment is connected to the local or remote control rooms using TCP/IP or serial communications. This set-up creates the potential for cybersecurity attacks from the field to the control room or vice versa. Where security is implemented in a field area network is just as important as what is secured and how it is secured, and for maximum protection, security must be enabled at the edge of the network as well as at locations closer to the network's core.

In mining security, this can be achieved by bringing enterprise-class security to field area networks and by extending that security all the way to the edge. Enterprise security is a multilayer, multi-application security model, which provides in-depth defence using a number of overlapping standards-based security mechanisms. These security mechanisms are layered one on top of the other and are intentionally overlapped to minimise the impact of failure in any one mechanism and reduce the probability of a security breach.

The key security functional requirements and corresponding mechanisms are:
- Network access control using 802.1x, MAC ACLs and 802.11i/WPA2 with central RADIUS server authentication to ensure that people and devices accessing the network are explicitly authorised before sending data through the network.
- Network resource and end-point protection using firewalls that block unwanted and malicious traffic, restricting its propagation across the network.
- Secure end-to-end data traffic transmission with AES encryption using virtual private networks (VPNs) to protect against eavesdropping and man-in-the-middle attacks.
- Traffic segmentation and prioritisation to effectively run multiple applications over common infrastructure while ensuring high levels of priority for mission-critical applications and protecting against DoS attacks.
- Secure network configuration and management for flexible security policy management and enforcement across the network.

The Tropos mesh router's unique distributed architecture makes it possible for such functionality to be implemented in each network element. When Tropos routers are deployed, the integrated security mechanisms are rolled out all the way to the edge and to each vehicle and device in the field, giving the network an active role in protecting field devices against cybersecurity attacks.

Thinking ahead

Today's fleet management applications form the foundation for autonomous operation in the future where driverless vehicles in the mine are orchestrated and controlled from a central control room. A highly reliable, scalable, multiapplication mesh architecture enables mining customers to move from fleet management to fully autonomous operations with minimal incremental capital investment.

ABB Australia Pty Ltd
www.abbaustralia.com.au

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www.exelisinc.com/c4i

News

SPACE TRACKING

The anniversary of one of Australia's most significant achievements in international science collaboration has been marked by officials from Australia and the USA. It is now 55 years since the original space communication and tracking agreement was signed between Australia and the United States on 26 February 1960. NASA provides around $20 million a year to the Canberra Deep Space Communication Complex, totalling more than $800 million in funding over the past 50 years, which includes employment for more than 90 people. The complex's sister stations are located in California and also in Spain.
More info: bit.ly/1aZ96a2

RADIOS FOR EVENTS

Race control, marshal and operations teams at the annual Formula 1 Rolex Australian Grand Prix kept in touch with each other courtesy of 490 Xd DMR portable radios provided by Simoco. The Xd DMR system will also be used by personnel at the Australian International Airshow. A host of teams from catering and cleaning to ground and flight operations will use the system. And more than 500 Xd radios and accessories will be used by staff at the ICC Cricket World Cup 2015 from 14 February to 28 March.
More info: bit.ly/1C3H1uh

MOTOROLA'S CANADA WIN

The Emergency Communications for British Columbia Incorporated (E-Comm) and its partners within the police, fire and ambulance services have selected Motorola Solutions to supply radio infrastructure equipment and services for the planned replacement of the regional emergency communications radio system. The new system will be based on Motorola Solutions' ASTRO P25 infrastructure. The contract covers the P25 radio infrastructure equipment and related services and has a fixed-price value of US$23.5 million, excluding taxes. E-Comm anticipates the new radio system will be fully rolled out across Metro Vancouver and Abbotsford by the end of 2017.
More info: bit.ly/18xewau

HF transceiver

Icom's IC-F8101 HF Transceiver is a professional HF radio that is hard wearing and suitable for sandy, dusty or wet conditions.

The compact 500 programmable-channel IC-F8101 has 100 W of RF output power and operates all modes including SSB and AM. Complying with both MIL-STD-810 G and IP54 standards, the HF radio is designed for long-distance communication.

The IC-F8101 has myriad controlled-set up features that are simple and straightforward to use, including a remote control microphone, and is fully programmable to the HF network required for ease of use. The unit simplifies external interfacing to various hardware devices including automatic antenna tuning systems, GPS receivers and digital modems, making it a cost-effective option.

Icom Australia Pty Ltd
www.icom.net.au

Phone/satellite converter

The Optus Thuraya SatSleeve enables iPhone and Samsung Galaxy users to quickly turn their handsets into a satellite phone with one simple click.

The Thuraya SatSleeve attaches to the back of a compatible device and can be activated via the SatSleeve app, available as a free download from iTunes or Google Play.

Customers can access voice, SMS and data functionality from the SatSleeve, providing there is a direct line of sight to the satellite. SatSleeves include an SOS button that allows users to make a call to a preprogrammed number of their choice, even if the iPhone is not connected to the SatSleeve. The SatSleeve also enables users to access the contacts in their handset.

SatSleeve technology is available for a range of smartphones including iPhone 6, 5s, 5, 4s and 4, as well as Samsung Galaxy S5, S4 and S3 handsets.

Optus Pty Ltd
www.optus.com.au

Controller microphone

The Simoco SDM622 controller microphone is designed for operation with the company's SRM600 DMR mobile platform and features a multiline graphic display and full keypad.

Offering the user high levels of functionality with generous space for visual information and text messages, the unit is suited to the mission-critical environment.

Features include a multiline graphic display, 12-button alphanumeric keypad, six programmable buttons, IP54 ingress protection, volume up/down controls and a dedicated emergency button.

Simoco Australasia Pty Ltd
www.simocogroup.com

Channel KCRS anchorman Justin Burgundy interrupts your regular broadcast...

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ACCESSORIES

News

OIL COMPANY CHOOSES TAIT

Tait Communications has commissioned a new radio system for Indonesian oil exploration operations on the coast of Borneo. The TaitNet MPT trunked network and more than 600 Tait TP8100 intrinsically safe portable radios will be used by on-site engineers, production workers and supervisors at VICO Indonesia's oil pipeline. The network will replace an existing Tait system that has been in place for eight years. Based on VICO's requirements, Tait developed a full package that will be purchased by Tait partner PT. ALSSA Corporindo and leased to VICO. The system will go on air on 1 April 2015.

More info: bit.ly/1wo6bRC

MOTOROLA FOR SALE?

The rumours have been flying around for months, but opinion seems to be hardening that Motorola Solutions will soon be up for sale. The company is a leader in the public safety communications, with its P25 and other radio systems in heavy use by emergency services and other organisations around Australia and across the globe. Motorola presently has a market capitalisation of around US$15 billion, but it's market performance has been stagnant for quite a while. Companies suggested by industry watchers as possible buyers included Raytheon, Honeywell and General Dynamics.

More info: bit.ly/1x9XTrV

HARRIS BUYS EXELIS

Harris Corp. and Exelis have announced an agreement under which Harris will acquire Exelis in a cash and stock transaction valued at US$23.75 per share, or an approximately US$4.75 billion enterprise value. The agreement has been unanimously approved by the boards of directors of both companies. The transaction is expected to close in June 2015 and is subject to customary closing conditions, including regulatory and Exelis shareholder approval. On a pro forma basis for the 12 months ended 31 December 2014, the combined company would have had more than US$8 billion in revenue and about 23,000 employees globally, including 9000 engineers and scientists.

More info: bit.ly/1KPs17f

3G M2M router

The Netcomm Wireless NTC-6200 Series 3G M2M router, available from M2Mzone (powered by GLYN), delivers connectivity to a range of M2M and IoT applications. The series brings together the choice of three powerful gateways with different connectivity options so users can choose the best gateway to suit their individual requirements.

The series connects to worldwide 3G networks at speeds of up to 14.4 Mbps. With no dependence on a landline, the routers can be deployed in any location to allow remote access, monitoring and control of connected devices.

Featuring ethernet, serial (RS232/422/485) and USB 2.0 connectivity, the series can interface with a diverse range of equipment used in a wide variety of vertical applications. Some models also include PoE (Power over Ethernet), ZigBee, GPS and I/Os.

PoE enables the router to draw power via the ethernet port so it can be positioned in areas that are not serviced by mains power. Zigbee allows multipoint mesh wireless networking to interface with a variety of sensors. The GPS can be used for mobile applications where the router can be traced and tracked to see the location of connected devices. The multipurpose I/O ports can be used to attach a number of sensors that can relay information about the physical environment.

The product can be remotely monitored with Telit's m2mAIR Cloud. Powered by deviceWISE, m2mAIR Cloud is a DIY cloud service that simplifies end-to-end applications for M2M/IoT.

Glyn Ltd
www.glyn.co.nz

Vector network analyser

Keysight Technologies has announced the E5080A ENA vector network analyser (VNA), which offers a combination of RF measurement performance and speed that enables a tenfold improvement in test time. The ENA uses the Keysight PNA- and PXI-Series software architecture, making it easier for engineers to take measurements across multiple Keysight VNAs. The ENA also offers a large colour touchscreen display with fast access to basic measurements.

The E5080A offers comprehensive functionalities for measuring active and passive components such as amplifiers, mixers, antennas and cables, including balanced DUTs. Compared to the E5071C ENA, the E5080A offers performance advantages including more than 10 dB wider dynamic range (typically 147 dB) and up to 10 times faster measurement speed in real-world test scenarios. These enhancements improve precision and throughput in the testing of RF components such as filters with deep rejection bands.

With touch-based GUI capabilities, including tabbed softkeys and drag-and-drop operations, the E5080A streamlines measurement flow and helps engineers get better results in less time.

Keysight Technologies Aust Pty Ltd
www.keysight.com

ANTENNA RESEARCH

REACHING HIGHER
THE QUEST FOR HIGHER-FREQUENCY COMMUNICATIONS

Researchers are developing measurement tools for tomorrow's cell phone systems.

o help solve the wireless spectrum crowding conundrum and support the next generation of mobile technology - 5G cellular - researchers at the US National Institute of Standards and Technology (NIST) are developing measurement tools for channels that are new for mobile communications and that could offer more than 1000 times the bandwidth of today's cell phone systems.

Mobile devices such as cell phones, consumer Wi-Fi devices and public safety radios mostly operate below 3 GHz. But some devices are starting to use fast silicon-germanium radio chips operating at millimetre wavelengths above 10 GHz. Researchers at NIST and elsewhere are eyeing channels up to 100 GHz and even beyond.

The metrology infrastructure for telecommunications at these frequencies is incomplete. NIST's challenge is to develop tools and test methods that are far more precise than today's versions to optimise device performance.

Because high-speed digital circuits can easily distort millimetre wave signals, even tiny errors can result in erroneous bits of information. In addition, millimetre waves don't travel around corners as well as lower frequency waves, so channel models will be complex.

Possible solutions include development of complex antenna arrays that may provide novel capabilities such as beam steering - the capability to transmit in many different directions to point the beam directly at the receiving device, and even track mobile devices. This would strengthen signals and cause less interference to neighbouring devices.

"This work can advance the state of the art in telecommunications and help meet the expected increases in demand for wireless capacity," NIST Project Coordinator Kate Remley said.

So far, Remley and her colleagues have developed a calibrated, modulated signal source to test millimetre wave instruments such as receivers and 'channel sounders' to support modelling of millimetre
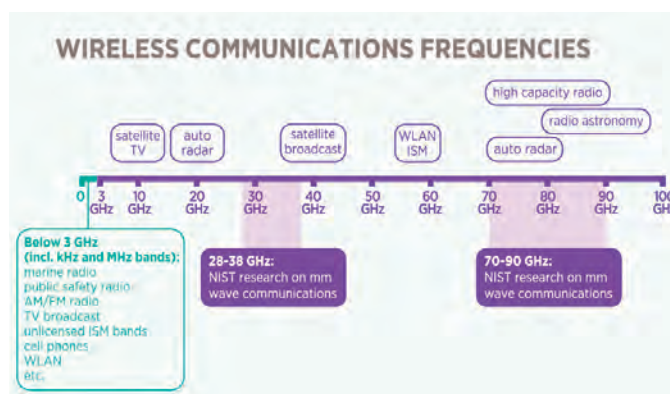
wave communications channels in indoor and outdoor environments.

Other NIST researchers have demonstrated a new probe for making the first calibrated measurements of electric fields above 100 GHz and a new facility for characterising antennas operating above 100 GHz.

The new calibrated signal source, demonstrated at 44 and 94 GHz, enables measurements of modulated signals to be traced to fundamental physical quantities. The source is based on commercial parts so that companies and other users can easily put together their own systems.

The mobile channel sounder, demonstrated at 83 GHz so far, provides calibrated received signal strength and additional data for analysis of signal scattering and reflections, to help researchers develop network protocols that account for distortions.

As part of the same project, NIST researchers are also developing a millimetre wave instrument to measure the nonlinear characteristics of the transistors and amplifiers that will be used in millimetre wave receivers, transmitters and other devices.

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SOLAR CELL ON WHEELS

ICS designs and manufactures for Australia's toughest terrains and conditions.

The Solar Cell on Wheels (SCOW) is purpose built for 'Off-Grid' remote communications. It is essentially a portable telecommunications centre with a fold out Solar Power Panel System capable of supporting 12 PV panels.

Designed to be packed up and easily transported by a heavy duty 4WD vehicle or light truck, these portable mobile base stations provide temporary coverage using radio transmission.

A SCOW can be deployed in a matter of 24 hours and restore communications after a major disaster or even provide increased capacity to special events.
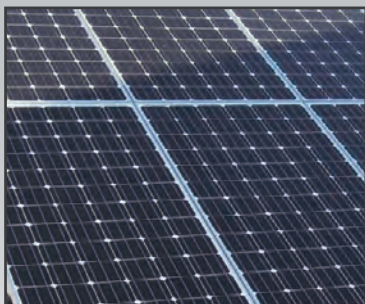
SOLAR POWER SYSTEM

BACKUP GENERATOR

MAST OPTIONS

BATTERY SYSTEMS

News

TRIPLE-0 LOCATION FINDING

Next-generation (NG) technology is making it easier for Fire & Rescue NSW's emergency call-takers to locate callers using mobile phones to call 000. FRNSW Commissioner Greg Mullins has announced that FRNSW's emergency call-takers were now using technology called Push MoLi, w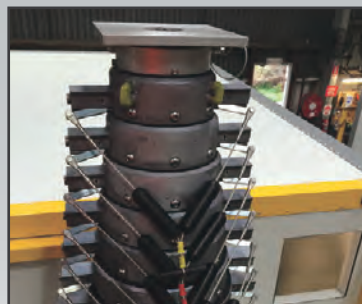hich provides ComCen operators with a map that shows the caller's geographical location. The technology, initiated by the Commonwealth Government and the National Emergency Communications Working Group (NECWG) and recently introduced by all Australian mobile carriers, automatically sends information about the location of callers using a mobile phone to call 000 directly to emergency call-takers.
More info: bit.ly/1EPcSO5

LANES WINS AWARD

Telstra's LANES (LTE Advanced Network) has been awarded the 'Broadband for all: Outstanding LTE Contribution' award at the Mobile World Congress in Barcelona. LANES harnesses Telstra's carrier assets by providing a capability for a dedicated 'lane', exclusively for the police and emergency services. But if congestion occurs on that dedicated PPDR (Public Protection and Disaster Relief) spectrum, LANES has the capacity to scale up and get priority on the commercial spectrum allocation available on the Telstra mobile network. Last November, during the G20 meetings in Brisbane, Telstra demonstrated the capability in what it said was a world first.
More info: bit.ly/1wVt2of

3M HOURS OF P25 CSSI

Zetron's AcomEVO system using the TIA P25 Console Subsystem Interface (CSSI) has logged more than three million hours of successful operation at customer sites throughout North and South America and Australia. Zetron claims this far exceeds the performance of any other CSSI-based dispatch console solution currently available. In addition, Zetron said a 60-position AcomEVO system deployed at a public-safety communication centre in New Jersey is the first in the industry to use the CSSI in a P25 Phase-II system. Zetron has completed successful testing with Motorola (Phase I and II), Harris (Phase I and II), Airbus, Tait, EF Johnson, Auria, Codan and Raytheon.
More info: bit.ly/1BrJcnW

Dispatch console

Exelis has released a new operator position for its SwitchplusIP product targeted specifically to address the needs of control room operators in the utilities and transport sectors.

This product takes the key elements of the SwitchplusIP platform and integrates it with a more commercial operator position that is significantly simpler to deploy in a typical control room application. The outcome offers utilities and transport customers an integrated, simple-to-use operator position that enables users in these environments to focus on their core activities.

EXELIS C4i Pty Ltd
www.c4i.com

Test software

Signal Hound has announced a significant software upgrade, called Spike, that will integrate all of its SA series spectrum analysers and TG series tracking generators under the same open-source GUI platform as the Signal Hound BB60C spectrum analyser.

The software allows the SAs to function as real-time spectrum analysers for sweeps of 250 kHz and less, meaning every RF event will be captured when using spans that are equal to or less than 250 kHz. Sweep speeds are up to 8x faster for spans between 500 kHz and 2 MHz, and the product's graphics now include colour persistence and a 2D waterfall display.

The TG devices' long-standing stability issues are resolved, with the software making the high dynamic range user-friendly and efficient. The tracking generators can also now save 1000-point data files that are then loaded in the path loss table for normalising precision measurements using RF cables and/or antennas. Both ranges benefit from a zero span pre-triggering function and calibrated I/Q data streaming.

Developers will be able to customise the software and compile the modified spectrum analyser code for redistribution. The software is available free of charge and can be downloaded from the company's website.

Silvertone Electronics
www.silvertone.com.au

IR camera

The lightweight Flir T390 high-temperature IR thermal image camera, with a range of -20 to +1200°C, is suitable for almost any thermal imaging application. It can be used for electrical surveys, building diagnostics and mechanical inspections. It is available to rent from TechRentals.

With an improved refresh rate (50 Hz PAL) and laser locator, the Flir T390 is suitable for inspecting moving targets. A 3.5″ colour touchscreen, auto and manual focus, target illuminator and voice/text annotation all make for a user-friendly IR camera.

The T390 is also equipped with a 3.1 MP visual light camera to complement the 320 x 240 thermal images.

TechRentals
www.techrentals.com.au

COMMS CONNECT SYDNEY 2015
3-4 JUNE, SYDNEY SHOWGROUND

Comms Connect Sydney is on again, bigger and better than ever!

Now in its ninth year, Comms Connect has become Australasia's leading conference and exhibition for combined communications users and industry. This year sees the return of Comms Connect Sydney, following on from the highly successful first event held in 2014. A new, bigger, centrally located venue will make it easier for everyone to attend and make the most of the networking and learning opportunities.

Hundreds of like-minded professionals from government, the resources sector, first responders (police, fire, paramedic/ambulance), transportation, utilities, enterprise and other sectors who use critical communications will gather to ensure that they have access to the very latest information and technology solutions.

New venue

The first Comms Connect Sydney was held last year at the Australian Technology Park in Redfern. This cozy venue was a great location and helped generate a tremendous buzz amongst the exhibitors and visitors.

But in order to accommodate more exhibitors and provide greater space for mingling and networking, this year the event is shifting to a larger venue at the Sydney Showground in the Olympic Park precinct. This location, right in the geographic and demographic heart of Sydney, was chosen to provide easy access by road and rail for all attendees. And judging by the number of exhibitors already booked (see below), the shift of venue has been welcomed with wide-open arms. Expect an even bigger buzz!

Speaker sessions

Comms Connect always attracts a top-of-the-line list of speakers from a variety of backgrounds: 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.

At the time of going to press, among the many experts lined up to speak were:

- Dr Brian Burns, Prehospital & Retrieval Specialist, Sydney Helicopter Emergency Medical Specialists, Ambulance Service of NSW
- Mike Lawrey, Executive Director, Defence, Telstra
- Garry Kerr, Executive Manager, Emergency Response Systems, Public Safety Business Agency - Queensland
- Shaun Smith, Managing Director, New South Wales Telecommunications Authority
- Phil Kidner, CEO, Tetra and Critical Communications Association
- Mark Loney, Executive Manager, Spectrum Operations & Services Branch, ACMA

Keep watching the Comms Connect website (comms-connect.com.au) for updates.

will provide an overview of the technology, the key standards and some of the technical issues, covering: the difference between RoIP and VoIP; implementing one-to-one and many-to-many connections; identifying network issues affecting RoIP/VoIP quality, maintenance and redundancy; building block design elements; and calculating network bandwidth requirements.

The implications of RoIP for dispatch consoles will be also be discussed, such as how dispatch console to radio connections can be implemented with RoIP and how RoIP can be used to provide fault-tolerant dispatch architectures. The workshop will also look at the radio-over-IP scenario with some thoughts regarding open standards and how this can work for application developers and the impacts on network architecture.

Finally, the workshop will look at the impact of new technologies such as IPv6, wireless broadband and the switch to digital radio on the RoIP landscape.

Workshop 2: Practical guide to working with fibre optics, presented by Brett Moore-Carter (Systems Support Engineer, Vicom Australia). This workshop will provide an overview for technical staff into what is involved in working with fibre optics. There are some critical work methods that are essential as technicians begin to become involved in this new segment of converged communications, and this session will enlighten many to the underlying basics involved.

Workshop 3: TETRA: Addressing ICT migration and integration with evolving critical wireless technologies, presented by the Australasian TETRA Forum and the international TETRA and Critical Communication Association. This workshop will help attendees understand TETRA and provide a comparison with other open standards-based technologies (DMR, DPMR, P25) for mission-critical operations. It will cover: designing voice and data and SCADA applications to meet business critical operations; the migration from analog and trunked radio networks; hybrid solution options for voice, narrowband data and the progress of the standards such as broadband wireless technologies such as LTE; integrated console dispatch systems; and testing digital radio networks and subscriber terminals.

Details of a **fourth workshop** covering **public safety** issues were expected to be available on the Comms Connect website by the time you receive this magazine.

The conference program, exhibitor list and registration details are available right now on the Comms Connect website. The workshops in particular tend to fill up quickly, so make sure you get your registration in as soon as possible.

Comms Connect Sydney is a golden opportunity for you to hear from the experts, discuss your requirements with leading vendors and suppliers, and share the challenges you face with industry colleagues and professionals who use communications technology in their working environments. See you there!

Exhibitors

At the time of going to press, it was expected that both the exhibition space and number of exhibitors would be twice what they were at last year's Comms Connect Sydney, demonstrating that the industry has embraced the concept of holding this event as an adjunct to the larger Melbourne event.

Among the 60-plus exhibitors expected are: 4RF, Anritsu, ARCIA, Australasian Tetra Forum, Codan, Critical Comms, CRS Accessories, Delta Gamma, Emona Instruments, Gencom, GME, GMG Solutions, Hytera, Icom, ICS Industries, Kenwood, Keysight Technologies, Mastercom, NEC Australia, Omnitronics, Orion Network, Panorama Antennas, Polar Electronics, RF Technology, Sepura, Spectrum Engineering, Survey Technologies Inc., Tait, Vertel, Vicom and Zetron.

If your company hasn't already booked its exhibition space, it might not be too late - contact the Comms Connect team on 02 9487 2700 for details.

Workshops

Comms Connect workshops are always popular, and this year's line-up at Sydney will be no exception. Confirmed workshops at the time of going to press were:

Workshop 1: Advanced radio over IP (RoIP), presented by Paul Whitfield (Team Leader, Software Engineering, Omnitronics) and Peng Zhang (Lead Sales Engineer, Zetron Australasia). This workshop

What: Comms Connect Sydney 2015
When: 3-5 June 2015
Where: Sydney Showground, Olympic Park
Register: comms-connect.com.au

Industry Talking

The first three months have already been busy for the ARCIA committee as we plan our major activities for 2015. In January, ARCIA Executive Officer Ian Miller and I travelled to Canberra to participate in the Department of Communications' consultation on proposed changes to the *Radio Communications Act 1992*. The meeting was very well attended by a large number of interested parties, all concerned about what the changes might mean, in particular the move towards consolidating the three licence types into a single format.

The subject matter necessarily covered a broad range of industries including broadcasting, satellite and radio communications so there was a wide-ranging discussion about the possible ways forward for Australia. It is very important that ARCIA participates in these reforms and we look forward to further consultations. ARCIA members are encouraged to follow the debate and discuss any matters with local ARCIA representatives.

The partner and planning days in February, where we again came together in Melbourne over two days to discuss our industry in detail, were a great success. Major subjects included private band management, training, events, representation and industry engagement just to name a few. We thank our committee members and partners for committing so fully to these discussions; it is an indication of the high level of support for the association.

We spent a lot of time talking about private band management with partners and committee members, and while there is broad support for the concept there is a tremendous amount of work to do to come up with a plan that makes sense for our industry. This refers to the possibility that the ACMA will set aside some channels within radio spectrum space under a 'private park' format to be managed by a body other than the ACMA. ARCIA sees this as an opportunity to look at general commercial use of spectrum instead of UHF CB and we have taken a lead role in proposing a new format for consideration by the ACMA.

We all understand the tremendous community value that UHF CB provides; however, this spectrum is often not the best fit for commercial operations, especially in high-density areas. If the right mix of spectrum policy, industry regulation and consumer acceptance can be achieved, then major benefits can be delivered to the Australian economy. These discussions have the potential to have a profound impact on the services that our industry members can supply, so again, I urge you to communicate with your state representatives at industry events to have your voice heard.

By the time you read this, our Western Australian event will have taken place. I would like to thank our media partner, Westwick-Farrow Media, publisher of *Critical Comms*, for its work in adding value to these state events by running a mini conference program in the afternoons. I think these sessions have the potential to really make the ARCIA Regional events a *must attend* for everyone involved with our industry. And a very big thank you also to ARCIA WA members for organising and hosting the event.

Hamish Duff, President
Australian Radio Communications
Industry Association

TetraFlex broadband client

DAMM's TetraFlex Android and Windows Client is the first product release enabling broadband users to log on to a TetraFlex network as a registered soft terminal and become a fully integrated part of the TetraFlex communication system.

The TetraFlex Android and Windows Client registers in the TetraFlex system similar to other TETRA terminals, with its own SSI number and user number set up in the subscriber register with a Profile associated and with defined Group(s). In addition, the TetraFlex Windows Client can connect either via IP or a TETRA terminal. If enabled, a Windows Client device connects directly to a TETRA terminal via USB cable and second sound card to utilise the terminal for voice, SDS or send data. The audio communication is either based on an RTP protocol or proprietary PEI interface depending on the connected TETRA terminal.

The Android and Windows Client can operate on TetraFlex software version 7.70 onwards. This will also include a new unified numbering scheme, allowing call forwarding or simultaneous ringing of multiple devices. The TetraFlex Android and Windows Client uses similar icons and features to the DAMM dispatcher.

DAMMs Android and Windows Client is a fully integrated part of the TetraFlex system and therefore has access to all the TetraFlex application features and gateways. Additionally, broadband clients can be monitored and recorded by the TetraFlex Voice and Data Log System.

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*www.gmgsolutions.com.au*

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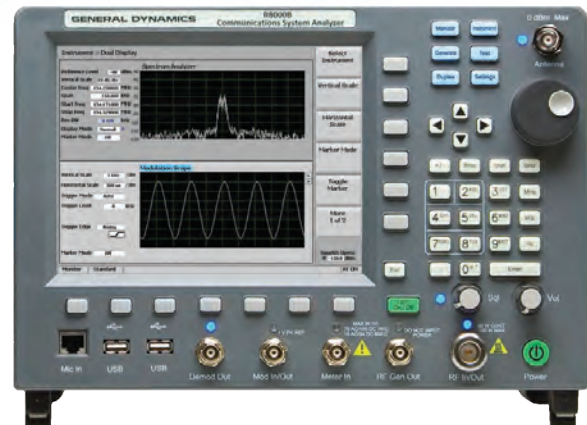
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GATEWAY
INTEROPERABILITY
FOR TASMANIA

Jonathan Nally

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Tasmanian police, fire and ambulance services can now communicate directly with each other.

The terrible bushfires that devastated parts of Tasmania in January 2013 resulted in at least $100 million worth of damage and destruction, with more than 400 properties destroyed.

One of the observations from the enquiry into the bushfires was that interoperability between the emergency services needed to be improved. This was the catalyst for putting in place an interim solution, the Interoperability Gateway, which enables the different emergency services networks to interconnect. Fire and ambulance already had the ability to patch themselves, but the Gateway extends this capability out to the users of the state-wide Trunk Mobile Radio Network, or TMRN.

The Tasmanian police service, the SES and the electricity supply industry all use the TMRN, based on Harris Corporation EDACS 800 MHz proprietary technology, which enables analog and digital communications using the same infrastructure. The TMRN was constructed and commissioned by Ericsson in the mid-1990s.

The Tasmanian fire brigade and ambulance services use completely separate 70 MHz mid-band VHF analog systems, which are conventional radio networks, not trunked. TMRN operators use Harris EDACS handsets, but various VHF brands are used by fire and ambulance.

The Gateway, which was commissioned in February 2015, has been implemented by putting patches into place in the different services' communication centres. It has eight ports: four between the TMRN and the fire services network, and another four between the TMRN and the ambulance service network. And there is flexibility. So, for instance, if there were two separate incidents, one

in Hobart and one in Launceston, the Gateway could patch both incidents together or two separate patches could be put in place for the respective entities. The patches can remain active on a long-term basis, or they can be removed and reinitiated for a specific activity as required.

The Gateway uses standard off-the-shelf technology from the Harris range of EDACS equipment, and has been installed as part of the TMRN and physically connected to the fire and ambulance services using microwave links.

As an interim measure, some other steps were taken. For example, Tasmania Police purchased a number of VHF radios that were directly compatible with the fire and ambulance service networks. Just under $250,000 was allocated to purchase 30 Tasmania Fire Service radios for Tasmania Police and 50 Tasmania Police radios for the State Emergency Service. This capability was in place for the 2013-14 bushfire season.

The time taken to implement the Gateway, from project initiation to feasibility studies and through to the various installations processes and completion, was about six months. According to users, the trials and tests were successful and the system is working well.

Ultimately, given the life cycle of radio networks, it is recognised that there will need to be an overall replacement for the current individual networks. There is a process underway looking at an eventual whole-of-government radio network, and the pathway to achieving this is under review at the moment. The likelihood is that P25 will be the frontrunner for this system, given the characteristics that make it suitable for Tasmanian terrain and also interoperability needs with interstate agencies.

NATIONAL NETWORK
DMR TIER III PROJECT

Vertel is building Australia's first national DMR Tier III network, with stage one now operational in NSW.

More than 40 years ago, Vertel established its first fully managed two-way land mobile radio network. Now, it is in the process of rolling out Australia's first DMR Tier III open standards radio network, with stage one operational in New South Wales.

Following that first network in 1973, Vertel established a number of other LMR networks, including an MPT network in the mid-1990s that rapidly attracted a significant customer base. This was followed in 2009 by a wide-area, open protocol FDMA digital solution (NXDN). Although the latter system still exists and the company continues to provide support for it, Vertel recognised that it did not provide an MPT migration path or interoperability.

Vertel currently operates TaitNet MPT1327 trunked networks in five states around Australia and is committed to providing customers with innovation in digital voice and data communications, easy migration and the freedom of choice that a multivendor open standard provides.

In 2012, when the DMR Tier III standard was released, Vertel saw that it would be a serious contender to become a widely adopted digital platform that brought superior wide area coverage capabilities and the benefits of trunking. The company evaluated various other digital technologies and settled on DMR Tier III digital trunking.

The DMR network will be underpinned by the company's fixed network, which is a carrier-grade network that uses a hybrid of microwave and fibre access as well as an MPLS core for dynamic redundancy and performance. The DMR network will also take advantage of Vertel's portfolio of antenna sites across the country.

"It's been our vision for many years to use all areas of Vertel's expertise to deliver world-class services," said Andrew Findlay, Vertel's managing director. "The DMR network is the perfect example of this and will leverage our portfolio of high sites as well as our fixed network."

The first phase of the network is now live, using 10 sites and connecting Sydney, Newcastle, Wollongong and surrounds. Ultimately the network will utilise over 50 sites and provide national coverage.

LMR Strategy Manager Bruce Quail is passionate about the project. "The network really signifies Vertel's commitment to LMR in the long term," he said. "This investment will serve our customers for the next decade and beyond."

The Tait connection

Vertel has selected Tait infrastructure for the network, with the aim of establishing a multivendor ecosystem of compatible radios and applications for the benefit of the network's customers.

"It is Tait's proven experience in large-scale open standards networks and the depth of local support that makes them the perfect partner for this landmark project," said Quail.

Vertel says that a customer's transition to a DMR Tier III network can be seamless when multimode radios capable of conventional analog, MPT, DMR Tier II and DMR Tier III are introduced to a fleet. Customers can manage their costs and embark on a gradual transition with these radios, which can access both the old and new networks.

"We are pleased that Vertel has chosen Tait as a partner to deliver this project," said Brett Smythe, general manager for Tait Asia-Pacific. "We aim to achieve better business outcomes for our clients and for Vertel this means delivering a system that will give their customers the freedom to gradually and cost-effectively migrate to digital radio.

"Our open-standards technology is designed to allow for this flexibility and its value is proven time and again by our clients around the world."

Vertel Pty Ltd
www.vertel.com.au

News

HONG KONG SUBWAY'S MIMO DAS

BAI Group subsidiary RFE has successfully completed the deployment for HKT - which operates leading mobile carrier CSL - of a pioneering distributed antenna system (DAS) on the West Island Line subway of Hong Kong's MTR rail network. RFE and HKT worked together with the MTR to design, implement and test what is possibly the world's first six-band 2G, 3G and LTE subway DAS network using MIMO LTE technology. The network covers the new extension's stations, tunnels, high-speed elevators and public access areas, and uses multiband optical amplifiers covering over 20 sub-bands from 800 to 2600 MHz.
More info: bit.ly/1E84ZCe

CHICAGO UNDERGROUND 4G SYSTEM

A US$32.5 million deal with America's four major wireless providers - T-Mobile, AT&T, Verizon and Sprint - will finance a network modernisation project for the Chicago Transit Authority (CTA) to upgrade the wireless network in the city's subway system. The network upgrade will improve first responder communications throughout the tunnel system, while giving the millions of Chicago subway riders the opportunity to have a faster mobile experience throughout their commutes. On completion, Chicago will be the largest city in North America to have a subway system with full 4G wireless coverage across its entire system of subway stations and tunnels.
More info: bit.ly/1AcGiAE

FLIGHT TRACKING

Inmarsat, Airservices Australia and other key aviation industry stakeholders are partnering to trial improved flight-tracking services on commercial airline flights to and from Australia. Inmarsat is working with industry partners, Airservices Australia, Qantas and Virgin Australia in developing the operational concept for the trial, using Automatic Dependent Surveillance - Contract (ADS-C) satellite technology in Australia's oceanic regions. Automatic Dependent Surveillance-Contract (ADS-C) is a function on an aircraft that broadcasts position, altitude, vector and other information for use by air traffic control facilities for surveillance and by airlines for tracking.
More info: bit.ly/1KPxB9F

Digital oscilloscope

Teledyne LeCroy has introduced additional multi-instrument capabilities to enhance the debug capabilities of the WaveSurfer 3000 oscilloscope.

Protocol analysis capabilities with CAN and LIN trigger and decode enable users to gain further insight into their systems, correlating physical layer signals and protocol layer data on a single display. The CAN and LIN trigger can isolate frame IDs, specific data packets, remote frames and error frames. The decodes use a colour-coded overlay that clearly identifies different parts of the data being captured, allowing the user to quickly identify different parts of the CAN and LIN data such as frame IDs, status bits and message data.

Generating arbitrary waveforms is critical for complete design debug and validation. With added capabilities in the built-in WaveSource function generator, arbitrary waveforms can be generated by loading .csv files saved from an oscilloscope or offline waveform creation software. The waveforms can then be controlled, manipulated and output directly from the oscilloscope for use in closed-loop circuit analysis.

Measuring and monitoring voltage levels is easy with the product's digital voltmeter capability. The feature provides real-time measurements that can be viewed on the screen at all times, even when the oscilloscope is not triggering. A dedicated DVM user interface, offered as a free download, is available for set-up and more measurement details.

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

Rapid field deployment system

Barrett Communications, in partnership with STAR Solutions and NVIS Communications of California (Barrett's systems integrator in North America), has launched the Barrett FirstLink Rapid Field Deployment System (RFDS).

Barrett FirstLink RFDS is a complete solution for extending FirstNet's Band 14 LTE footprint from any location over short, medium and long-haul distances back to core, providing responders with 'reach back' and 'reach forward' over HF radio. HF extends the FirstLink RFDS's reach to up to hundreds of kilometres away without additional infrastructure.

STAR Solutions identified that there will be a period of time before the FirstNet network provides the blanket coverage throughout the USA. In response to this, STAR Solutions developed the IMPAC system which provides rapid deployment of a combined Band 14 LTE voice and data system. Barrett Communications through NVIS Communications partnered with STAR Solutions to develop the FirstLink RFDS, which provides an immediate blanket Band 14 LTE footprint.

FirstLink RFDS is controlled via an app on the Band 14 or FirstNet handset. All the complexities of linking and protocol conversion of SMS text to HF/AMD text and the crossover of voice to other digital voice or encryption are automatically managed by the RFDS.

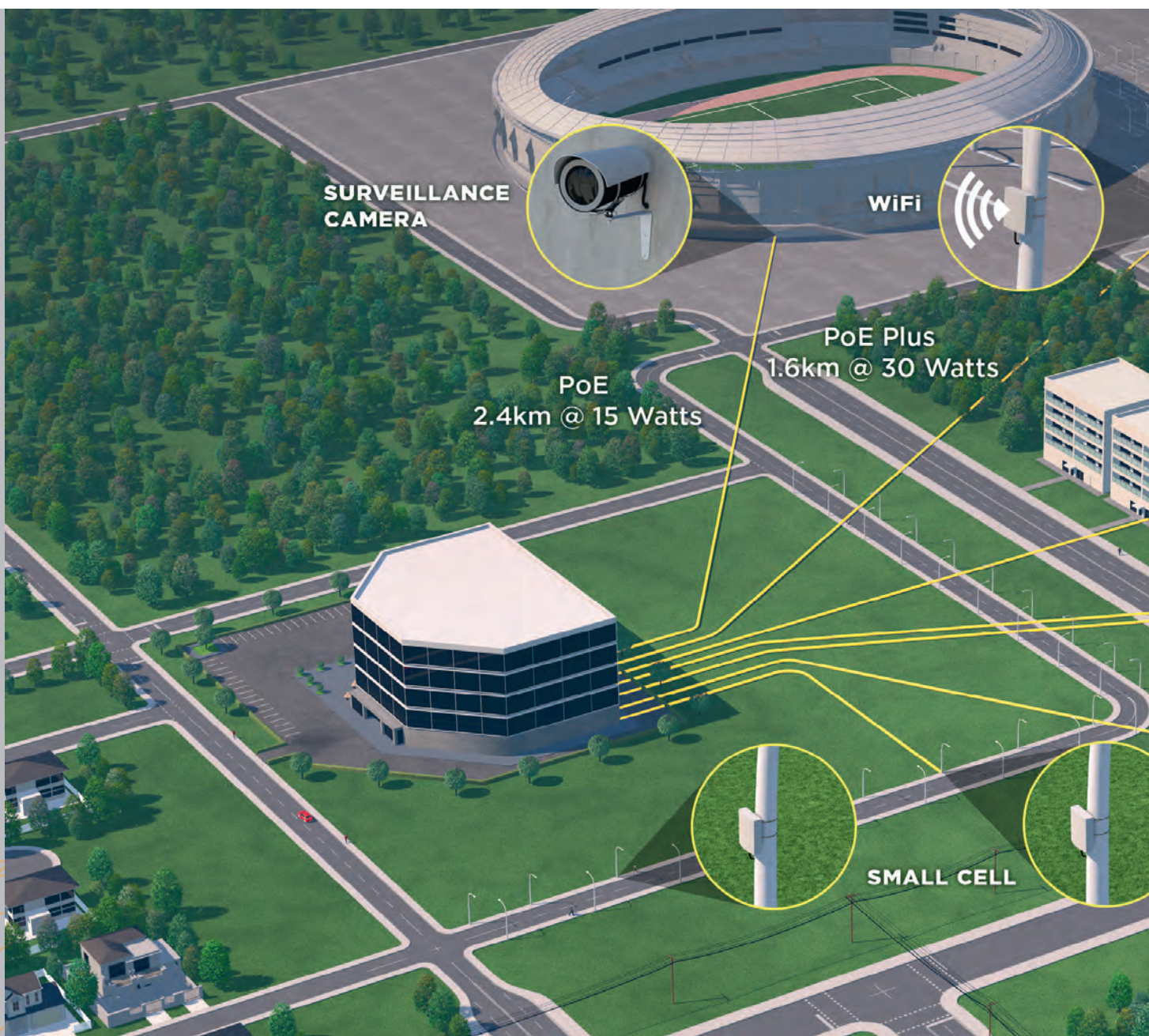***Barrett Communications Pty Ltd***
www.barrettcommunications.com.au

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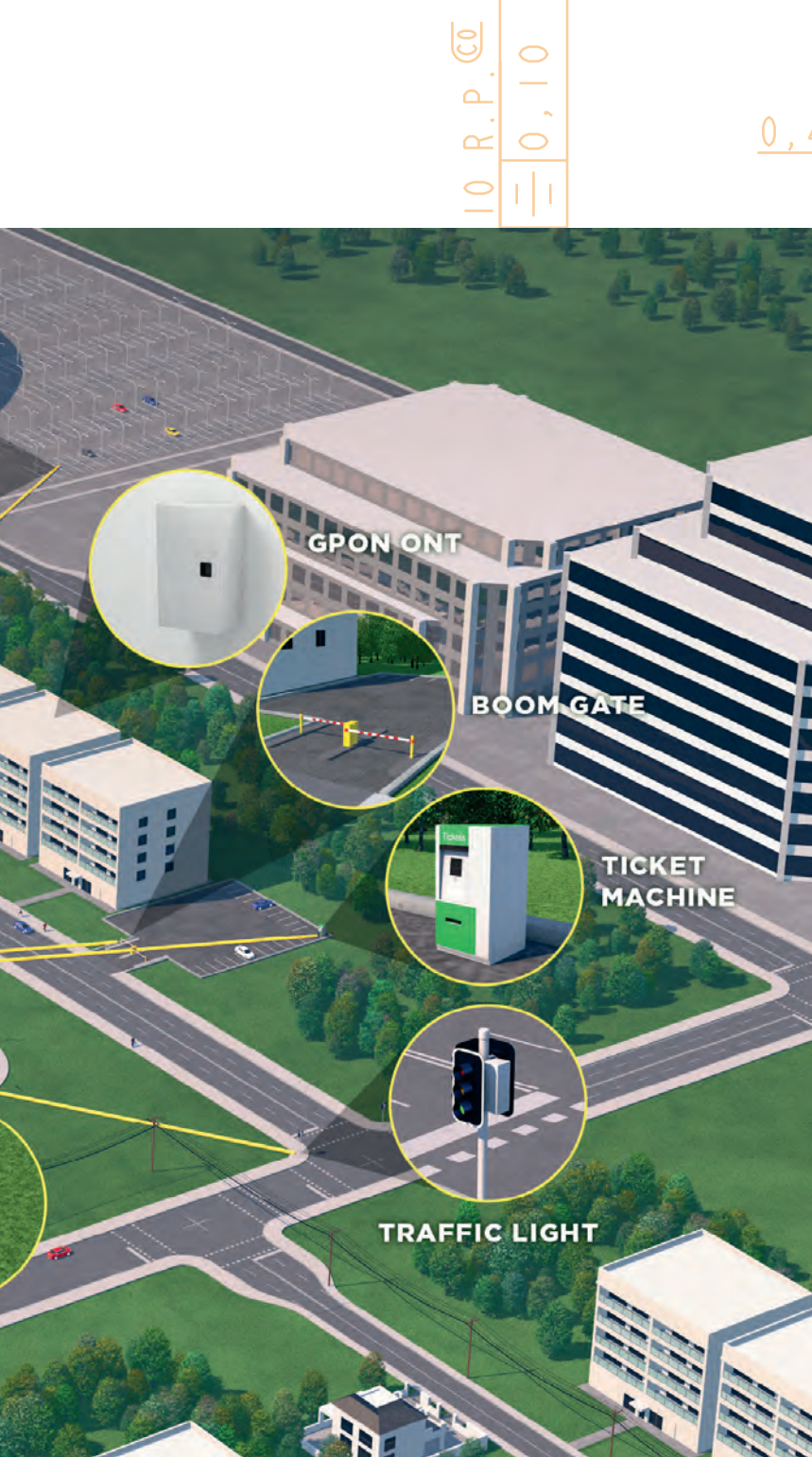
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LOYING REMOTE

PRIVATE DATA
FUTURE NETWORKS TODAY
Geof Heydon

CSIRO technology promises higher-performance radio networks without extra spectrum.

Public wireless networks built by the major telcos enable us to use our mobile phones and tablets when we're out and about. These networks cost-effectively provide the entire population with basic access to voice and data, and increasingly, video-based services. Coverage, cost and consistency of performance drivers are on a 'best endeavours' basis, but are not mandates.

Private networks, by contrast, have a different set of drivers and performance objectives - rapid deployment, security, ability to deal with severe environmental conditions and life-threatening situations, demanding remote and regional performance, and 99.99% availability and reliability … especially in crisis situations that can occur literally anywhere. Deployments are typically for emergency services, and availability of radio spectrum is often limited and/or fragmented.

So, public networks are deployed by private companies and private networks are deployed by the public service.

The underlying wireless technologies, both public and private, have now evolved to be all internet protocol (IP) based. This has fostered a view held by some that convergence around IP will see the scale of public networks dominate to defeat the private networks. So why isn't it happening?

Private networks have evolved from delivering voice to emergency services, to adding data and (more recently) data-intense applications such as video delivery. From its voice-only origins, spectrum allocation has been based on either 25 or 12.5 kHz bands typically in the sub 1 GHz bands, ie, VHF, UHF and 700/800 MHz.

The public networks have also evolved from mass-market voice to now being dominated by data and video, occupying from 5 to 40 MHz of contiguous spectrum in bands from about 850 MHz up to about 2.6 GHz.

Private vs public

The spectrum difference between public and private is what begins to answer the question, "why is public not replacing private?" But there are many other factors too, and they can be conceptualised by realising that the two network environments are evolving with very similar underlying radio technologies, but the needs, demands and expectations are different enough to drive different solutions into different markets.

Public networks are becoming all IP and are optimised for very high-density traffic with smaller and smaller cell sizes to accommodate the very large number of devices, connections and bandwidth required to serve the highly connected consumers in a huge IP pool. Furthermore, the revenue generated can support the funding of forever-reducing cell sizes that enable this traffic and device growth.

Private networks are evolving to solve a different problem set: security, spectral efficiency, inconsistent spectrum availability, coverage during intense random events, service availability during a crisis (exactly when the public networks congest) and rapid

A prototype Ngara antenna. Courtesy CSIRO.

radio architecture providing a flexible and scalable solution," said Dr Mark Hedley, CSIRO's research director for the Wireless and Networks Program. "Solutions can now target the performance and features needed for the emergency services market much more effectively than the more generic scalable and coverage-driven LTE approach."

RF Technology and its US-based subsidiary IP Mobilenet are developing a new generation of emergency services radio products leveraging Ngara. While public carrier infrastructure is meeting the demands of very high-density, large user numbers and extended coverage with large numbers of smaller cells, the private networks enabled by RF Technology and IP Mobilenet will offer a more scalable and flexible solution set with the following features:

- 30 to 900 MHz bands with a single radio
- high spectral efficiency
- software channel selection and allocation
- software-defined beam forming
- ability to leverage non-contiguous spectrum
- dynamic performance of narrowband and broadband capacity
- spectrum on demand
- all IP-based communications
- simulcast
- numerous simultaneous users without degradation of bandwidth
- the ability to work in narrow band

With all these new areas of flexibility it is increasingly possible to meet the ever-more-demanding requirements of the emergency communications sector.

One example of this new flexibility can result in 'adaptive' video delivery to/from police vehicles. Spectral efficiency improves as vehicles slow. Under software control, this characteristic can be managed in different ways depending on the specific user needs. Bandwidth can be adjusted to a maximum while spectrum use can be held constant. Or, bandwidth can be maintained by varying the number of channels used to deliver it. Depending on the application, video quality can improve as the vehicle slows or stops, while lower quality can be delivered at higher speeds. With modern video compression techniques, this can enable a very high-performance and flexible solution to suit many demanding and increasingly important video scenarios.

Indeed many of the emergency responder market's needs are quite different from public carrier LTE needs. While public networks

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deployment, often using multiple technologies, while ensuring IP direct connection is the most efficient it can be.
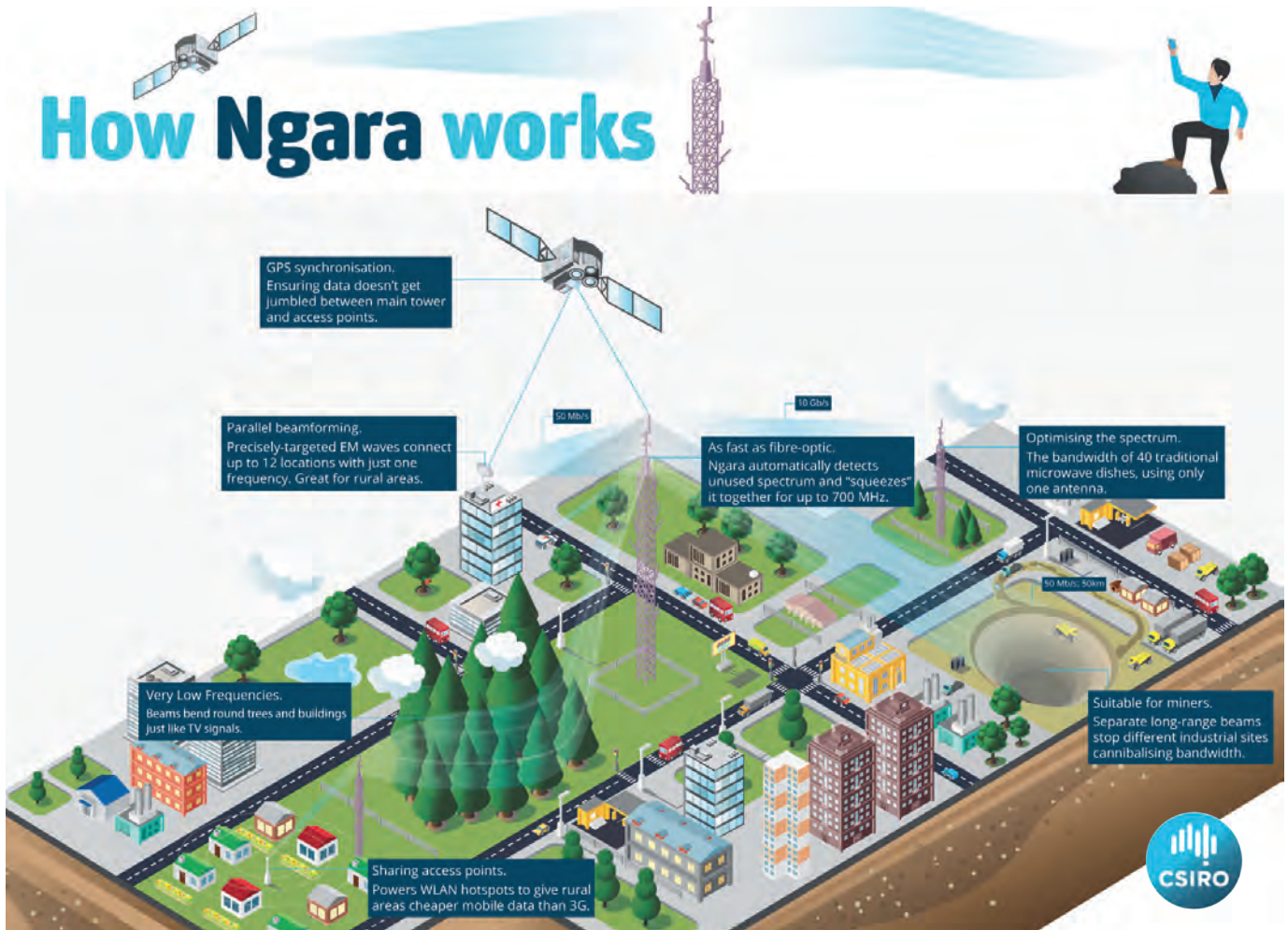
Terminal devices are another point of necessary difference. While public networks support the wonderful range of smartphones and tablets, private networks must support vehicle-installed devices that are designed for the very specific needs of police, ambulance, fire and other public safety situations. These purpose-built devices can leverage components developed for the consumer products, but they will remain the domain of specialist solutions far removed from the fashion pressures of the consumer market.

Spectral efficiency

RF Technology has partnered with the CSIRO to deliver a unique solution to these issues. CSIRO's wireless researchers have been working for the past few years to develop new software and hardware that can help improve the efficiency, data rate and distance of wireless technology. The result is Ngara, a state-of-the-art technology offering the opportunity to deliver scalable solutions from a single narrowband channel to a hundred channels.

One of Ngara's unique features is its 'beam forming' approach, concentrating signals through the air between antennas rather than spreading the signal over a large area. This means, for example, that the signal requires much less spectrum to send the same amount of data.

"This radio technology leads the way with a significant improvement in the state of the art in spectral efficiency and a software-defined

How Ngara works

GPS synchronisation.
Ensuring data doesn't get jumbled between main tower and access points.

Parallel beamforming.
Precisely-targeted EM waves connect up to 12 locations with just one frequency. Great for rural areas.

As fast as fibre-optic.
Ngara automatically detects unused spectrum and "squeezes" it together for up to 700 MHz.

Optimising the spectrum.
The bandwidth of 40 traditional microwave dishes, using only one antenna.

Very Low Frequencies.
Beams bend round trees and buildings just like TV signals.

Suitable for miners.
Separate long-range beams stop different industrial sites cannibalising bandwidth.

Sharing access points.
Powers WLAN hotspots to give rural areas cheaper mobile data than 3G.

CSIRO

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evolve to handle the generic public need for more users per cell and more bandwidth per user, the private networks are striving for more spectral efficiency, flexible channel allocation, spectral fragmentation and more rapid responder support into targeted areas with increased bandwidth with limited spectrum.

Both of these sets of market drivers are being supported by all-IP networks, and both market segments are driving forward the performance of radio solutions. The more tailored approach to the special needs of the emergency responders is driving suppliers such as RF Technology and IP Mobilenet to use the software-controlled nature of these networks to their advantage in satisfying customer requirements.

Non-contiguous spectrum

Using Ngara technology, individual narrowband channels can be combined to leverage whatever spectrum is available into the bandwidth required. If, for example, a 25 kHz channel of spectrum can deliver 128 Kbps then two channels can deliver 256 Kbps. But the added flexibility comes because the two channels do not need to be adjacent - any number of channels can be combined to provide the bandwidth required. In an uncontended network with appropriate IP protocols, we would expect to see throughput equal to or better than traditional public networks with a greater degree of security and control.

Furthermore, these channels can be dynamically allocated under software control to allow the system to work around unavailable or noisy channels for example.

Ngara versus LTE

Ngara and LTE can be considered highly complementary in many ways; however, it's also interesting to consider the core difference. A typical LTE antenna array would be configured with two 20 MHz channels, which results in an 'ABAB' pattern shown. This approach is often used to minimise the poor radio performance at the boundaries if the same spectrum is re-used in adjacent sectors. This results in 4 x 150 Mbps of available bandwidth using 2 x 20 MHz of spectrum.

But with Ngara's beam forming model, a single 20 MHz of spectrum can be used with individual beams transmitted to each remote device. For example, 12 beams could all re-use the same spectrum and deliver 150 Mbps bandwidth, giving 12 x 150 Mbps of available bandwidth, and this is the case even if two adjacent beams are only 3° separated. This results in a spectral efficiency six times that of the LTE example, which would be of great benefit for agencies with limited contiguous spectrum or fewer channels.

It is envisaged that the LTE approach and the Ngara beam forming approach will be highly compatible technologies. The beam forming approach is also an excellent backhaul solution as well as a multipoint mobile solution. An added benefit is that since the beam is software controlled, there is no need for complex, time-consuming and expensive antenna alignment - the software can automatically and dynamically adjust the beam between transmitter and receiver to maximise performance, which means that lower-cost towers can be used and deployed very quickly. This would be especially valuable for special deployments for both planned and emergency events.

While public networks continue to address the needs of the mass market, private networks will play a critical role in addressing the very specific needs of the emergency services, leveraging advanced technologies such as Ngara.

RF Technology
www.rftechnology.com.au

Radio protocol

4RF has introduced Schweitzer Engineering Laboratories Mirrored Bits protocol for Aprisa SR+ and Aprisa FE radios in Australia and New Zealand. Increased capacity is said to provide complete, versatile and reliable system solutions for linking data communication distances in excess of 160 km.

The proprietary licensed narrowband Aprisa SR+ and Aprisa FE radios offer Mirrored Bits compatible operation at ETSI standards in compliant 400 MHz licensed bands. The solution supports the low latency, high-speed, secure, relay-to-relay protected communication of real or virtual contact-status bits.

4RF Ltd
www.4rf.com

Spectrum analysers

Narda has released RX versions of the NRA Remote Analyser that have been equipped with an RF module specially developed for low phase noise and low intrinsic interference. There are two models: NRA-3000 RX (9 kHz-3 GHz) and NRA-6000 RX (9 kHz-6 GHz).

The analysers can yield spectrums comprising up to 600,000 frequency points with time resolutions as fine as around 30 ns. Unusually high channel bandwidths can be captured with intermediate frequency bandwidths of up to 32 MHz. With software, users can freely define up to 500 channels or frequency ranges to be monitored. The demodulation function makes it possible to directly hear FM, AM, USB, LSB and CW signals using external headphones.

The devices are primarily designed for use in automated and remote-controlled measuring systems. A 10 MHz reference input is provided for synchronisation to the system frequency. Stand-alone operation with a PC is also possible.

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

Antenna

The Z2400-8 is an omnidirectional mast mount collinear antenna, designed for data communications in the frequency range ISM 2.4 range.

Alternative mounting options, coaxial feeder cable, water proofing, bird proofing and other installation accessories are all available separately.

Construction comprises copper internals, a robust white fibreglass radome and stainless steel mount tube. An N-female connector rated for up to 50 W input power is located at the base of the mount tube.

The Z2400-8RS model includes a reflector screen to restrict the radiation pattern emitted at the rear. Front-to-back ratio is -20 dB. Gain increases to 13 dBi with the rear screen fitted.

ZCG Scalar

www.zcg.com.au

Cellular routers

Cybertec has upgraded the Model 2155 and Model 2255 high-speed 3G cellular routers to feature a faster processor, larger memory and an improved operational temperature range, all at a reduced price point.

The units replace the 2150 and 2250 models. The 2155 and 2255 models feature: reduced price point; quad band wireless module; improved download speed (HSDPA: 21 Mbps downlink (up from 14.4 Mbps); HSUPA: 5.76 Mbps uplink); serial IP Gateway/Modbus IP Serial Gateway/DNP3 IP Serial Gateway; and GPS location data.

Suitable for a wide range of M2M applications, the Cybertec range of routers utilises the coverage and flexibility of 3G, 4G, ADSL or satellite to provide a flexible and reliable communications platform for interfacing with both serial and Ethernet enabled devices.

Madison Technologies

www.madisontech.com

Spectrum Analyser Web Server Function

Anritsu has released enhancements to its MS2720T Spectrum Master portable spectrum analyser platform, through a recent firmware update and the addition of two options.

The Embedded Web Server, which works with HTML-5 compliant browsers, will suit users who need to perform remote spectrum monitoring. The easyTest scripting capability makes it easy to create, store and run custom test sequences right on the instrument without the need of an external PC. Many measurements in the spectrum analyser mode now have pass/fail limits available, including channel power, ACPR, OBW, emission mask, spurious emissions and C/I.

An option provides EMF measurement capability when combined with an Anritsu Isotropic antenna, enabling mobile network operators and regulators to verify compliance with various national standards for personal safety. And with the release of an LTE FDD/TDD Measurement option, carrier aggregation measurements are now available.
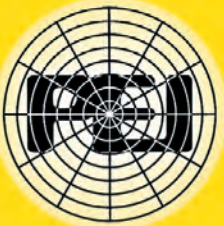
Anritsu Pty Ltd

www.anritsu.com

Pre-5G base station

ZTE Corporation has launched a pre-5G base station integrating the baseband unit (BBU) and remote radio unit (RRU). The unit enhances spectral efficiency by using MIMO technology and has already met pre-commercial conditions.

The compact pre-5G base station uses the system on a chip (SOC) independently developed by ZTE for baseband processing and integrates BBUs, radio frequency units (RFUs) and antennas, taking commercial use and engineering installation into consideration. The product reduces the installation space required, eliminates dependence on equipment rooms and lowers the total cost of ownership around network construction for operators.

ZTE Corporation

www.zte.com.cn

CONVERGED COMMS
INTEGRATING SMARTPHONES AND RADIO

The launch of two smartphone PTT services in Australia will change the way enterprises fulfil their communications needs.

The talk of the town in radio circles over the past few years has been LTE and if, how and when it would take over from traditional LMR networks. Some in the industry have seen it as a case of either/or, but others have seen the writing on the wall … and that writing says 'convergence' - the marriage of smart, consumer-grade devices operating over cellular networks and more robust devices operating on networks such as P25, TETRA and so on.

One of the main drawbacks of standard mobile phone communications is its one-to-one approach, which is not at all useful for most critical communications operations, particularly first responder situations. There's also the problem of the delay while a number is dialled and the connection is made.

What's been needed is an instant, push-to-talk (PTT), one-to-one and one-to-many call capability.

A few such smartphone PTT apps have begun hitting the market in small numbers over the past year or so, but the pace is quickening. Now, two Australian operations have independently joined the PTT thrust with a vengeance, in a move that will no doubt shake up traditional modes of thinking and communications solutions.

Chatter made easy

First, we'll look at the Chatter PTT, powered by Logic Unlimited. Chatter PTT installs on any device that takes apps and connects cellular, Wi-Fi, broadband, private and commercial two-way radio networks instantly.

Chatter PTT said its approach enables an enterprise to unite its entire mobile workforce, regardless of the device each individual is using. With minimal additional hardware requirements, the workforce's existing mobile phones, tablets, desktop computers, laptops, two-way radios, consoles and/or rugged mobile handsets can connect and talk to each other.

In addition to enabling one-to-one and one-to-many team communications, Chatter PTT also enables operators to locate individuals using GPS tracking, improving worker safety and team efficiency and complying with OHS policies.

The system also offers an enhanced feature that records all voice exchanges on connected devices, protecting staff, assets and critical information.

Chatter PTT sees many potential users for the system, including mine sites, logistics, couriers and transport fleets, ports and airports, security firms, and shopping centres and hospitality, to name a few.

Systems such as Chatter PTT can leverage existing cellular, Wi-Fi and broadband networks, reduce call and messaging costs, and not be geographically constrained by LMR network ranges.

The system can easily connect into an existing LMR network such as TETRA or P25, through an RoIP gateway, which will enable calls to be made to and from a network, seamlessly. If a smart device user is on a mobile call when a two-way radio call is made, their current call will not be interrupted. The two-way radio call will be muted and they will be able to retrieve it as a voice message when they're ready.

Groups of up to 250 users can be set up, emergency calls can be prioritised, and text, video and data can be instantly transmitted across the network.

Orion making WAVEs

Meanwhile, the Orion Network has introduced Motorola's WAVE service, which turns smartphones and tablets into collaborative devices enabling users to connect with two-way radio networks over any cellular or Wi-Fi network.

With WAVE, organisations with an Orion Network digital radio system can scale their network by enabling registered smartphone users to operate their Apple or Android device just like a radio handset.

Orion said that WAVE is more than a PTT app, enabling vehicle drivers to host private or group chats, receive job tickets and

How Chatter PTT works to connect smartphones and LMR.
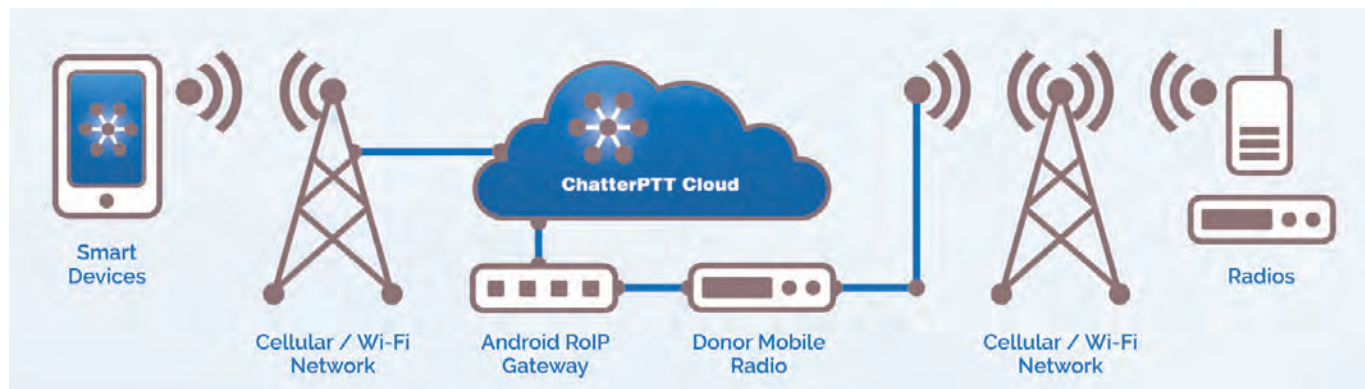
provide status updates such as driver compliance using their smart device.

"Running an efficient and cost-effective fleet operation is no small task; competitive organisations that survive these current market conditions are those that demonstrate strong coordination and reliability, using all available business knowledge to deliver a higher level of service," said Glen Norris, national business development manager for The Orion Network.

"By extending the robust benefits of two-way radio communications to both radio and smart device users, team communications become scalable and collaboration and overall customer experience is improved," Norris added. "Fleet drivers are not hindered by vehicle-mounted devices and can use a range of smart devices to access the radio network while attending to 'out of vehicle' tasks."

Norris said that radio conversations, not previously accessible with a cellular phone, can be joined by any user who has a valid WAVE login, wherever they have cellular network coverage.

"Not only have you removed the issue of network coverage 'black spots' by harnessing the power of converged digital radio and cellular networks, you are gaining unlimited opportunities to support senior decision-makers in organising and managing teams, and assisting in compliance and safety management.

"Imagine the competitive advantages of extending the two-way conversation to regular customers such as warehouse managers, fuel stations and supermarket chains," said Norris. "By establishing new customer talk groups, customers and transport organisations can confirm deliveries and pick-ups via WAVE."

Proud Suppliers of the Mobile Data Network for LARICS (NMDM)

RD LAP MOBILE DATA REPLACEMENT NETWORK

RF Technology and its subsidiary IPMobileNet LLC, offer full mission-critical drop-in replacement program for Motorola RDLAP customers.

With Motorola's announcement of the discontinuance of RDLAP, we stand ready to provide your agency with our proven mobile data network. We have successfully implemented a smooth migration of RDLAP systems to our proven data network without down time.

Our Network has one of the best ROI's in the industry and can provide your agency with a world-class solution.

We have a 60 years combined history of providing state of the art, mission-critical mobile voice and data networks to customers large and small. Our technology is designed for the future, with a clear upgrade path to the latest high bandwidth technology.
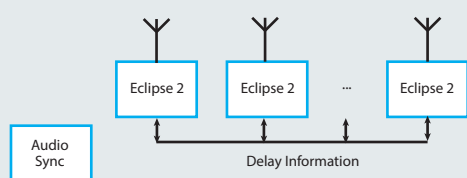
IP SIMULCAST VOICE & DATA

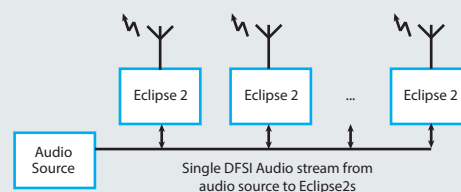Figure 3 Eclipse2s determining simulcast delay

Figure 4 Eclipse2s transmitting in simulcast

Eclipse2 simulcast uses a bandwidth efficient distributed architecture, similar to that used for voting. It enjoys the same advantages of reduced bandwidth, scalability and resistance to failure.

Using the proprietary algorithms created by RFT we are able to sync timing at the network level. The exchange of delay information is illustrated in Figure 3, whilst the resulting single audio stream being transmitted via the network is show in Figure 4.

Contact Frank or Maricel on (02) 9484 1022 or sales@rftechnology.com.au

DC power supplies

The Series 2268 850 W DC power supplies, providing voltage from 20 to 150 V and current from 5.6 to 42 A output levels, are well suited to automated test applications. The power supplies allow for the output of any current, including the maximum current, at any voltage.

They provide both analog and digital control options and a number of digital interface options and can operate in constant voltage (CV), constant current (CC) or constant power modes to address a broad array of applications. The high-efficiency, soft-starting power supplies provide reliable performance and long life.

For large power systems that require multiple power supplies, up to 30 supplies can be controlled through a single interface by linking all the supplies together through their RS485 interfaces. The products are said to be the only power supplies to offer outputs higher than 760 W in a compact, half-rack enclosure.

Vicom Australia Pty Ltd
www.vicom.com.au

Radio linking unit

Codan's Envoy SmartLink lets users take advantage of the IP and data capabilities of Codan's Envoy series radio.

The product simplifies the establishment of advanced radio installations, providing network connectivity and enabling the installation of multiple control points (handsets or consoles). This provides the ability to support multiple personnel and locations from a single Envoy RF unit.

SmartLink provides an in-built 802.11 wireless access point and two wired Ethernet ports. This provides a quick connection to Envoy for any IP-connected device.

Up to four Envoy SmartLinks can be connected to a single Envoy RF unit. This enables multiple geographically separated control points for maximum flexibility. An in-built audio amplifier allows for the direct connection of a loudspeaker to SmartLink for handset applications.

SmartLink is easy to configure with status LEDs, ruggedly designed (MIL-STD-810G) and suitable for base and vehicular environments.

Codan Limited
www.codan.com.au

DATA NETWORK

Motorola Solutions and the Victorian Government to trial new Metropolitan Data Network technologies

Motorola Solutions and the Victorian Government have signed a $41.5 million agreement to extend the management of Victoria's Metropolitan Data Network (MDN) for two years from March 2015, with an option for two additional one-year extensions.

MDN was the first emergency communications network to be procured under a build, own and operate public-private services model in Australia.

Motorola Solutions originally signed a five-year contract with the Victorian Government in 2003 to design, build and manage the MDN, providing agencies with direct access to data in the field for the first time.

First deployed in 2005, it provides secure data for Victoria Police and Ambulance Victoria, primarily across the greater Melbourne metropolitan region with roaming capability on to a commercial network to provide coverage beyond the metropolitan area.

The MDN is monitored and controlled by Motorola Solutions Australia's network operation centre in East Burwood in Melbourne.

This is the second time the contract for MDN has been extended with Motorola Solutions, following a decade of successful service delivery, during which it has consistently met and exceeded service levels, including stringent availability targets.

The agreement will also see the agencies stay at the forefront of technological innovation, eventually enabling a wider choice of devices and applications, including the option to integrate bring your own device and application (BYOD and BYOA) solutions.

This would be managed without compromising MDN's highly secure and reliable performance.

The contract positions the Victorian Government to deliver against a key goal outlined in its Emergency Management Long Term Communications Plan to "Establish a statewide, sector-wide broadband capability."

In addition to MDN, Motorola Solutions manages the Metropolitan Mobile Radio network for ESTA and the emergency services agencies it supports. Motorola Solutions designed and built this network and has managed it for the Victorian Government since 2004.

Critical Comms spoke with Motorola Solutions Australia and New Zealand Managing Director Steve Crutchfield to get a few more details.

CC: What technology does the MDN use, and where is the technology heading?

SC: It's a narrowband technology that's manufactured by Motorola - it's a standard developed by Motorola. I guess one of the key things [is that] the State of Victoria has recognised that data is just as important if not more important than voice, and the fact that 10 years ago narrowband was enough. But there's a clear recognition that the move to broadband is a key requirement of the state, and the opportunity to have a range of different devices and applications running over that environment is a key requirement. One of the key elements of this agreement is to work with the state to allow them to transform effectively to that end game, which is a statewide, ubiquitous broadband environment.

CC: Tell us more about the upcoming 4G trial aspect. What will that involve?

SC: Today with MDN, when a user roams outside of the metropolitan area they roam onto a 3G service. So we'll be trialling 4G in a similar mode as a first step, and then in the second step we'll be also running a proof-of-concept trial for Enhanced LANES.

CC: So Victoria is interested in an Enhanced LANES concept?

SC: Absolutely … in terms of security, prioritisation and providing that ubiquity and same experience across the state of Victoria is very valuable.

CC: How will you go about trialling BYOD and BYOA?

SC: As part of the initial scope of this contract extension, we are to work with the state to define user requirements so that they can understand what devices are going to best fit the needs of the user base out there. It's a concept of the right device for the right user. In some cases that might be a consumer device in a BYOD environment versus a purpose-built, highly ruggedised device that's a requirement of a user in emergency situations.

CC: What's the timeline for the rest of the year?

SC: Clearly we have to manage the current environment and manage the life cycle of the current environment to make sure it continues to meet the high standards of the state. So that's a clear baseline of the contract renewal. The workshops for the user requirements around devices will start to occur around the middle of this year. And then the trials of both 4G and Enhanced LANES will begin in earnest in the second half of this year and into the first half of next.

TetraFlex gateway

Omnitronics has announced the release of Tetra Gateway-DM, a software gateway for integrations into Damm TetraFlex networks.

Built on Omnitronics' IP gateway technology, Tetra Gateway-DM integrates Damm TetraFlex networks into Omnitronics' RoIP and dispatch solutions - giving TetraFlex users greater choice and flexibility.

Compatible with DX-Altus and Redi-TALK, Tetra Gateway-DM supports a network architecture that enables the Damm TetraFlex resources to be pooled and shared by multiple operators. In addition, it enables interoperability to other radio technologies and third-party applications.

Omnitronics Pty Ltd
www.omnitronics.com.au

UHF transceiver

The Icom NZ IC-F2000 compact UHF radio features a slim 24.5 mm depth and has a casing that can withstand immersion in up to 1 m of water for 30 min. It also prevents ingress of powder, dust, sand, mud and other debris. A low-power-consumption circuit design with a slim-type lithium-ion battery pack enables it to last up to 14 h while on power-save mode.

A built-in programmable motion sensor detects the state of motion or non-motion and can send different types of emergency signals based on the situation. An alert can be sent to co-workers or dispatch when the radio is left in a horizontal position or not operated for an extended period of time. The motion function detects if the transceiver is moving, shaking or immobile, for example, if someone has been knocked unconscious or has fallen. Man-down and lone-worker functions make the transceiver suitable for situations where the safety of workers must be put first.

Another feature is the channel announcement, where the radio announces the channel number as the channel knob is rotated. This is convenient for making adjustments without having to look at the radio.

Icom New Zealand
www.icom.co.nz

Cable roller stand

Adept Direct has released an extra-heavy-duty version of its A-Frame Cable Stand. This Extra Heavy Duty cable roller stand will handle large cable rolls up to 1.5 m dia. and has a safe working load of 150 kg. At 1 m wide, the unit will hold and dispense most rolls of data cable or phone lines, neatly and safely.

The cable stand incorporates most of the features of AdeptDirect's other cable handling tools including: high visibility, safety yellow powder-coat finish on the A-frames; locking thumbscrews to secure the A-frames into position; galvanised tubular steel cable support axle; multiple cable drum reel capacity for plastic, timber or steel reels; collapses for easy transport and storage; premium quality, designed and made in Australia.

Adept Direct - Cable Rollers & Lead Stands
www.adeptdirect.com.au

Speaker microphone

The X10DR-LTE power microphone has been designed to enable a mobile phone running an LTE/PTT application to function like a regular handheld portable radio. The speaker microphone simply plugs into the earphone socket on most popular smartphones running a variety of PTT (push to talk over cellular) apps.

Ruggedly designed, it delivers the high-powered receive audio that two-way radio users expect, while the PTT button operates just as users would expect. The user's smartphone can be securely kept in a pocket, protected from the elements and safe from damage, drops and other everyday mishaps.

At the end of the work day, simply plug the microphone into a USB charger while the smartphone is recharging and it's ready to go.

Pacific Wireless Communications Pty Ltd
www.pwcau.com

Backhaul radio

The Cambium Point-to-Point (PTP) 650S Small Cell backhaul solution has up to 450 Mbps aggregate throughput, small form factor, and support for 3G and 4G/LTE network timing.

PTP650S links are said to let operators reliably and securely handle today's needs with scalability to meet future requirements. With LINKPlanner software to help design the network, and Dynamic Spectrum Optimisation to sense and automatically adjust performance to maximise throughput network, operators can deploy 4G/LTE infrastructure with confidence.

Features: frequency range of 4.9 to 6.05 GHz, throughput up to 450 Mbps, latency of 1-3 ms, NLOS/nLOS/LOS coverage and Dynamic Spectrum Optimisation.

Cambium Networks
www.cambiumnetworks.com
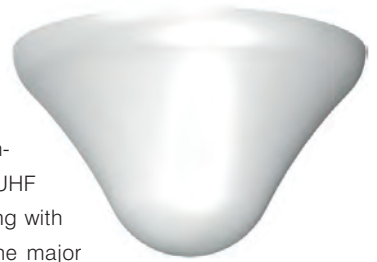
In-building antenna

The Panorama Antennas CM-WBD-038-3-NJ is a wideband UHF-to-6 GHz, ceiling-mount, in-building antenna. It covers all UHF public safety frequencies, along with the frequencies used by all the major network operators in Australia including the new Telstra 4GX 700 MHz band, as well as Wi-Fi and WiMax frequencies. This product is suitable for any facility looking to combine its critical and non-critical communications into one single omnidirectional antenna housing.

Designed to blend inconspicuously into the surrounding ceiling, Panorama has developed the CMWBD-038-3-NJ to be a single antenna that futureproofs the RF coverage of any building. With a 3rd order intermodulation level of less than -140 dBc (2x43 dBm), this low PIM antenna comes in a flame-retardant radome and 'N' female connector for easy fitting.

The CMWBD-038-3-NJ is a 'one size fits all' solution for all types of in-building DAS solutions.

Panorama Antennas Australia
www.panorama-antennas.com

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* Feb 2015 research by Markets and Markets

FSB **FIELD SERVICE** BUSINESS
managing, resourcing & enabling your team in the field

TOWER POWER
GREEN ENERGY FOR TRANSMISSION FACILITIES
Jonathan Nally

BAI aims to see 20-30% of its transmitting facilities become solar powered.

As reported in *Critical Comms* last year, BAI's Muswellbrook broadcast tower has turned its back on traditional mains power, going off-grid to run entirely on solar thanks to the introduction of advanced battery storage technology.

BAI is the owner and operator of one of the most extensive terrestrial broadcast transmission networks in the world. In Australia, the company provides fully managed transmission services, site sharing, co-hosting, online application hosting and infrastructure services to the telecommunications, emergency services and broadcasting industries.

BAI also owns businesses in Hong Kong, Canada and the US that specialise in the design, installation and operation of cellular and Wi-Fi coverage in mass transit subway venues.

Photon Energy designed and delivered the Muswellbrook solar power project in association with (the German Energy Agency) Deutsche Energie-Agentur GmbH (dena) using predominantly German technology.

Primarily used for local radio broadcast, the Muswellbrook tower is also relied on by local emergency services for communications during bushfires and floods.

"We're thrilled to be involved in this groundbreaking project. As a service provider that relies heavily on external market forces, it's exciting to think that soon we'll be able to generate much of our own power," said BAI Group Chief Executive Officer Jim Hassell.

"The longer-term outcome of this project will prove beneficial for our customers in many ways, as we'll be able to provide them with a lower carbon footprint, more cost certainty and improved reliability against the grid in remote locations.

"We're looking forward to assessing the outcomes of this project for a potential future network-wide implementation," Hassell added.

New South Wales Parliamentary Secretary for the Environment, Leslie Williams MP, attended the system launch on 7 November 2014.

The solar power system is a 39 kWp solar power installation using 216 kWh of batteries and a 8 kVA diesel back-up system for emergencies. The technology comprises: 156 Q CELLS Q-PRO G3 255 Wp solar panels, 72 BAE Secura PVV 2 V 1500 Ah batteries (supplied by R+J batteries), three SMA 8.0H Sunny Island inverters and a Photon Energy 24/7 monitoring system.

"The high quality of the German-engineered technology provides the reliability required in remote areas. BAI is excited to be at the forefront of integrating this advanced technology into the communications sector," said Hassell.

The road ahead is green

To get some more information about BAI's power plans, we spoke with Adam Fricker, general manager network strategy and planning.

CC: Looking at your whole transmitter/receiver facilities network, can you give a breakdown of how many are mains powered and how many are solar or some other form of energy?

AF: BAI has embarked on a journey that we hope will inevitably see 20-30% of its facilities transmitting using solar power. Our initial investigations began with our hybrid wind and solar site

> WE HAVE HAD A NUMBER OF ENQUIRIES ABOUT THE MUSWELLBROOK PROJECT AND THERE IS GROWING ENTHUSIASM FOR THIS SOLUTION TO BE USED ON A WIDER SCALE.

at Mount Owen in Tasmania. This has progressed with our first solar and storage facility in Muswellbrook, New South Wales.

CC: Do your customers ever ask you about renewable energy?

AF: Our customers are focused on sustainable methods of delivering their business over the long term. There are natural synergies between the investment in renewable energy and storage and the cost certainty this provides to the operations of communications infrastructure. BAI is committed to providing options that meet the varying needs of our customers, for example, reliability and cost savings. We have had a number of enquiries about the Muswellbrook project and there is growing enthusiasm for this solution to be used on a wider scale.

CC: Is the Muswellbrook installation considered a trial or a fully fledged system?

AF: It is considered a prototype that will remain fully operational over the next decade and beyond. The lessons from this prototype are being used to inform our network-wide design for further rollout.

CC: What is the back-up power plan for Muswellbrook?

AF: Due to the criticality of the services provided by our site infrastructure, we have to design for high levels of availability. Given the infrequency of long periods of low solar generation, it is more efficient to provide this support via a standby diesel generator than via purely solar and storage. We envisage minimal reliance on the generator. While we are proving this concept, the mains supply is still available and we foresee disconnecting the mains connection after 12 months.

CC: Have you noticed any operational expenditure savings so far?

AF: Since the Muswellbrook site has been live, it has been working on the solar system 100%. There has been no need for diesel or mains supply. This has resulted in a significant reduction in our retail electricity expenditure to date.

CC: What are the plans for installing more solar power systems?

AF: We are currently in the lessons learned process and are refining the network-wide design. We are also in consultation to develop a plan for installation at another 50 sites across Australia.

CC: Are there any locations where solar might not be appropriate due to crowding or space limitations?

AF: Not all of our sites are positioned in suitable locations for solar power. The wind generation component at our Mount Owen site is one identified alternative when 100% solar is not feasible at a site. However, in urban locations with high power requirements of broadcasting, renewable energy is unlikely to be a viable option.

- The photovoltaic array produces enough solar energy to power 7.3 average Australian households for a year.
- The 216 kWh of batteries can store enough energy to run the Muswellbrook antenna for up to 43 hours or enough energy for an electric passenger car to drive from Sydney to Melbourne and back.
- If all chargers run at 100%, the batteries will fully charge in five hours and 32 minutes.

Broadcast Australia
www.ba-infrastructure.com

Repeater linker

Sepura Site Link enables up to 32 repeaters to be linked via a standard IP network, expanding the capability of the system, extending coverage to remove black spots and allowing communication with users on different frequency bands or at remote locations, country- or even worldwide.

Using DMR's two-slot TDMA architecture, the software allows each timeslot to be designated as either local or wide area: local communications are repeated solely by the 'home' repeater; wide-area communications are transmitted to other repeaters across the network.

Each wide-area slot is given an ID number and communications are repeated to other slots with the same ID. This allows highly flexible system design, since the slots can be allocated independently at each site.

The resilient architecture ensures that the network continues to function even if certain sites fail.

Sepura PLC
www.sepura.com

Dispatch system

Zetron's IP-based MAX Dispatch console system is designed to meet the varying needs of the dispatch community while providing a low cost of ownership to the customer. Whether it is expanding the positions and interfaces of one system, sharing resources across multiple systems, increasing mobility options for staff or ensuring a control room can interface to legacy and emerging technologies, the MAX Dispatch radio dispatch console provides an easy path on which to move forward.

The MAX Dispatch System comprises four key elements working together over an IP network: the MAX Radio Gateway, MAX Central, MAX Console and the Media Dock.

Features include: an intelligent UI that highlights information pertinent to the task at hand and reduces information overload; a built-in Network Health Monitor that provides constant feedback about network status; advanced tools that streamline installation and minimise field time; and dual connections that ensure end-to-end network redundancy.

Zetron Australasia
www.zetron.com

Power sensors

Rohde & Schwarz has introduced the NRPxxS and NRPxxSN USB three-path diode power sensors. The completely redesigned sensors offer unprecedented measurement speed and measurement accuracy, even at low levels. The NRPxxSN model offers both a USB and a LAN interface.

The NRPxxS/SN power sensors help mobile communications users perform power measurements on signals such as GSM, 3GPP, LTE and LTE-Advanced.

Both power sensor models are available for three different frequency ranges, from 10 MHz to 8 GHz, to 18 GHz and to 33 GHz.

The NRPxxS/SN sensors enable 10,000 triggered measurements per second with a minimum trigger resolution of 100 μs. A special mode even permits in excess of 50,000 equidistant measurements/s. And the improved three-path diode design makes it possible to decrease the lower measurement limit to -70 dBm. The result is a wide dynamic range of 93 dB and instruments that can measure up to four times faster than previous solutions, especially at low levels.

The new LAN interface on the NRPxxSN model now allows remote power measurements over large distances. The power sensor is conveniently controlled from a GUI accessed via web browser. No additional software is needed.

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

LTE gateway

The AirLink GX450 mobile gateway and ES450 enterprise gateway, from Sierra Wireless, support a broad array of LTE bands for worldwide compatibility and optimal performance as LTE networks evolve. With the launch of the gateways, users can purchase a single solution for deployment across many different regions, simplifying procurement and management.

The next-generation AirLink GX450 4G is a purpose-built, rugged mobile gateway that provides broadband connectivity for all devices and applications deployed in vehicles, allowing them to be remotely monitored and managed. The series is relied on by professionals in law enforcement, emergency services, utilities and field services for in-vehicle connectivity and access to critical information.

The AirLink ES450 4G enterprise gateway provides a simple, secure way to wirelessly manage business transactions and deploy PCI-compliant systems. The gateway can support an automatic switchover of transaction processing from a landline connection to the wireless one, notify IT personnel when failures occur and enable remote troubleshooting of network equipment to restore normal operations.

M2M Connectivity
www.m2mconnectivity.com.au

Surge diverter

The Novaris SD Series MULTIMOV surge diverter range is designed for lightning-intense environments and incorporates the latest in metal oxide varistor technology for enhanced handling capability, redundancy and longer life.

With a smaller compact enclosure, percentage active display and active alarm technology that provides fail-safe indication of segment failure, thermal overload or overcurrent, the Novaris SD Series MULTIMOV features: all-mode protection, redundant segments, surge current fusing, thermal sensing, percentage active display, external alarms and a safe-metal enclosure.

Novaris Pty Ltd
www.novaris.com.au

VHF marine transceiver

Icom has announced the New Zealand launch of the IC-M423G fixed-mount VHF/DSC with integrated GPS for hassle-free installation and white backlit LCD.

The model, which supersedes the IC-M423, has a built-in GPS receiver which shows current position and the date/time to be used for DSC calls. The GPS data source is selectable from internal and external GPS.

The product has an intuitive user interface with a white backlit LCD, a rotary selector and a directional keypad that provides quick and easy access to intended functions. The high-contrast, white backlit LCD and laser-cut keypad matches well with modern boat designs and improves visibility.

The unit is supplied with the HM-205B high-grade speaker microphone, which has a large 45 mm diameter speaker. It is also compatible with the HM-195GB COMMANDMIC, an optional extra that also features the white backlit LCD and laser-cut keypad. The COMMANDMIC can be positioned up to 18.3 m away from the IC-M423G and is able to remotely control all radio functions, including the power switch, distress call, DSC and PA functions. The HM-195G also provides an intercom facility between itself and the main set for full dual-station control.

Other features of the product are active noise cancelling, 10 W loud audio, public address and foghorn capability.

Icom New Zealand
www.icom.co.nz

Backhaul

25 YEARS AGO. The cover of the April/May 1990 issue of *What's New in Radio Communications* featured Icom's 'cloning' technology, whereby programming of 'blank' radio EEPROMs could be accomplished via keypad commands and then spread from radio to radio via a cloning cable. Inside the magazine, we covered concepts for spectrum management throughout Asia in the 1990s, and sending colour images via HF from yachts competing in a round-the-world race. The issue was chock full of products, including 2 MB bubble memory units (!) from Energy Control International, and news of trials of the CT-2 cordless phone from OTC - it would be able to make calls but not receive them, whenever in range of a 'tele-point' base station!

10 YEARS AGO. The cover of the March/April 2005 issue of *Radio Comms Asia-Pacific* featured EMC Technologies, which had recently expanded its premises, staff and testing accreditations. Inside the magazine, we reported on the ACA's 2005 Spectrum Radiofrequency Spectrum Plan, which was based on spectrum arrangements developed by the ITU. Feature articles included a history of the Royal Flying Doctor Service, and microwave networks connecting rural Australia. In an invited editorial, Andrew Findlay from Vertel gave Telstra a bit of a blast over a digital PTT venture that never eventuated, and also opined that the rumoured establishment of a Radio Communications Industry Association sounded like a step in the right direction. Products featured in this issue included the Tait TM8250 analog mobile radio, a 2 GHz Aprisa XE microwave radio from 4RF, a UHF CB radio with GPS from Uniden, the MR450 SCADA digital data radio from Trio DataCom and a 400-470 MHz mobile antenna from RF Industries.

Spectrum

The migration path to LTE

The TCCA is an association of manufacturers, operators, users and those interested in global critical communications. It is driven by the desire to ensure that users always have the best technology available to them. Today that means TETRA and P25. TETRAPOL can be a choice for some, PDT in China, but DMR is not designed for critical communications. So what next? Is there a future for these PMR technologies or will we be replacing them with LTE?

LTE is a consumer point-to-point broadband data technology. The public safety community around the world has recognised it as the solution to enhance their current services with broadband capability. The US, UK and other European governments, supported by the TCCA and others, have been working for the LTE standard to include critical communications functionality. 3GPP, the organisation responsible for the standardisation, has supported us in our ongoing efforts despite there being over seven billion consumers and fewer than 42 million critical communications users.

The US has been at the forefront of the evolution towards broadband, both in standardisation and in bringing it to reality. FirstNet was set up to provide a national LTE network for its critical communications. It was promised some initial funding which was realised in recent spectrum auctions and is currently consulting with users in all states. This network will not replace the current P25 networks still being implemented across the country but will provide broadband data. It will subsequently also offer voice.

The US government is not planning to provide any further funding. The shortfall must be found by sharing capacity or similar arrangement with commercial operators.

There is a lot of talk about what is happening in the UK, which is well into a national procurement program to replace its existing TETRA service with a broadband service from a network provider on a public network. But the UK is unique. It does not have its own PMR network. It buys services from Airwave. Those contracts - there is a range of different contracts with different users - expire between 2016 and 2020. The UK is looking to replace this service with another service, but not on a dedicated network this time. The timescales are very ambitious but I am confident that the Home Office will make decisions in the best interests of the users.

South Korea has announced that it also intends to have a nationwide LTE network. Driven by last year's ferry disaster and supported by its own world-renowned LTE industry, it is looking to provide a dedicated public safety network in the shortest possible time.

In the Middle East there has been an LTE pilot in Qatar for the last couple of years. It exists alongside the nation's TETRA network. It is reported that users are very happy with the data being provided. There are no plans for it to replace the TETRA network, which continues to provide mission-critical communications.

Some of the first adopters of TETRA were national public safety networks in Europe. Their approach is to refresh and update their existing networks with the latest TETRA products for their critical communications and use public networks to provide additional broadband services. This is seen by some as a long-term migration path towards broadband services when functionality is standardised and proven, when suitable spectrum is identified and when the necessary funding becomes available.

Clearly LTE will be a significant part of the solution for critical communications users worldwide whatever the chosen migration path.

Phil Kidner is the CEO of the TETRA and Critical Communications Association, based in the UK.

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