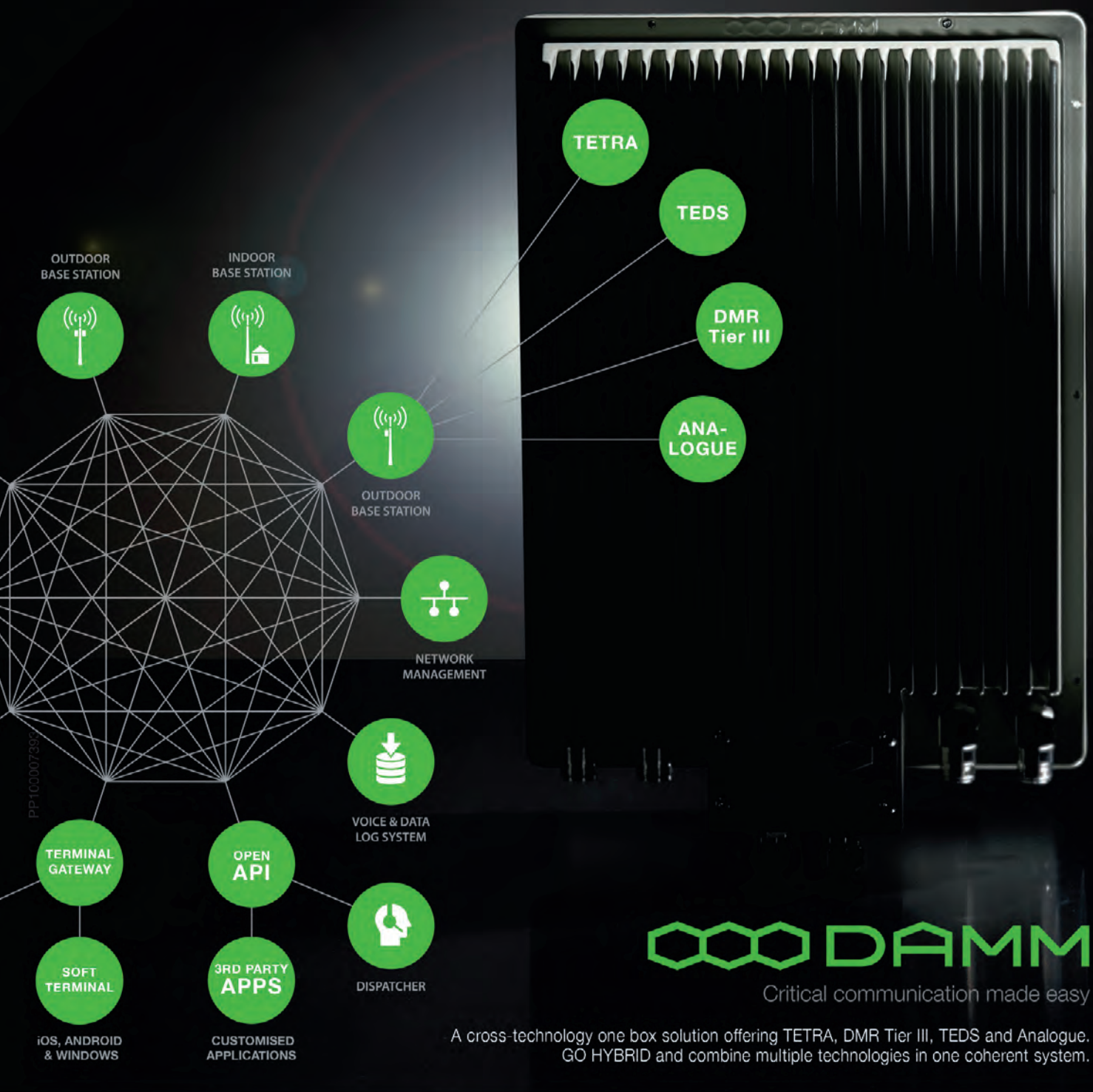
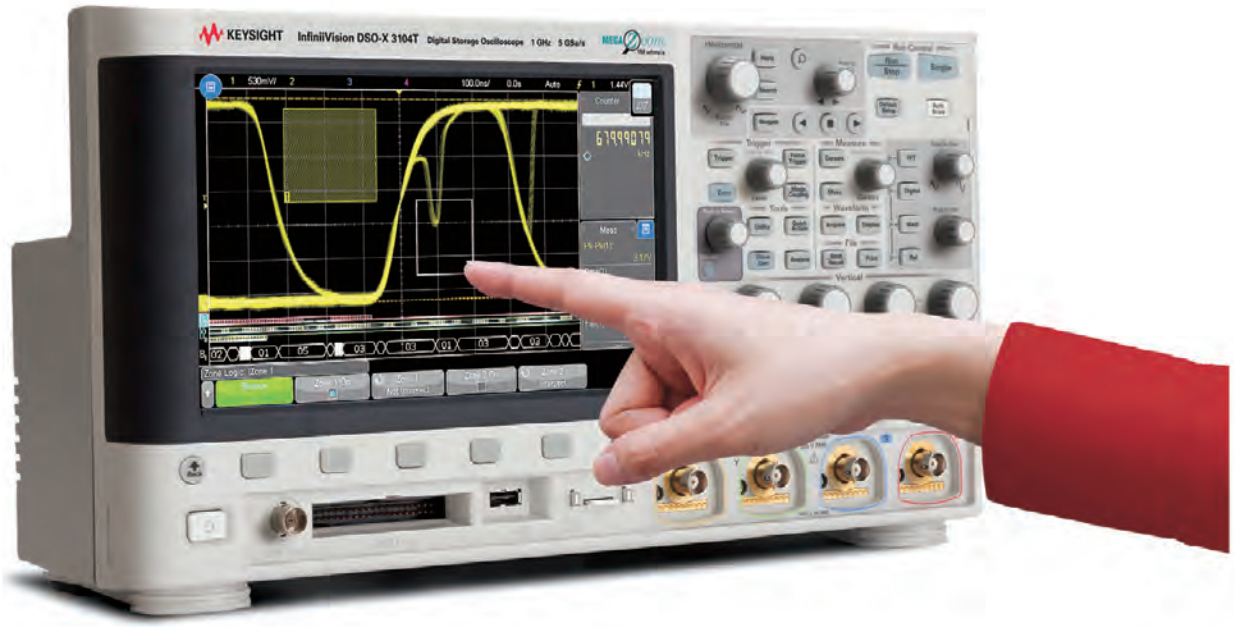
JULY/AUGUST 2015 Vol.2 No.5

comms critical

PUBLIC SAFETY | UTILITIES | MINING | TRANSPORT | DEFENCE



Touch. Discover. Solve.



Oscilloscopes redefined.

We've improved on the proven. The new Keysight 3000T oscilloscope is the next-generation of the InfiniiVision X-Series. With its zone touch triggering, you can trigger on any signal in just two steps. So you can isolate a signal in seconds–much faster than with any competing scope. The 3000T is also a 6-in-1 instrument. Along with your oscilloscope, you can get an MSO, WaveGen function generator, protocol analyzer, DVM and counter. Get in touch with the future of scopes. Take the Trigger Challenge today.

Models	Keysight 3000T X-Series*	Tektronix MDO3000 Series**
Bandwidth	100 MHz-1 GHz	100 MHz-1 GHz
Update Rate	Uncompromised 1M wfms/s	Up to 280K wfms/s
Touch Screen	8.5-inch Capacitive	No
Zone Touch Triggering	Yes	No
Sample Rate	5 GSa/s	2.5 GSa/s (>= 500 MHz) 5 GSa/s (1 GHz)

Take the Trigger Challenge at:
www.keysight.com/find/3000t

AUS: 1800 629 485 NZ: 0800 738 378

KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

* Refer to Keysight document 5992-0140EN for product specs, and 5989-7885EN for update rate measurements.
** Competitive oscilloscopes are from Tektronix publication 48W-30020-3

comms critical
Formerly Radio Comms Asia-Pacific

Inside

July/August 2015

ON THE COVER

DAMM Cellular Systems is a world-leading provider of TETRA digital radio infrastructure systems to industrial, commercial and public safety customers in critical radio and broadband communication. DAMM provides distributed architecture on a true IP backbone, offering a scalable, flexible and highly cost-effective integrated system that is easy to design, commission and expand.

The DAMM BS422 Outdoor Base Station is a cross-technology, one-box solution that offers TETRA, DMR Tier III, TEDS and analog, enabling hybrid use in one coherent system. The BS422 offers improved synchronisation, improved redundancy, high power and extended frequency range.

The DAMM TetraFlex® BS421 TETRA Outdoor Base Station, with its IP65 protection and compact design, is suitable for installation in harsh environments and for direct mounting on antenna masts, buildings and towers, reducing feeder loss and installation costs considerably.

The DAMM TetraFlex® System comes complete with outdoor or indoor base stations, plus DAMM offers built-in applications such as Network Management, Dispatcher, Voice & Data Log System and Group Bridge. With the TetraFlex® Client, users can benefit from coverage extension, as well as data capacity for videos and pictures using Android, Windows and iOS soft terminals.

www.damm.dk

www.gmgsolutions.com.au

Transmit

In this issue we cover the gamut of critical communications use cases and technologies, which serves to remind us of how crucial our industry is to all sectors of modern life. Without reliable and secure communications, civilisation as we know it would grind to a halt (which is another way of saying that we'd end up back in the 1950s… although some might welcome that).

We also speak with the bosses of two of the region's leading tech companies — Dean Brookes of Tait Communications and Steve Karandais of Keysight Technologies. They're both very interesting people, and they each had a lot to say about where their companies are heading.

One topic we touched on with Dean was public safety mobile broadband. It's going to be interesting to see what the Productivity Commission comes up with in its report, due out soon. It was good to see that some representatives from the commission attended Comms Connect Sydney and had discussions with a range of industry stakeholders.

Speaking of which, Comms Connect Sydney was a great success, and I know that many of the exhibitors did substantial business there. It was also great meeting up with readers and advertisers, and I came away with lots of ideas for articles. Please keep those ideas coming via the email address below.

As this issue was being released, a joint ARCIA/Comms Connect Brisbane event was being held. And don't forget the main Comms Connect event coming up in Melbourne at the beginning of December.

Next issue we'll be tackling the topic of training and education in Australasia. If you have some views you'd like to express on this matter, please contact me.

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

Calendar

August 2015

What: APCO 2015
When: 16-19 August
Where: Washington, DC
Web: apco2015.org

September 2015

What: AFAC15
When: 1-3 September
Where: Adelaide Convention Centre, Adelaide
Web: afac.com.au/events/conference2015/home

What: Electronex 2015
When: 9-10 September
Where: Melbourne Park Function Centre
Web: electronex.com.au

October 2015

What: Critical Communications Middle East 2015
When: 5-7 October
Where: Jumeirah Beach Hotel, Dubai
Web: criticalcommunications-me.com

What: LTE Asia 2015
When: 6-8 October
Where: Suntec Singapore International Convention & Exhibition Centre
Web: asia.lteconference.com

November 2015

What: MilCIS 2015
When: 10-12 November
Where: National Convention Centre, Canberra
Web: milcis.com.au

December 2015

What: Comms Connect Melbourne
When: 2-3 December
Where: Melbourne Convention & Exhibition Centre
Web: comms-connect.com.au

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

WESTWICK-FARROW MEDIA

A.B.N. 22 152 305 336
www.westwick-farrow.com.au

Head Office
Cnr. Fox Valley Road & Kiogle Street, (Locked Bag 1289), Wahroonga NSW 2076 Australia
Ph +61 2 9487 2700 Fax +61 2 9489 1265

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

Chief Editor: Janette Woodhouse

Publisher: Geoff Hird

Associate Publisher: Glenn Silburn
Ph 0422 931 499
gsilburn@westwick-farrow.com.au

Art Director/Production Manager:
Julie Wright

Art/Production: Tanya Barac, Colleen Sam

Circulation Manager: Sue Lavery
circulation@westwick-farrow.com.au

Copy Control: Mitchie Mullins
copy@westwick-farrow.com.au

Advertising Sales
Mike Woodcock Ph 0411 969 248
mwoodcock@westwick-farrow.com.au
Salim Charania Ph 0421 116 421
scharania@westwick-farrow.com.au

If you have any queries regarding our privacy policy please email privacy@westwick-farrow.com.au
Subscriptions: For unregistered readers, price on application

Audited Media Association of Australia
March 2015 total CAB Audited Circulation 3,674 (83% personally requested)

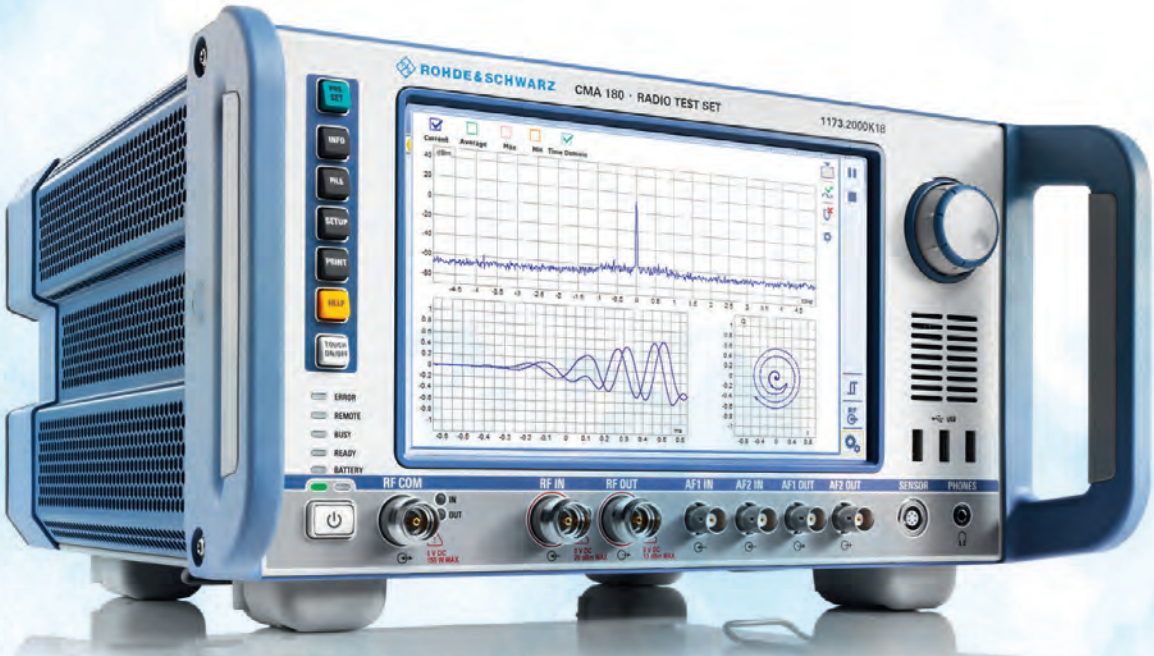
Print Post Approved PP100007393
ISSN No. 2202-882X
Printed and bound by SOS Print + Media
+61 2 9549 2119

R&S®CMA180: Radio test set revolution!

Analog goes digital.
The R&S®CMA180 is a revolutionary radiocommunications tester for radio systems that operate in the 100 kHz to 3 GHz range. Its technology is based fully on digital signal processing and advanced computing. Intuitive operation and efficient measurement capabilities make the R&S®CMA180 an indispensable tool for performing radio measurements.

- Frequency range from 100 kHz to 3 GHz
- Analog modulation and demodulation (CW, AM, FM)
- Up to 150 W peak input power and up to 100 W continuous input power
- Signal level for receiver measurements can be lowered to –140 dBm
- Integrated audio generators
- Audio quality tests (SINAD, THD, SNR)
- Spectrum analyzer with integrated sweep function
- Arbitrary waveform generator

www.rohde-schwarz.com/ad/cma



ROHDE&SCHWARZ

> THE BEST THING IS THAT THE RADIOS WORK EACH AND EVERY TIME. IT'S A CRITICAL SERVICE AND IT WORKS FANTASTICALLY.

CAMPUS COMMS

A new radio system has removed black spots and boosted safety for the University of Canberra.

The University of Canberra caters to more than 16,000 students and close to 1000 staff at its campus in the suburb of Bruce, ACT. As with any large site, staff need to be able to communicate clearly and efficiently no matter where they are located.

But the university's legacy radio system wasn't keeping up.

"We had a number of black spots in our communication system, with radios virtually working only on line of sight on a campus full of buildings," says Vittorio Cox, the university's manager of security, traffic and estate management. "Radios were old and outdated, two repeaters barely or didn't work, and the decade-old software was too basic for the university's needs."

A new system was needed and, through Sydney-based dealer Telechnics, a Motorola MOTOTRBO solution was put in place.

Selecting different handsets based on job roles while retaining interoperability was critical, says Cox. Plain-clothes security managers use the SL4010 radio for its aesthetic appeal; security staff have keypads on the DP4801 for future texting capabilities; and the crisis management team needed communication without the bells and whistles and were therefore allocated the DP4401s.

"Yet all the radios talk to each other," says Cox. "With four channels now instead of two, the controller can direct people like cleaners or maintenance staff, and exercise more control over frontline staff.

"We have better safety for staff and students," Cox adds. "With MOTOTRBO, we know which staff member is calling even if they can't speak for some reason. Although never used, access to the duress function is part of our duty of care. While not the panacea for all ills, it gives security staff peace of mind and they tend to be more robust in their patrolling."

GPS monitoring (via updated TRBOnet software) also helps with staff safety. The TRBOtact interconnect allows standard phones and help points to access the radio system. For students using the help points located throughout the campus, GPS and location finding helps the controller dispatch the nearest available officer.

"Using GPS, we can establish how effective patrols are and how busy staff are," says Cox. "We learned that staff do up to 16 km per shift, so now we can manage fatigue and work out how many shifts per week is too many for staff. What was potentially a long-term employment issue can be more effectively managed."

The university has a dedicated control room and utilises a base station set-up. Two repeaters on separate buildings provide redundancy and the capacity to cope with the unforeseen.

"With lots of remaining bandwidth, we also have a system that grows as the campus expands," says Cox. "We have four hours backup which automatically switches on... one of the highlights [of the system] is that it will still work in the event of a power outage.

"We simply cannot be offline," concludes Cox. "The best thing is that the radios work each and every time. It's a critical service and it works fantastically."

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

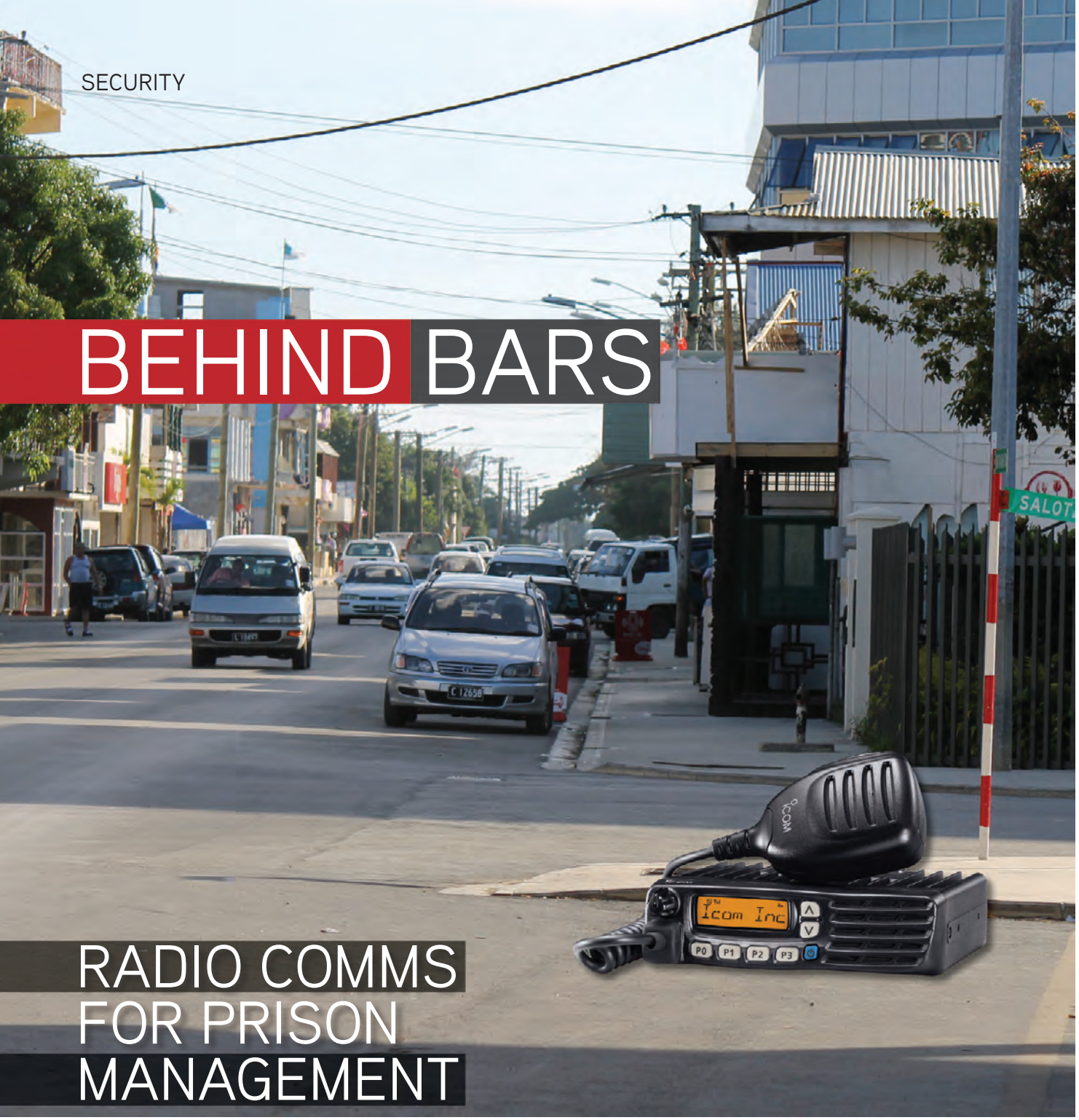


Image courtesy limeasia / Flickr / CC

BEHIND BARS

RADIO COMMS FOR PRISON MANAGEMENT

The Tongan Prisons Department uses Icom radios for the safety of its staff and inmates.

The Icom radios were successfully commissioned following the department's decision to replace its old radios, which were no longer able to meet requirements.

In order to keep the prison running smoothly, the department needed radios that weren't flimsy or easily damaged during use. Its old radios had poor battery life and were affected by the tropical humidity — both concerns which the department wanted its new radios to address.

The department also needed its radios to provide clear, reliable communications for officers patrolling both inside and outside the prison, as well as for staff in offices and vehicles. Prisoners are sometimes outside of the prison on day work and officers have occasionally had to chase down escapees, so a range of at least 10 km is needed to cover a mix of built-up and remote areas. When told of the radio requirements, Greg O'Dwyer, the general manager of one of Icom New Zealand's dealers, Express Diesel, recommended Icom to the department. Supplied in October 2014 and installed by a local contractor, a total of 25 radios — 15 IC-F5023s along with 10 IC-F1000s — are now being used, plus 2.5 m antennas, cabling and orange harnesses supplied by Icom.

The radios are MDC-1200 compatible and, unlike the old units, have a long battery life, are lightweight and are able to survive the Tongan humidity. Both models are built for heavy-duty use and provide long-term reliable operation in all manners of environments due to rugged construction and a MIL-STD810 rating. The IC-F1000 is one of the slimmest Icom radios (24.5 mm) and is IP67 rated.

The department is planning to purchase more radios in the coming months.

Icom New Zealand
http://www.icom.co.nz

Image: Downtown Nuku'alofa, Tonga. Prison guards occassionally have had to give chase to escapees, thus the need to radios with a range of at least 10 kilometres.

WDS
WIRELESS DATA SOLUTIONS

www.wirelessdata.com.au

Digital Patrol Radio PD41X

DMR standard radio, double channel capacity
Analog & Digital Mixed Channel, embedded RFID

DMR
DIGITAL MOBILE RADIO ASSOCIATION

LIGHT & DURABLE
DIGITAL VOICE, CLEARER AND LOUDER
EMBEDDED RFID
ANALOG & DIGITAL MIXED CHANNEL

RFID board

For dealer enquiries please contact:
Matt Kelly 0409 999 917
or **Andrew Wyborn 0429 993 011**

DON'T BLOW IT
PROTECTING AGAINST RF DAMAGE

Adam Purkiss, Field Applications Engineer, Anritsu, EMEA

A few simple guidelines can help protect expensive field test instruments.

Technicians such as radio tower mast riggers are responsible for the use of finely engineered RF field test equipment that offers very high levels of accuracy and precision, while also being portable and rugged.

The handheld spectrum analyser, for instance, is a mainstay of the technician's toolkit. With a rugged plastic housing and a toughened display screen, it is easily capable of withstanding the knocks and shocks encountered in everyday use in the field.

Rugged it might be, then, but there is one phenomenon that it cannot endure — excessive RF power. For all the recent advances in the design and manufacturing of circuit protection devices, breaching the instrument's specification for maximum input power will cause damage.

Unfortunately, a measurement instrument's accuracy and precision depend on the use of extremely high-quality components assembled to fine tolerances. This means that the repair or replacement of a damaged instrument can be very expensive.

As so often in life, prevention is better than cure. This article describes the main methods and products that field operators should employ to eliminate all risk of exposing their test equipment to harm in ordinary use, whether through excessive RF power, static electricity or connector mismating.

Excessive continuous RF power

The most obvious way in which incorrect use of a test instrument can damage it is by the application of continuous excessive RF power to the instrument's inputs. It is the most obvious because the resulting damage can be easily seen – and smelled. Figures 1 and 2 show damage to the front ends of handheld spectrum analysers. Here, continuous RF power above the maximum threshold specified by the manufacturer resulted in the burning of various components inside the case. In Figure 1, it also damaged tracks on the PCB, which rendered it unrepairable, since the PCB was a multilayer assembly and some damaged tracks were therefore not exposed to view.

When measuring signals with a handheld spectrum analyser, the correct method to protect the RF input is to use an external attenuator of a known value: this reduces the amplitude of the input signal to an acceptable level. The user should specify carefully both the scale of the attenuation provided by the attenuator (in dB) and its maximum power rating (in W). If a user mistakenly applies RF power in excess of the attenuator's maximum power rating, it will fail to provide the expected level of attenuation of the input signal, potentially exposing the instrument to the risk of burnout.

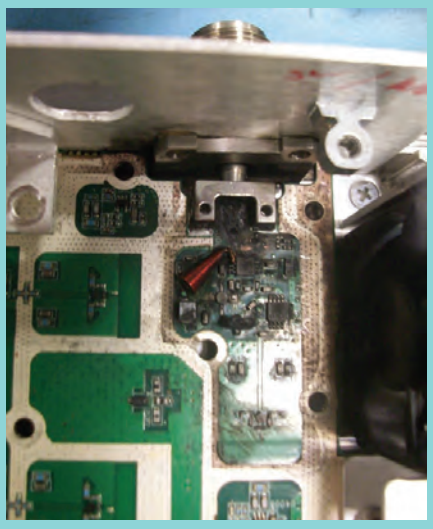


Figure 1. A spectrum analyser's front-end components and board have been burned by excessive RF power, as shown by the blackening of the area around the input.

Figure 2. Less conspicuous excess power damage can be expensive or impossible to repair.

The value of the attenuator should be entered into the spectrum analyser, which will automatically apply compensation so that the instrument still displays an accurate measurement of received power.

Detecting live RF cables

Mast riggers who perform cable measurements must always be aware of whether the cable they are testing is live or not. This might seem obvious, but riggers with many years of experience will have seen a huge increase in the density of cables and antennas mounted on masts. Today, it is not uncommon for a single mast to host 10 or more different transmitter/receiver combinations side by side. This means that it is surprisingly easy to mistake one cable for another.

Again, there is a guaranteed method for avoiding damage caused by inadvertently testing a live cable that the operator thought was dead. This is to connect an RF power indicator to the cable before testing it (see Figure 3). If neither the yellow nor the red light is illuminated, the cable can be safely coupled to a test instrument.

Another reason for the use of an RF power indicator is to avoid damaging cable termination devices. Some cable analyses are performed by coupling an RF input of 1 mW into a cable terminated with a precision 50Ω termination (see Figure 4). This enables the technician to test the reflection characteristics of the cable. These terminations have a maximum power rating of 1 W. So if the user were to accidentally attach the 50Ω termination to the end of a live cable, which might carry transmissions of up to 40 W power, the termination will be damaged.

When the technician is testing a cable for the existence of passive intermodulation (PIM) products, the analysis must be performed on live cables, since PIM products arise from the combination of two RF transmissions at roughly adjacent frequencies. Here again, a special termination must be connected to the free end of the cable, but this time it has to withstand up to 40 W of RF power (see Figure 5).

Protecting against ESD strikes

So far, this article has described the methods to be used to avoid any risk of damage to test equipment from excessive continuous RF power. Any qualified and experienced operator working with RF devices will also be aware of the risk of damage from electrostatic discharge (ESD) strikes.

Because of the high value of RF test instruments, protection against ESD is of particular importance to users.

ESD can be a fairly unpredictable phenomenon — the amount of static electricity in a device depends on the material it is made from and the humidity in the surrounding environment. Even the size of the user's body affects how much static electricity is accumulated.

It is true that the performance of ESD protection devices, such as transient voltage suppression (TVS) diodes, has improved dramatically in recent years. No protection device, however, can guarantee that a device will not be damaged.

Rather than relying on an instrument's protection devices, it is safer for the user to avoid triggering ESD strikes. This is a simple matter of having the discipline to follow familiar guidelines for handling electronic equipment.

Interestingly, the damage caused by ESD strikes is more insidious than that caused by excessive continuous RF power. The voltages generated in an ESD strike can often reach 2 kV, and sensitive devices such as MOSFETs can be rated for a breakdown voltage of just a few hundred volts.

At the same time, the energy in an ESD strike is dissipated in a matter of nanoseconds. This means that the damage caused by ESD can break a component down very quickly, but with much less visible evidence of damage than the widespread charring caused by excessive RF power.

Figure 6 shows an ESD protection device, a toroid coil which is part of a protection circuit for an RF output amplifier, after suffering a strike. It is slightly discoloured, but as Figure 7 shows, it is not markedly different in appearance from an undamaged coil. Nevertheless, this tells us that the RF amplifier is probably now damaged as well.

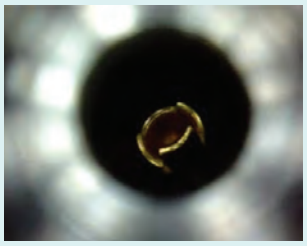
Figure 3. An RF power indicator reliably shows whether a cable is carrying RF signals at a power of 50 mW or more.

Figure 4. A termination device is susceptible to damage by RF signals of more than 1 W in power.

Figure 5. A special termination device is required when performing PIM tests on a live cable.

Figure 6. ESD damage has slightly discoloured this toroid coil.

Figure 7. An undamaged toroid coil.



Figures 8a and 8b. Poor handling of connectors can cause the test instrument's female centre conductor to be splayed.

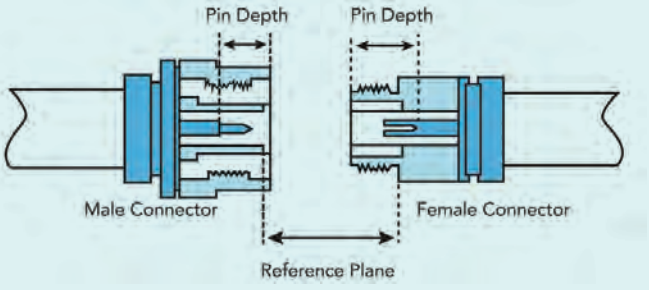


Figure 9. Use of a device connector with an overly long pin could damage an instrument's connector.

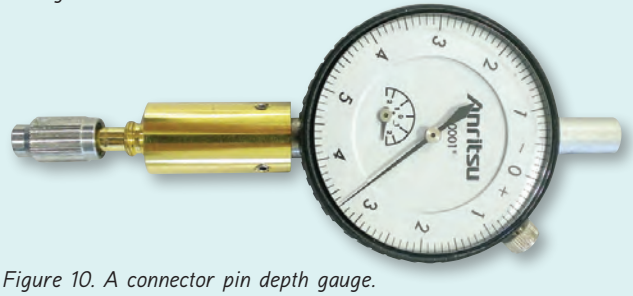


Figure 10. A connector pin depth gauge.

> PROTECTING TEST INSTRUMENTS IS A MATTER OF FOLLOWING SIMPLE GUIDELINES.

The dangers of mismating a connector

The connector is the last important part of a test instrument that is commonly damaged by the user. As with RF power and ESD strikes, such damage is easily avoidable through the application of correct handling techniques.

When connecting devices to a test instrument, the general rule is to hold the body of the device and to only turn the coupling nut to tighten it on to the instrument. This is because the internal construction of instruments is precisely designed to optimise measurement accuracy. If the body of the external device is turned, once partially or wholly mated it will also turn the conductor inside the instrument.

When both centre conductors meet, the female centre conductor may then either splay or break off if the male and female parts are not perpendicular. The damage that might ensue is shown in Figure 8.

Unfortunately, the front-end connectors of test instruments are usually very expensive to replace. Therefore, field test technicians should use a precision adaptor specified for the instrument's connector type to connect the device under test to the measurement instrument. The cost of such an adaptor is far less than the cost of repair to an instrument's damaged female connector.

Users should also take care to follow the manufacturer's guidelines on the torque to be applied to a connection. In addition, each device type has a specific pin depth, which allows for highly accurate mating to a compatible device of the opposite sex (see Figure 9). A depth gauge (see Figure 10) should therefore be used to check both connectors before connecting them together.

Protecting test instruments is a matter of following simple guidelines. Here's a five-step process for making connections that includes all the precautions that the user should take.

1. Check that each device has the same connector type but of opposite sex.
2. Use adaptors if possible.
3. Check the pin depth of each connector.
4. Check for centre conductor damage, with a magnifying glass if required.
5. Use a torque spanner when tightening to exert the correct torque.

Precision measuring equipment can be very expensive to repair. As this article shows, a few, simple guidelines and items of specialist equipment can go a long way to eliminating the risk of damage when using measurement instruments in the field. As the saying goes, it's better to be safe than sorry!

Anritsu Pty Ltd
www.anritsu.com

ICOM

FULL DUPLEX COMMUNICATION OVER WIRELESS LAN AND IP NETWORKS

IP 100H

Icom Australia has released a revolutionary new IP Advanced Radio System that works over both wireless LAN and IP networks.

The IP Advanced Radio System is easy to set up and use, requiring no license fee or call charges.

To find out more about Icom's IP networking products email **sales@icom.net.au**

WWW.ICOM.NET.AU

ICOM5000

News

TELSTRA, KOMATSU M2M DEAL

Telstra will continue to partner with Komatsu to facilitate the future of Komatsu's ICT and M2M strategy in a whole-of-business deal worth $23 million over the next three years. Komatsu will build on a recent trial of M2M connectivity, which enabled a 'zero touch' remote download of performance diagnostic data from more than 700 pieces of Komatsu equipment on mine sites. Being able to access this data from the Komatsu inSite Centre in Fairfield, Sydney, in real time, negated the need to remove the equipment from use while the data was downloaded.

More info: bit.ly/1CndqwL

LORD'S GOES DIGITAL

The UK's famous Marylebone Cricket Club (MCC) has chosen Sepura DMR to replace its analog radio communications system at Lord's Cricket Ground. The contract was signed by Chatterbox Limited, Sepura's channel partner for the south-east of England. Under the five-year contract, Chatterbox has supplied MCC with over 80 SBP8040 Sepura keypad/display hand-portables for use by catering, security, maintenance and management teams. On match days, another 360 SBP8340 non-keypad hand-portables are used by stewards for crowd control, while SBM8040 desktop mobile radios are deployed in the ground's control room. MCC wanted IP67-rated radios that could also offer high audio clarity.

More info: bit.ly/1NLuoVN

GREATER TDD USE IN NZ

New Zealand's Radio Spectrum Management (RSM) agency recently consulted current management right holders and Crown licensees in the 3.5 GHz band on a proposal to permit greater use of time division duplex (TDD) equipment in the band. Taking into account the feedback from the submissions, RSM has decided to make two 5 MHz channels in the frequency ranges of 3495-3500 MHz and 3500-3505 MHz available for TDD trials by existing Crown licensees and private management right holders.

More info: bit.ly/1HKm1eQ

Portable radio

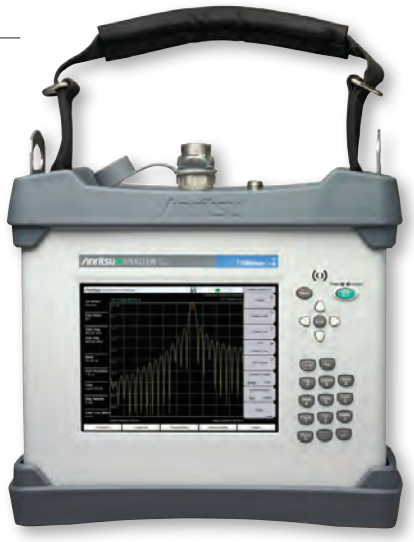
The Simoco LinX 200 meets DMR standards and operates on Tier II digital conventional and analog modes, making it suitable for organisations planning to upgrade to digital radio communications from their analog systems.

The DMR standard offers the benefits of a digital air interface, including spectral efficiency, quality audio to the edges of reception and enhanced battery life. The LinX 200 supports individual, group and emergency calling and features an emergency alarm as well as four programmable side buttons to enable personalisation according to operational requirements.

Simoco says the product is particularly suited to the rental market as well as sectors including hospitality, retail, security and maintenance.

Simoco Australasia Pty Ltd

www.simocogroup.com



PIM analyser

The Anritsu MW82119B-2100 will test for unwanted passive intermodulation (PIM) signals and also comes bundled with Site Master cable and antenna analysis options. It is available to rent from TechRentals.

This portable analyser will verify PIM performance at difficult-to-access sites such as remote radio head installations and indoor distributed antenna systems. The PIM Master enables operators to adjust the test power from 20 dBm (0.1 W) for indoor DAS testing to 46 dBm (40 W) for macro site testing.

PIM measurement options include PIM vs time, sweep PIM, Distance-to-PIM (DTP), 1-port phase and Smith chart. The unit is battery operated, covers the cellular 2100 MHz band and has high 2x 40 W test capability for major wireless standards.

TechRentals

www.techrentals.com.au

Dipole antenna array

The Polar 814D-12-IC is an all stainless steel, vertically polarised, 12-stack exposed dual element folded dipole antenna array with an omnidirectional free space radiation pattern.

The model comprises two distinct antenna arrays, each with its own feeder cable, ie, it comprises an 8-bay antenna array (model 814D-8-IC) mounted on top of a 4-bay antenna array (model 814D-4-IC).

The unit is designed to be mounted to the side of a support structure/tower using suitable outriggers (one on top of the antenna array and the other at the bottom). All dipoles are attached to the supporting mast and all cabling is internal.

Polar Electronic Industries Pty Ltd

www.polarelec.com.au

Two Way Radio: We only compare apples with apples, there are no oranges

Ace Communications is an Independent Two-Way Radio distributor, specialising in Motorola, Vertex, Icom, GME, Simoco, TAIT, Kenwood and Uniden. We proudly parallel import selected genuine radios and accessories, cutting out the middle men, and therefore giving our dealers the best purchase prices

- 26 years' experience in the industry – Specialising in Motorola imports
- In addition, we stock and distribute Australian sourced Icom, Vertex, Kenwood, TAIT, Simoco, Uniden & GME
- Large and diverse inventory with same day dispatch for ex-stock items
- Particular focus and service to Australian two way dealers
- Support and service for all radio brands and accessories
- Discounted distributor prices
- All products are Genuine & Original and fully guaranteed
- ARCIA Member
- We never compete with our dealers

ACE Communication Distributors Pty Ltd
Po Box 3376, Victoria Point QLD, 4165
Tel: 07 3821 4111 Fax: 07 3206 0800

Ace Communications GENUINE

EXPECT NOTHING LESS THAN GENUINE AND ORIGINAL PRODUCTS

News

MOTOROLA'S BIG DATA MOVE

Motorola Solutions has announced that it is partnering with Wynyard Group to integrate next-generation crime analytics into the company's Intelligence-Led Public Safety platform to enable agencies of all sizes to share data and solve crime with fewer resources. Motorola said that such software solutions help identify criminal patterns and explore relationships by analysing data in minutes rather than days, freeing up agency resources to investigate leads and solve cases.

More info: bit.ly/1S67U39

INTEROPERABILITY ISSUES

The US Department of Homeland Security's Inspector General, John Roth, has said that the department still does not have an acceptable level of interoperability in its radio communications. "Fewer than 0.25% of the 479 radio users we tested could access and use the specified common channel to communicate. Further, of the 382 radios tested, only 20% (78) contained all the correct program settings for the common channel." Roth concluded: "DHS continues to lack reliable interoperable communications for emergencies, as well as daily operations and planned events. The inability to communicate effectively during an emergency presents serious risks to the health and safety of the public."

More info: bit.ly/1Tj7jxy

RAAF C-17 SATCOMS

The Royal Australian Air Force (RAAF) has flown its first Boeing-built C-17A Globemaster III equipped with a new advanced satellite communication (SATCOM) and imagery display system, providing the flight crew and passengers with unprecedented situational awareness. Boeing installed the high-speed SATCOM system to support the RAAF's 'Plan Jericho', an initiative to transform the Australian military into an integrated, networked force able to deliver air power in all operating environments. Applications enabled by the antenna include video teleconferencing, instant messaging, email, transfer of large graphics files, voice and radio over internet protocol and common operating picture capability.

More info: bit.ly/1HKm1eQ

Vector network analyser

The MegiQ VNA0440 from Emona Instruments is an affordable and compact USB-driven, fully bidirectional two-port VNA that enables detailed impedance measurements of antennas, components and circuits over a range of 400 to 4000 MHz, ie, all popular communication bands for GSM-LTE, GPS, ISM, Wi-Fi, Dect and so on.

An extra generator output is useful for characterising 3-port devices such as splitters and hybrids. The internal, programmable bias generator with bias tees enables fully automatic parametric measurements of, for example, amplifier and varactor/PIN circuits. The UFL kit enables measurement of circuits on micro-PCBs, such as baluns, antennas and amplifiers. Other kits are available: WFL, SMA and balanced, including calibration tools. The PC software provides intuitive control, extensive graphing, data export and reporting. Measurements and set-ups can be stored in sessions for easy 'Retrace-and-Compare'. The handy 'Click-and-Match' calculates and simulates matching circuits.

Emona Instruments Pty Ltd

www.emona.com.au

TETRA base station

Sepura's SOLO Instant Coverage has been designed to provide temporary TETRA infrastructure for emergencies and special events that have poor or non-existent TETRA network coverage, such as remote disaster zones or specific incident locations.

SOLO Instant Coverage delivers additional outdoor capacity and improves communications among the rescue teams on the scene. It can also be deployed to provide connectivity for pre-planned events and operations, such as VIP protection, and, in particular, to deploy in-building TETRA coverage during major fire incidents.

The base station can be remotely activated through a simple control panel which also monitors its performance. This is a fundamental requirement for certain markets where untrained personnel may be required to report faults during daily maintenance checks and, more importantly, need to activate the SOLO in case of an emergency.

The base station supports three levels of radio terminal access: open, enabling access to any TETRA radio via dynamic registration; filtered, enabling access to radios with specific features, attributes and configurations; and closed — which checks the unique user's identification number — where radios need to be pre-provisioned before they can register on the network.

Sepura PLC

www.sepura.com

Since 1895

MT8821C

Test Tomorrow Today

LTE-A Smartphone development - in one box

The new MT8821C Radio Communication Analyzer offers revolutionary, forward-thinking technology that allows functional test and RF verification of LTE-A **up to 4CA** with **2x2 MIMO** and **2G/3G/4G** in a single box.

The MT8821C is extremely easy-to-use. Using the latest state-of-the-art GUI technology, the intuitive, Windows® based, multi-screen, high definition touch display is second to none.

Interface innovation and world leading test technology that's backwards compatible with the MT8820C.

4CA MIMO

6 GHz RF

1 box multiRAT

Accelerate device development, increase test efficiency

Call 1800 689 685 (Australia)
www.anritsu.com

Anritsu
envision : ensure

5G STANDARDS

The ITU is working on standards to make wireless comms match the speed and reliability of fibre optics.

The ITU has established a focus group to identify the network standardisation requirements for the 5G development of International Mobile Telecommunications (IMT) for 2020 and beyond.

These 'IMT-2020' systems will enable wireless communication to match the speed and reliability achieved by fibre-optic infrastructure. The potential application fields of IMT-2020 systems, in addition to voice and video, span from health care to industrial automation, virtual reality, automated driving and robotic systems controlled with an imperceptible time lag.

One-millisecond end-to-end latency is necessary for technical systems to replicate natural human interaction with our environment, a goal that experts say should be within reach of future networks.

In 2012, ITU established a program on International Mobile Telecommunications (IMT) for 2020 and beyond, which provides the framework for IMT-2020 research and development worldwide.

ITU's Radiocommunication Sector (ITU-R) is coordinating the international standardisation of IMT-2020 systems. ITU-T is expected to play a similar convening role for the technologies and architectures of wireline networks.

"Air interfaces and radio access networks are progressing rapidly, but there is a need to devote more attention to the networking aspects of IMT-2020," said ITU Secretary-General, Houlin Zhao.

"Wireline communications will transform significantly in support of IMT-2020, and the coordination of ITU's standardisation and radio communication arms will ensure that the wireline and wireless elements of future networks develop in unison."

"Following on from the successful development of IMT-2000 and IMT-Advanced, the standards for all of today's 3G and 4G mobile systems, the work to be carried out by ITU-T on the network aspects will be an important complement to the activities undertaken by ITU-R in developing the radio interface standards for IMT-2020," added ITU Radiocommunications Bureau Director François Rancy.

ITU Telecommunication Standardization Bureau Director Chaesub Lee said, "Today's network architectures cannot support the envisaged capabilities of IMT-2020 systems. Innovation in standardisation is essential across core networks, access networks, virtualised data clusters and masses of smart networked units. Moving beyond convergence, the concepts underlying networking must evolve to support the development of integrated fixed-mobile hybrid networks."

"5G will power a wide range of new user experiences, but the bottleneck remains the speed of the network. Everyone in the ICT ecosystem needs to work together," said Huawei Head of 5G Research and Development Wen Tong.

"This is the most important condition for us to realise 5G, and this is the reason Huawei is contributing to ITU's efforts to consider what the road to 5G demands of all parts of the ecosystem."

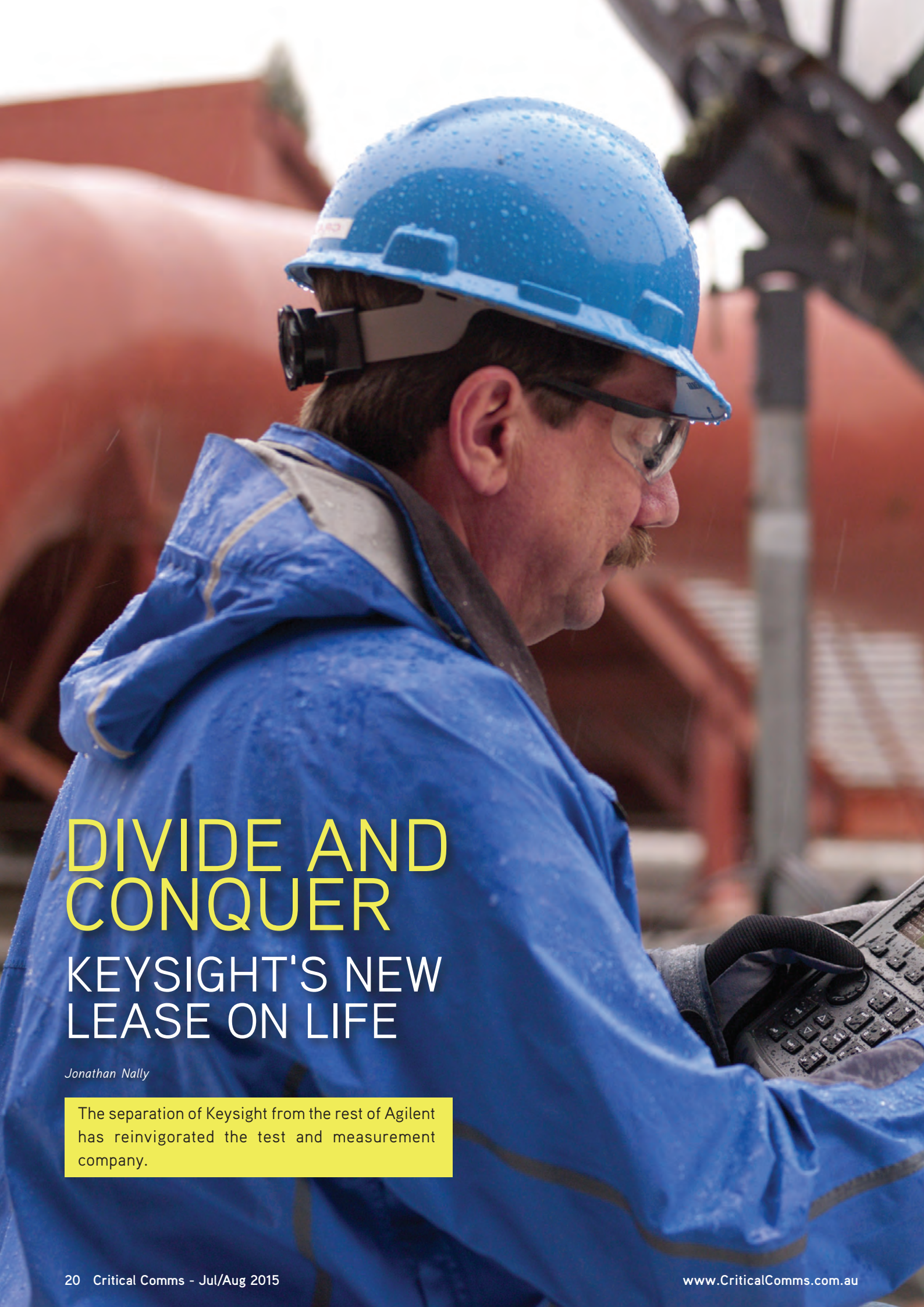
The new Focus Group, which is open to participation by any interested party, will provide the launching point for ITU-T's contribution to IMT-2020 standardisation. The group will follow an intensive work plan to complete its study prior to the December meeting of ITU's standardisation expert group responsible for future networks, cloud computing and network aspects of mobile communications, ITU-T Study Group 13.

IMT-2020 research and development is underway in a wide range of industry and public sector bodies. The Focus Group's scope of activity will be concentrated in identifying the standardisation needs of the wireline elements of 5G networks, building on an analysis of IMT-2020 studies being undertaken by other entities.

Enabling Wireless Everywhere

WirelessTech

Wireless Tech (Australia) Pty Ltd
+61 2 8741 5080 | sales@wirelesstech.com.au
www.wirelesstech.com.au



DIVIDE AND CONQUER

KEYSIGHT'S NEW LEASE ON LIFE

Jonathan Nally

The separation of Keysight from the rest of Agilent has reinvigorated the test and measurement company.

"I'm an extreme technologist," says Steve Karandais. "I still love understanding all the technology and getting right into it." This is just the right attitude to have when you're the general manager of the Australian division of one of the world's foremost electronics companies, Keysight Technologies.

The global business is headquartered in Santa Rosa, an hour north of San Francisco, where its main microwave engineering, research, development and manufacturing facility is located. The Australian arm is based in Melbourne, where it has a full NATA (National Association of Testing Authorities) accredited calibration lab. It's the oldest such lab in Australia, having been continuously accredited since 1974.

Karandais brings several decades of technical and sales experience to the job. "I was in the Air Force as a radtech many years ago, and then joined Hewlett-Packard in 1989 in the cal lab," says Karandais. "I was in calibration and repair for six and a half years as the senior microwave engineer in the service centre, so I got a really good grounding in all our instruments; I really knew them from the inside out.

"We then formed a technical consulting group, part of our call centre, where customers would call in saying, 'Look, I've got this job I need to do but I don't know what kind of test equipment I need; all I know is I've got to measure these things,'" he says. "And we would help figure out exactly what kind of equipment they needed, what kind of specs they needed."

From there he moved into sales in the late 1990s and was the company's Defence account manager, a role he held for about 12 years.

"My job has always been diagnostician," says Karandais. "When I was in the Air Force, I had to fault-find HF and communications systems; I worked on the air traffic control tower at Pt Cook. It's always been 'What is the problem? How do we get down to it, how do figure out what it is, and let's solve it.' And I approach sales in the same way.

"In the period of time when I was sitting on the phone helping people figure out 'What are we trying to solve here? What measurement is going to complete this solution?', I found that that's all I needed to do," he says. "It is problem solving. And that takes really active listening, understanding what the customer is trying to do, and that relies on the customer being confident and trusting you with that information."

Karandais says that consultative technique stood him in good stead for 12 years as Defence account manager, then as sales manager and now as general manager of the company. "Even though I don't need to apply my technical knowledge [day to day], I still need to have it to understand what's going on," he says.

The separation

Until late last year, Keysight Technologies was one half of Agilent Technologies — a blend of test and measurement and biotech. I ask Karandais about the reasoning behind splitting the company in two.

"The separation occurred [for reasons] very similar to the HP days," he says. "Back in the HP days, coming up to 1999 where Agilent split from HP, they [HP] had made a decision that they wanted to be a pure IT company. The cost model for a computer company is that they put between 2 and 3% of revenue back into R&D. For a test and measurement company, we need between 12 and 15% of revenue back into R&D to come up with the next leading-edge capabilities.

"Coming up to the last five years, the executive management was … struggling to figure out 'Are we a measurements company or are we a biotech company?'" he says. "And realistically, about five years ago, they put us into the biotech category. And that meant that the test and measurement portion was suffering. A lot of the revenue and profit that was

being developed from test and measurement was feeding the biotech portion of the organisation.

"So we really made a decision that we just had to separate, and, for the first time since about 1965, we're a pure test and measurement company again."

In the field

A major trend in the test and measurement field is the move from benchtop instruments to field-portable instruments. Keysight's new FieldFox instrument is a good example and is a testament to the effort the company has put into R&D and design.

"We've developed the measurement science — how do you do spectrum analysis really, really well? How do you do network analysis really well?" Karandais says. "We've taken all that science, all those measurement algorithms, and, with new technology such as ASICs and MMICs, we can put all that measurement science into the chip. So we took our very best spectrum analysers, our very best network analysers and cable antenna test people, our power meter people, put them together and developed new ASICs, so that now [with FieldFox] in a 3 kg box, we've got a full 2-port VNA, a full spectrum analyser, we've got a tracking generator, independent source, a power meter, cable and antenna tester, an interference analyser, a 32 VDC source and GPS.

"It's been amazingly popular — we've sold hundreds in Australia," says Karandais. "And overall, we have 70% of the world market in network analysers."

In addition to making and selling its own gear, Keysight also operates a calibration service for other manufacturers' equipment. "About 40% of the work that comes in is not from our own company. We calibrate products from anybody pretty much," says Karandais. "We have the widest accreditation for calibration of any company in Australia. We go from DC to 50 GHz, and we have more than 500 points of accreditation.

"We have the best measurement science in the world. We've been at this since 1939. So we're a 75-year-old start-up company," he jokes.

Building momentum

"One of the big changes that's going to occur over the next three to five years is the move from 4G to 5G," says Karandais. "5G will be working at much higher frequencies; probably a lot of it is going to be happening in the E band between 60 and 90 GHz.

"The idea will be that, just as we have femtocells now for 4G — because you can't just have one big base station — it'll be even more so for 5G," he adds. "Attenuation of signals will occur much faster, so there'll be whole lot more little cells around the place. Those cells will actually be beamforming to an individual [subscriber]."

Getting back to the changes with Agilent and Keysight, I ask him about the feeling inside the company now. Is there a sense of reinvigoration?

"Definitely," he says. "Right now we're going through a number of internal restructures. We had the structure of Agilent Technologies, which was a $7bn company, and that involves certain levels of hierarchy and separation of responsibilities for different capabilities.

"As Keysight, that now needs to collapse," he adds. "As a $3bn company we need to be much flatter. We need to have a lot more integration of our R&D organisations, and that's happening right now. We're integrating sales and marketing forces [for instance]. We're really feeling there's some momentum we can put into the organisation.

"We've just announced that we hope to be successful in acquiring a company at the end of October, which will give us more capability in the 5G space as well as some capability in the telco space that we've been lacking over the last few years," Karandais says. "So we really do have a sense that our R&D money is just our R&D money, and it will be ploughed back into growing the capability of the company and moving us in the direction where we're really going to take advantage of things like 5G." 5G is obviously set firmly in Keysight's crosshairs. "The technology doesn't have a standard, it doesn't have a product, it doesn't have any capability," he says. "But it's being researched and developed and we know it's going to occur, so we've got the team already in place and already working with all the research universities and organisations such as Samsung and so on, and embedded in there, to make sure we understand what they need. So by the time the standard comes out, we'll have the product. That's our intention.

"Keysight and Agilent Technologies have always had people embedded in the standards bodies, always had a representative from our company in all the IEEE bodies, or the 3GPP bodies and so on," he adds. "So we know what's coming up, we know what people are looking for and we're developing the capabilities to coincide with the need."

I comment that just as the company seems very forward-looking and eager to stay on course with the latest trends and technologies, Karandais too seems to have the same approach to his work.

"I don't think you need to stop learning. I still do the training and still go to training courses," he says. "My biggest worry going into the role of general manager of Keysight has been 'How am I going to let go of the technology?' And I don't think I can. Nor do I think I want to, because I still have very, very technical conversations with our customers, and I do joint visits now with our salespeople. And I tend to butt in and go, "Yes, but have you thought of…?" he says with a laugh.

Keysight Technologies Aust Pty Ltd
www.keysight.com

Steve Karandais, General Manager, Keysight Technologies Australia

Clamp meters

The FLIR Systems CM55/57 Flexible Clamp Meters and the TA72/74 Universal Flex Current Probe Accessories are designed for electrical applications and are made with narrow, flexible coil clamps. These tools enable electricians to take accurate measurements in tight, awkward spots that are difficult to access with a traditional hard-jaw clamp meter.

The CM55/57 Flexible Clamp Meters and TA72/74 Universal Flex Current Probe Accessories can snake around obstacles to achieve measurements and readings, adding up to 3000 A AC current for multiple conductor measurements. Both products are available in 10″ flexible coil lengths for easy manoeuvrability and compact convenience or 18″ flexible coil lengths for larger and multiple conductor measurements, double-wrap requirements and deeper access.

Portable, lightweight and built to withstand a 3 m drop, the CM55/57 and TA72/74 also provide bright, dual LED work lights for illumination when taking readings in poorly lit locations and in deep, crowded cabinets.

The CM55/57 units feature Bluetooth communication for remote viewing and data transfer to iOS and Android devices via the FLIR Tools mobile app, so data can be quickly shared and analysed directly from a jobsite. Users can even connect multiple units wirelessly for remote viewing of multiphase systems. The TA72 and TA74 probe accessories are equipped with a standard banana plug and voltage signal output, making them compatible with DMMs and clamp meters of any brand.

FLIR Systems Australia Pty Ltd

www.flir.com.au

News

NETHERLANDS TETRA UPGRADE

Officials from the Netherlands' Ministry of Security and Justice and the CEO of Hytera Mobilfunk GmbH, Matthias Klausing, have signed a contract for the renewal of the country's C2000 TETRA national network. C2000 is used by all emergency services in the Netherlands. As one of Europe's first nationwide TETRA systems, the end-of-life had been reached for most of the current system's hardware and software.

More info: bit.ly/1S69BNQ

ACMA REVIEW

The Federal Communications Minister, Malcolm Turnbull, has announced that the government will conduct a review of the ACMA to ensure that it is "able to effectively deal with challenges arising from a rapidly changing communications sector". The review will consider the current communications sector and the evolving shape of the digital media and communications environment and how the role of the communications regulator should adapt to these over time. The review will make recommendations to the Minister for Communications on the future objectives, functions, structure, governance and resource base of the communications regulator.

More info: bit.ly/1H7FgJP

TASMANIA'S NEW CAD SYSTEM

The Tasmanian Government will spend $15.3 million over the next two years to deliver an integrated emergency services computer aided dispatch (ESCAD) system. The ESCAD system will replace the three non-integrated CAD systems used by Tasmania Police, the Tasmania Fire Service and Ambulance Tasmania, and the manual process used by the State Emergency Service. An integrated emergency dispatch system was a key recommendation of the 2013 Tasmanian Bushfires Inquiry. The system will record information about emergency incidents such as brief details, taskings, attending officers and comments. ESCAD is due to be fully delivered in 2017.

More info: bit.ly/1HdEyN9

CB-capable radio

The Hytera PD462 radio is suitable for analog-to-digital migration and is capable of being programmed with 128 digital or analog channels, or 80 CB plus 48 digital or analog channels.

The product is commercial channel-mode ready, with a total of 256 channels. When CB channel mode is enabled, it still allows 176 channels (450-520 MHz) to be programmed. When CB channel model is disabled, it supports 256 programmable channels (450-520 MHz). With CTCSS/CDCSS stand-by, users can manually enable, disable or modify the CTCSS/CDCSS function via the radio's menu.

The device supports scanning not only in programmed list mode but also via programmed buttons (which users can enable or disable) or from the displayed menu (from which users can add or delete channels in the scan list). It also features talk around: when working under a repeater, this function enables the radio to communicate when the repeater is out of range or down. Via the programmable button or the radio menu, the unit can also use a receiving frequency to transmit.

The unit is compliant with MIL-STD-810 C/D/E/F/G standards and IP54. It features pre-programmed text messages and, at only 112 x 54 x 30 mm and 280 g, it is small, sleek and light.

Hytera Communications Co. Ltd

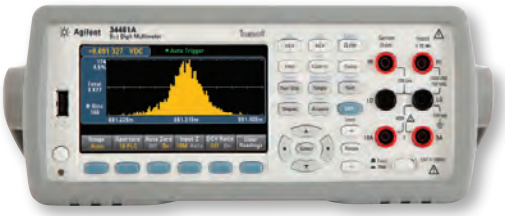
www.hytera.com.au

Universal charger

The CRS Accessories CRS-UMBC6 compact 6-bay universal charger has been designed with interchangeable charging pockets and is available for a limited range of brands/models of two-way radios. The product is small (29 x 19 x 9 cm), lightweight (1.5 kg) and compact. Features include the ability to charge Ni-Cad, Ni-MH and Li-ion batteries; a wall mounting option; and a one-year warranty.

CRS Accessories

www.crsaccessories.com.au



Digital multimeter

The Keysight 34461A is a 6.5-digit multimeter with an 11 cm, high-resolution colour display. Truevolt technology implements an analog-to-digital converter with a patented metrology-grade architecture to compensate for line noise, environmental noise, input bias current and injected current from the meter itself. It is available to rent from TechRentals. The product will measure AC RMS voltage (3 Hz to 300 kHz), DC and AC voltage (100 mV to 1000 V), resistance (100 Ω to 100 MΩ), frequency, period, continuity, diode (5 V), current and temperature. Other features include a graphical view of results with histograms and long-term trends, and the ability to save data to PC via USB or LAN. The 34461A is a 100% drop-in replacement for the 34401A.

TechRentals

www.techrentals.com.au

Telemetry modem

The TMO-100 telemetry modem enables data to be transferred to one or more positions anywhere within a TETRA network. The all-in-one solution includes a controller, router, modem and mobile radio, making it suitable as a turnkey solution.

The product is equipped with two serial interfaces (optional RS-232 or RS-422/285) and one ethernet port (10/100 Mbps). Serial protocols include Modbus-RTU, IEC60870-5-101, DNP3, ROC, BSAP, PakBus and Siemens SINAUT. For the Modbus RTU protocol, the TMO-100 makes it possible to send out event-driven alarms.

The unit can be equipped with an I/O board, the inputs of which send status alarm messages to the master radio station. The master radio station stores the alarms in Modbus registers, where they can be easily polled from the master PLC.

The product can also process UDP and TCP protocols. After the device is turned on, a PPP-connection is automatically established to the TETRA network, whereupon the TMO-100 receives an IP network address and can immediately send IP data from the local ethernet interface to the TETRA-IP-world and vice versa. The modem utilises NAT, port forwarding and port translation, which turns the device into a fully featured TETRA router.

GMG Solutions

www.gmgsolutions.com.au

In-building DAS

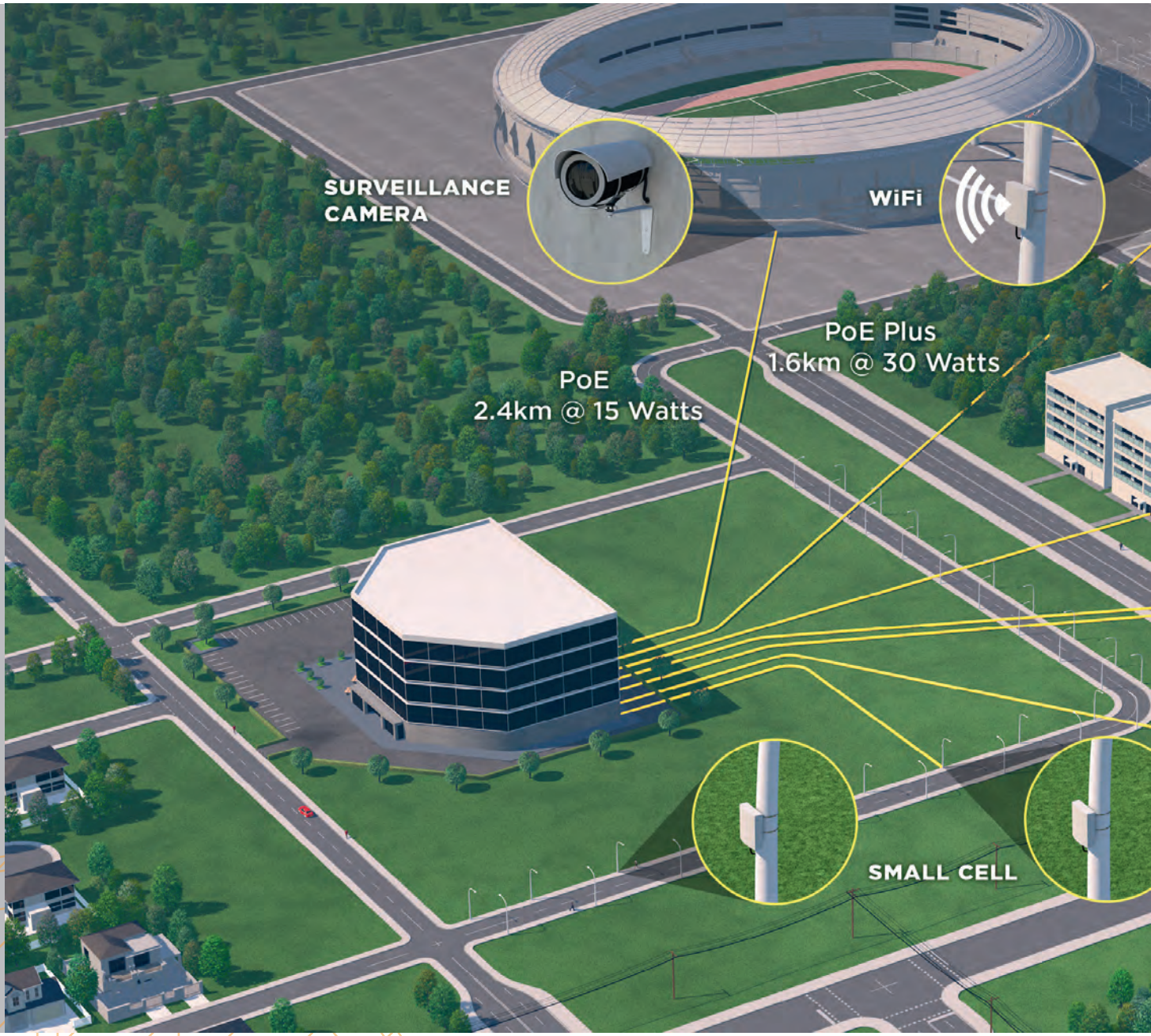
TE Connectivity's InterReach Express single-band all-Ethernet in-building DAS for 850, 900, 1800 and 2100 MHz applications is used to extend wireless coverage to specific areas indoors.

InterReach Express transports RF from a radio source over Ethernet cable to distributed active antenna units (AAU) to amplify the mobile signal close to the user. Compared to repeaters and passive systems, InterReach Express allows users to customise capacity inside buildings when the system is paired with a small base station and provides pinpoint coverage. Additionally, distributed amplifiers provide the same level of service output at each location. The signal is stronger, reliable and better for data.

InterReach Express is suited to: small to medium-size enterprise applications (single buildings <30,000 m²); large facility hole-fill applications where there is inadequate mobile reliability; maritime applications; and cascading in large facilities where passive systems are inadequate as capacity and data demands increase.

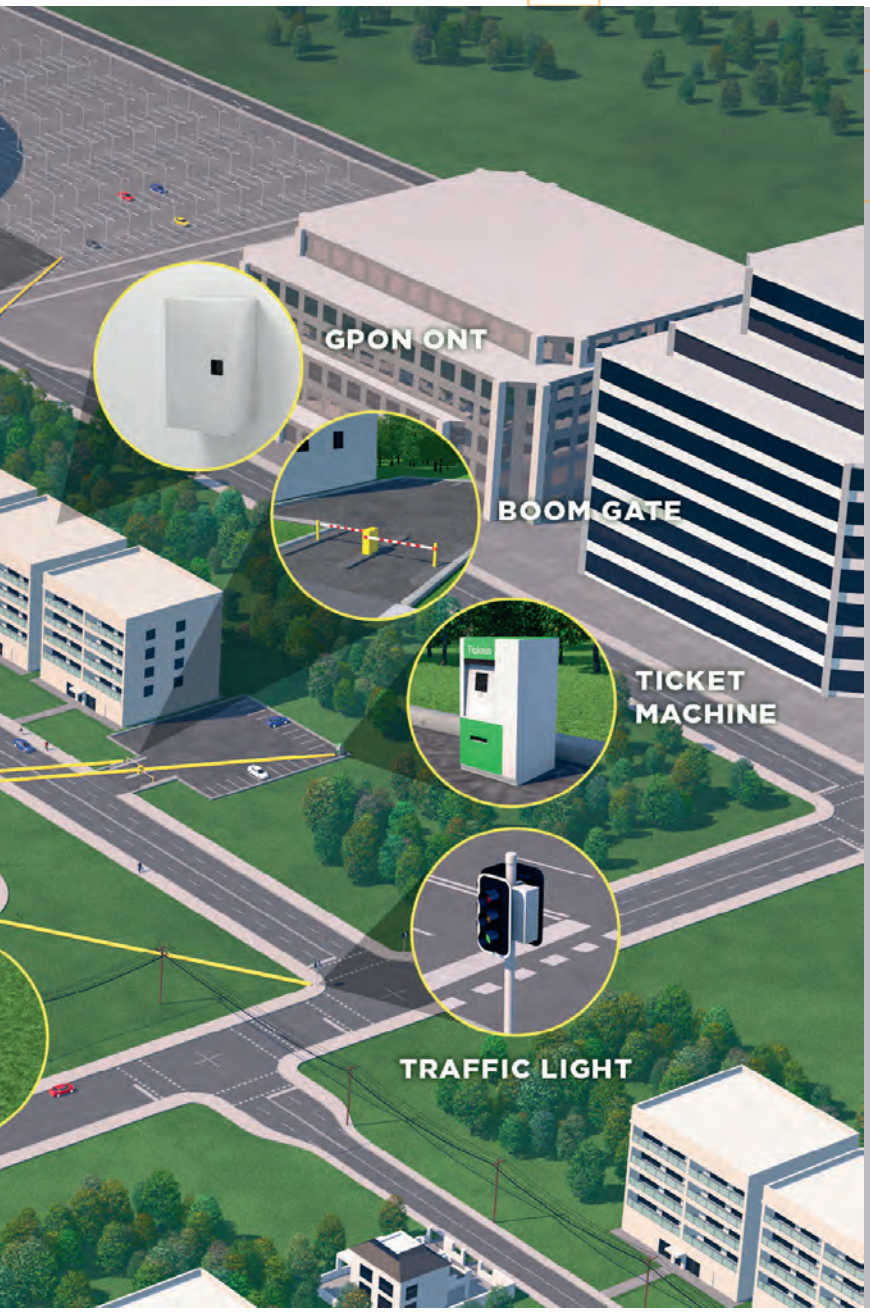
TE Connectivity

www.te.com/enterprise



TROUBLE WITH DEP
WIFI DEVICES?

call 1800 TE INFO (1800 83 4636) | email infoanz@te.com | te.com/bns



SIMPLIFY REMOTE PoE DEVICE INSTALLATION

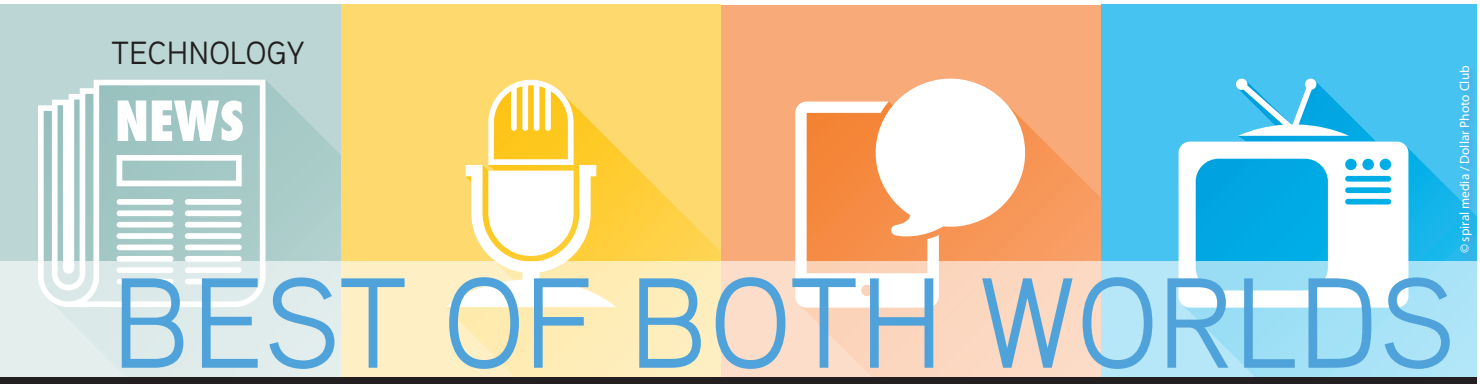
The powered fibre system is the perfect system for 3G/4G WiFi rollouts, CCTV, Access points and other remote PoE devices where the access to power is hard to reach.

- Supports any PoE device
- Remote data+power up to 3km
- Plug and Play system
- SLEV= no electrician or approvals required

LOYING REMOTE

EVERY CONNECTION COUNTS

TE connectivity



BEST OF BOTH WORLDS

RADIO COMMS GOING MULTIPLATFORM

Jonathan Nally

Why use just one radio technology when you can combine two or more?

Software-defined radio (SDR) has been described as the radio of the future for quite some time now, and many examples are on the market. At the Comms Connect Sydney event in June, *Critical Comms* spotted the DAMM Cross Technology Outdoor Basestation BS422 on the GMG Solutions stand. The company claims the device is the first of its kind — capable of working TETRA, DMR Tier 3, TEDS and analog modes.

We spoke with Allan Detlefsen, DAMM's CCO, about the company's philosophy as it applies to multiplatform technology and where he sees this field heading.

CC: It seems that more and more, critical communications devices are becoming multiplatform-capable. What do you believe is driving this?

AD: From our point of view, there are two things that are primarily driving critical communications devices to become multiplatform-capable: the migration from analog networks and devices to digital; and the increased requirement and need for being able to combine digital voice communication with data communication.

It is therefore a combination of easing the shift from analog to digital for users as well as being able to meet today's expectation of optimising communication networks.

We believe the best option today, if you want to have critical voice as well as high-speed data, will be to combine two or more communication platforms.

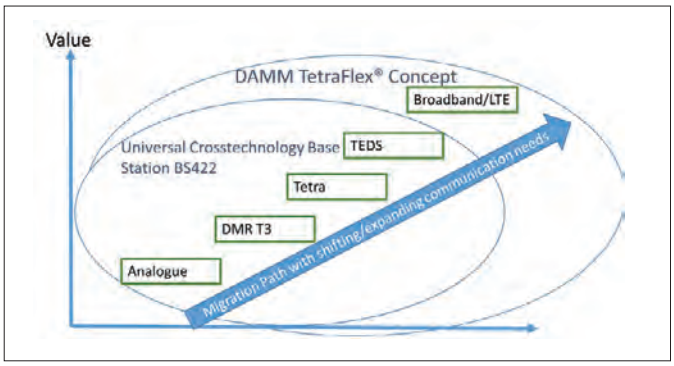
Also, the fact is that that people of today want to minimise costs and protect their investment when establishing a communication network. Therefore, instead of selecting a product which holds only one communication platform, they will with a multiplatform product able to meet their needs for today as well as for tomorrow — in essence prolonging the lifetime of the infrastructure.

Finally, the simplicity of working with only one hardware and software platform offers an attractive alternative to having to work with multiple products, each with their individual hardware and software. In essence, it means having the same API regardless of your radio technology.

CC: Can you give some use-case examples of where this sort of technology would be used?

AD: One use case is where operators of an analog network want to migrate to a digital network over time. During this period they want to be able to have a hybrid network consisting of analog as well as digital sites. Ultimately, the network owners want to have digital (DMR Tier 3 or TETRA) on all sites.

Another use case is where owners of a communication network want to permanently have a network running DMR as well as TETRA at the same time. This could be for public safety network operators where certain users would be assigned with a DMR radio terminal and other users would be assigned with a TETRA radio terminal. Common to the inquiries we have received from the market is that customers are attracted to the simplicity of combining the different communication platforms into a single network, with only one network management system, one software user interface and one hardware platform.



Our primary focus will be within industry segments such as metro and urban rail, mining, oil and gas, airports, utilities and so on. However, we also do work on the public safety segment in various geographies.

CC: Why did you choose the particular mix of TETRA, DMR Tier III, TEDS and analog?

AD: Basically, the BS422 is part of a communication network concept called TetraFlex, a true IP-based concept that integrates the communication platforms mentioned above with other IP-based networks like 3G and 4G mobile network as well as Wi-Fi. The BS422 is therefore a cross-technology base station that enables the customer to run analog as well as digital communication and integrate with data networks.

Included in the TetraFlex concept are a number of other DAMM product offerings such as a log server, a dispatcher and a network management program. Further to these, DAMM also offers a soft terminal, which is an app that runs on an Android, Windows or an Apple product (iPads, smartphones, PCs, etc) and which enables you to communicate and access voice and data communication in the TetraFlex system.

CC: How long has DAMM been working on this technology?

AD: The BS422 is a result of more than a decade's R&D experience; therefore, it has been in the making for many years.

GMG Solutions
www.gmgsolutions.com.au

Allan Detlefsen

Digital radio test set

The Aeroflex 8800S expands upon the features of the 8800 series with P25 Phase II TDMA compatibility and higher direct input power handling of 125 W. The unit has a hybrid portable design; large colour touch screen display; and analog and digital test features. Other specifications include a weight of only 7.71 kg; an internal battery with over 2.5 h of life; a 30 G shock rating; auto test; digital modulation analysis plots; and an internal 500 W (4% accuracy) in-line power meter.

Vicom Australia Pty Ltd

www.vicom.com.au

Outdoor wireless access point

The D-Link DAP-3662 Wireless AC1200 concurrent dual-band outdoor access point with PoE has weather-resistant features and an IP67-rated housing, making it suitable for outdoor wireless hotspot networks in high-demand business applications.

The product delivers high-speed wireless performance using the latest 802.11ac standard, with maximum wireless signal rates of up to 300 Mbps using the 2.4 GHz band and 867 Mbps using the 5 GHz band. It supports significant device densities and offers optimal range and coverage over both bands.

In addition to outdoor applications, the unit can be installed in environments where challenging or harsh conditions exist. This includes manufacturing plants, industrial automation facilities, convention halls, stadium facilities, airports, school campuses, golf courses, marinas or virtually any venue requiring a robust, high-performance wireless solution.

The product has internal omnidirectional antennas, supports operating temperatures between -30°C and 60°C and has two 10/100/1000 ethernet ports, so it can also bridge to other wired networks. It can be powered directly via a network cable using PoE from any switch or mid-span injector that supports IEEE 802.3af. A mounting bracket supports easy installation on a pole, wall or ceiling and integrated GORE venting technology repels water while ensuring pressure equalisation inside the device as weather conditions change.

D-Link Australia Pty Ltd

www.dlink.com.au

Credit: EU/ECHO/ OERK

DISASTER SCENARIOS

ETSI has released new specifications for handling emergency communications during crises

Disaster situations often require additional emergency communications networks to be set up locally to enable responders (eg, medical, rescue, care etc) to coordinate their operations more effectively in the disaster area.

To set up these networks efficiently, a standardised basis for estimating the capacity and other characteristics for communications by responders is highly desirable.

This basis could then be used by many organisations including satellite network operators, equipment manufacturers and responders for design and development of systems, equipment and applications, not only for voice and data but also multimedia services.

However, there are currently no publicly available disaster characteristics that could provide standardised 'user' requirements, particularly any based on realistic field activity and which are agnostic to the communications technology and yet provide enough elements to derive more technical requirements.

Thus the task of the European Telecommunications Standards Institute's (ETSI) Technical Committee for Satellite Earth Stations and Systems (TC SES) has been to specify 'reference scenarios' for emergency telecommunications.

These specifications have been prepared by a group of experts and delegates from ETSI, coming from the sectors of both disaster management and ICT.

They cover two different cases:

- A major earthquake in an urban environment specified in the technical specification TS 103 260-1.
- A mass transportation accident in a countryside environment (chosen as a train crash) specified in the technical specification TS 103 260-2.

For the first scenario, emergency responders are likely to be distributed over a large area and response actions are likely to be diverse (firefighting, search and rescue, first aid, emergency sheltering). Satellite communications are capable of replacing disabled infrastructures.

For the second scenario, responders are concentrated in a small area and responses are more restricted to a few specialties. Satellite communications can provide a communication hub to supplement the minimal existing infrastructures.

These scenarios have been specified to be representative in many respects of such disasters in order to allow their extrapolation to similar events.

The term 'reference scenario' encompasses definitions of:

- the event that causes the emergency
- the responses (eg, search and rescue; logistics; first aid; emergency sheltering, etc), and their key parameters
- the information exchange needed for the responses
- requirements for actors' communication exchange types and dimensioning aids
- a topological model defining how responders are deployed/move.

"We must thank the European Commission and the European Free Trade Association for their support of the industry experts that have completed this work," said Alice de Casanove, chairman of the SatEC working group of TC SES.

"These specifications are intended to stimulate applications benefiting victims of disasters as well as the satellite industry and encourage the development of better emergency communications."

ETSI produces globally applicable standards for information and communications technologies (ICT), including fixed, mobile, radio, converged, aeronautical, broadcast and internet technologies, and is officially recognised by the European Union as a European Standards Organisation.

ETSI is an independent, not-for-profit association whose more than 800 member companies and organisations, drawn from 64 countries, determine its work program and participate directly in its work.

Headset

The 3M PELTOR WS ProTac XP Ex headset is approved under the ATEX directive and has been tested in accordance with the IECEx standard for both gas and underground mining.

Features include: digital noise reduction; Ghost Voice guided menu; advanced VOX (self-adjusting) for increased high noise functionality; Bluetooth A2DP profile support for streaming high-quality stereo sound; lower power consumption than previous 3M PELTOR WS ProTac XP generations.

The PELTOR WS ProTac XP Ex provides a level-dependent function that enables the user to hear surrounding sounds and receive hearing protection when sound reaches potentially hazardous levels.

The unit also has a jack that enables connection to an external two-way radio while being simultaneously connected wirelessly via the Bluetooth link to an additional device.

3M Personal Safety

www.3M.com/au/PPESafety

Waveform generator

The Keysight 33612A is designed for communications, industrial or biomedical applications that require improved signal integrity from direct digital synthesis (DDS). It is available to rent form TechRentals.

This two-channel waveform generator has an 80 MHz bandwidth and will produce sine, square, pulse, ramp, triangle, Gaussian noise, pseudorandom binary sequence (PRBS) and arbitrary waveforms. Common signals such as modulation, sweep and burst are complemented by more advanced options such as waveform summing and combining.

Features include: 1 ps jitter and 0.03% total harmonic distortion, 1 GS/s sampling rate, 4 MSample memory and 14-bit amplitude resolution.

TechRentals

www.techrentals.com.au

Phase noise analyser and VCO tester

The Rohde & Schwarz FSWP phase noise analyser and VCO tester enables ultrasensitive and ultrafast phase noise measurements, as well as measurements of pulsed sources and the residual phase noise of RF components.

With the FSWP phase noise tester, users can quickly measure the spectral purity of signal sources such as generators, synthesisers and voltage-controlled oscillators (VCO). The instrument covers a frequency range up to 50 GHz and offers a top dynamic range. The low phase noise of its local oscillator coupled with cross-correlation makes it possible to easily measure signal sources that in the past required complex test set-ups or could not be measured at all.

Thanks to its fully digital signal processing, the FSWP performs complex measurements at the push of a button and features intuitive touch-screen operation. It can quickly and easily measure the phase noise of pulsed sources as well as residual phase noise under pulsed conditions. The R&S FSWP is therefore suitable for manufacturers of radar components and synthesisers. Thanks to its additional voltage sources, the FSWP is also suitable for measuring VCOs - in research and development and, thanks to its high measurement speed, also in production.

The FSWP can be upgraded to a signal and spectrum analyser.

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

TAIT TALK

INTERVIEW WITH DEAN BROOKES

Jonathan Nally

We speak with Tait Communications' new GM to get an insight into the company.

Critical Comms recently sat down with Dean Brookes, the new general manager of Tait Communications, to get the latest updates on the company's products and some insights into its ongoing approach to developments in the critical communications sector.

Brookes has an engineering background and spent 22 years with Nokia Networks. He joined Tait in 2012, heading up the regional service business unit, before being appointed GM in April this year.

CC: Let's start with the Tait Radio Academy. Why was set this up and what sort of response have you had?

DB: Tait provides a range of professional training services for its clients, and, with the skills and experience that we have inside the company, we've taken some initial steps to share this resource. There are three online courses currently available for Basic Radio Principles, Introduction to DMR and Introduction to P25, and we look forward to delivering more.

The reaction has been very positive. We've had more than 100 people register already from this part of the world and more every day. We've had over 500 registrations globally.

CC: There seems to be a shift underway around the world to a more managed-services model for critical communications solutions. Is Tait involved in this shift?

DB: We see many variations of this: managed service for networks and capital for terminals; capital for networks and terminals, and managed service for network management; and fully managed service.

There have always been customers that prefer OPEX to CAPEX and vice versa. Companies such as Telstra, Vertel and TeamTalk have been providing radio networks as a service for decades. Tait also provides network management services for customers such as NZ Police and Brisbane Airport who own their own networks but require the additional 24/7 support. The latest trend that we've seen with some major tenders is Device-as-a-Service.

Tait maintains itself in step with the market requirements, using both internal and external funding to provide OPEX models.

CC: What's your view on the provision of public safety mobile, especially the potential to use public carriers either solely or partly?

DB: We believe that mobile broadband complements mission critical radio very well. It will depend on the application whether a dedicated, purpose-built device and network is required compared to off-the-shelf carrier products and services. Tait is ensuring that our mission critical radio solutions can be integrated with the mobile broadband services of today and tomorrow. We look forward to the recommendations of the Productivity Commission for PSMB.

CC: What about the general push for PTT-over-cellular services and smartphone products?

DB: Tait views PTT-over-cellular services and applications as complementary to radio communications — it is an extension of a critical communications solution, not a replacement. Professional mobile radio provides purpose-built devices and networks that are dedicated to the customer's need — rugged devices with long battery life, coverage where you need it, battery backup for sites, simplified user interfaces, one-touch calls, minimum delay in calls across the network, simplex operation for off-network comms, emergency modes to improve worker safety, and so on.

For all of our customers who use dedicated radio networks and devices for all these benefits, smartphone apps such as UnifyVoice from Tait or ChatterPTT from Logic Unlimited provide additional value and connectivity for those in other parts of the organisation who wouldn't otherwise need to carry a radio, or for when they're away from site. For example, a dedicated radio network is provided for coverage of a mine site, but with smartphone apps like those mentioned, you can monitor and connect to that network from anywhere with mobile broadband or Wi-Fi connectivity.

CC: This leads into LMR. Does Tait see the LMR sector growing, shrinking or remaining static in the coming years?

DB: Tait sees a medium/strong future in LMR. We've invested a lot in delivering the latest for P25 and DMR to help our customers get the most out of these technologies, and we are designing this technology to complement carrier services and broadband alike.

We're not just investing in product development either. We've opened a new international headquarters in Christchurch and are one of the few critical communications suppliers headquartered and manufacturing in this part of the world, with a lot of support available to our customers in this region from Christchurch, Brisbane and Melbourne.

CC: What's the status of GridLink? Is it a fully operational technology? Is it getting traction amongst users and potential users?

DB: GridLink is now available and has been operational with a number of customers around the world in recent times. There is a great TV article on our website showing how this technology has helped Electricity Ashburton minimise power outages during recent snowstorms.

GridLink is a great example of getting the most out of your investment in a critical communications system. If you're deploying a radio network to provide dedicated voice comms and location services for the safety and productivity of your team, you can use the same network infrastructure to provide SCADA and telemetry services for monitoring and remote control of sensors, pumping stations and so on.

GridLink is based on DMR Tier 3 and uses industry standard DNP3 and IEC interfaces. We strongly believe that open standards and interfaces is the key to delivering better value for our customers. Open standards and interfaces protect the customer's investment and provides flexibility and freedom of choice in the long term.

CC: Where do you see the best customer fits for DMR Tier 2 and 3 solutions?

DB: We're a big believer in the value that a Tier 3 trunked solution provides for customers — that's why we've focused so much on it in recent years, and it is good to have been rewarded with so many significant contracts for Tier 3. If you look around the world at customers such as Queensland Rail, Vertel, Entropia and Alliant Energy, all of the largest DMR Tier 3 systems in the world have been provided by Tait. With Tier 3 there is so much more we can do for customers, like the GridLink SCADA option.

We know that there are many customers out there who are used to conventional analog, and DMR Tier 2 is the direct replacement for that. For many of these customers, though, we believe that when they consider migrating to digital, it is worth considering digital trunking or Tier 3 for a little more investment and a lot more value. Digital trunking is more affordable than ever before, simpler to use, does more, is easy to install and maintain — it is worth another look.

But conventional systems do make up a big part of the market, and so now we've delivered DMR Tier 2 solutions. We've had a great response from many customers who chose Tait quad-mode terminals over the past couple of years for use with their analog networks; now that a Tait Tier 2 base station is available, they're making the change to digital.

CC: What can you tell us about Tait's intrinsically safe radios?

DB: We're very pleased to soon be releasing a completely new platform for intrinsically safe radios that is compliant to the international IECEx standard and the Australian ANZEx standard for both P25 and DMR. There have been a number of stop gap standards used by various vendors over the years, and we're very pleased to deliver something that specifically meets the Australian standard. Under this standard we'll have an option that provides up to 5W power output, which is important for the coverage requirements of many of our customers.

CC: Finally, are there any parts of the critical comms sector that Tait is particularly focused on at the moment or in the near future?

DB: We continue with our strategy to focus on mission critical and business critical communications. As well as the traditional customers in this sector, with our DMR Tier 3 products we are engaging a wider base including transport and mining.

Tait Communications
www.taitradio.com

Broadband vector network analyser

The Anritsu VectorStar ME7838A4 4-port broadband vector network analyser (VNA) system provides what the company claims is the world's widest differential broadband sweep from 70 kHz to 110/125 GHz.

It uses the smallest mmWave modules to conduct highly stable and fast measurements when characterising differential devices. The ME7838A4 provides on-wafer and signal integrity engineers with a high level of performance when conducting differential measurements so they have greater confidence in their next-generation communications system designs. The integrated 3743A mmWave modules use an exclusive Anritsu design that incorporates nonlinear transmission line technology (NLTL), making them much more compact than alternatives and easy to mount on space-limited wafer probe station platens. Additionally, smaller and lighter modules improve overall performance, including raw directivity performance that results in higher calibration stability. Modules are available that can extend the VectorStar ME7838A4 to a 4-port 145 GHz system.

The VectorStar ME7838A4 4-port broadband system uses an internal substrate-mounted source for thermal stability, resulting in highly accurate calibration and measurement stability of 0.1 dB over 24 h. It also features fast measurement speed of 55 ms for 201 points at 10 kHz IFBW.

Users will benefit from mmWave noise floor sensitivity and the mmWave real-time electronic power levelling that eliminates the need for time-lagging software correction tables. Because internal frequency multiplication begins at 54 GHz in the VectorStar ME7838A4 compared to 67 GHz for other 4-port broadband systems, RF cable losses are reduced for improved dynamic range and phase stability.

Anritsu Pty Ltd

www.anritsu.com

Industry Talking

As I write this, ARCIA has recently held events in Perth and Sydney, and will be doing so in Brisbane at the end of July. These events, in conjunction with mini conferences from Comms Connect, are an excellent way for all industry participants to get across the latest technologies and techniques. We're certainly getting great feedback, and I encourage all members to make the time to get involved.

As part of these events, ARCIA has decided to recognise the significant contribution that people all over Australia make to our industry. At each event an award based on local nominations is considered and, as part of that process for the NSW event, I certainly found it interesting to read how many great people are out there doing what they do. I encourage you to keep an eye on your state event and think about how we celebrate and recognise the good work, often unnoticed, happening out there every day.

This year is certainly turning out to be a very busy one, with changes coming in spectrum rules, the Productivity Commission enquiry into Public Safety Mobile Broadband, a decision on the 900 MHz Band Plan and all the ARCIA events happening around Australia.

I read with interest the announcement at the end of June that the federal government, along with contributions from many of the states, had committed $100 million in mobile black spot funding. No one can deny how important good quality communications is, especially for regional areas, and we all understand the economic and social benefits it brings. However, it makes the industry think why there can't be the same level of cooperation for the funding of public safety communications.

Despite the obvious need and the great work being done by many people at a state level, it seems that we still don't have the necessary basic infrastructure required by all groups involved in public safety. It doesn't really matter what technology we end up with on the sites, be it LMR or LTE; without the core infrastructure, the cost of deployment overall is a major barrier to success, and the greatest costs of deployment are the sites and links. All the hype over technology is pointless if you can't afford to deploy it.

No doubt the federal black spot funding is intended to help carriers build infrastructure that would otherwise not be commercially viable; yet there seems no obvious coordination between the cellular and LMR industries, which would be a good start. In the case of NSW, as we struggle to replace legacy analog systems and despite years of building a state-wide GRN, we still do not have a coordinated plan for the basic infrastructure. To add another layer of complexity, we still have the NSW Department of Trade and Investment charging sky-high rents for radio sites located on Crown land.

It seems to me that if this problem was instead the planning of a major sporting event or perhaps a relief effort, all levels of government would have met, established principles and made decisions by tea time. Why does it need to become a crisis before we act?

Finally, here as some 'save the dates': ARCIA AGM, 12 August at the PARKROYAL Melbourne Airport hotel; and the Adelaide mini conference and dinner on 23 September. We're also spreading our wings: look for ARCIA on Twitter, @ARCIAorg.

Hamish Duff, President
Australian Radio Communications Industry Association

Image courtesy ADF

BATTLE COMMS

The ADF is to receive a $900m boost to its battlespace comms.

The Australian Government has given second-pass approval for the $900 million LAND 2072 Phase 2B project, which aims to provide the Australian Defence Force (ADF) with the next generation of battlespace telecommunications network capability.

A statement released by the Minister for Defence, Kevin Andrews, says the project is a "critical milestone in achieving a modern, networked army". The equipment will "enable deployed forces to operate more effectively, providing digital communications from theatre headquarters to the unit level".

The project will enable the army and some elements of the air force and navy to replace ageing mobile communications and computer networks.

It will also provide commanders with an increased level of situational awareness, command and control, and information sharing capability.

The system will use leading-edge digital wideband voice, data and video services over wireless and wired infrastructure to improve the capacity, flexibility and responsiveness of the ADF information exchange during operations.

The government says that access to, and exchange of, large amounts of multimedia data is becoming increasingly important for the effective conduct of operations.

The LAND 2072 Phase 2B equipment will enhance the ADF's capability to use modern information technology to link sensors, weapon systems, commanders and personnel in a networked environment.

The government says the preferred solution for the requirement is offered by an Australian team comprising Boeing Defence Australia, G.H. Varley and Harris Communications Australia. The program will also incorporate modern deployable computer networks sourced from Thales Australia.

LAND 2072 Phase 2B is expected to result in the employment of about 250 people across Australia in the defence industry sector.

Initial operational capability is expected in 2017, with final operational capability in 2020.

Trunking system

The Hytera XPT (Extended Pseudo Trunk) is a scalable, single-site digital trunking solution that enables a cost-effective increase in capacity by simply upgrading the current RD98XS repeater.

XPT has a large capacity, eight carriers and the number of channels for voice and data can be extended up to 16 with a software upgrade. Each channel can be customised to transmit voice and data or transmit data only. There is no control channel so no licence is required for continuous transmitting; all channels can be used as traffic channels.

Other features available in the XPT system include dispatching, voice recording, PABX interconnection and network management, LAN Switch Fail (each repeater starts working as a two-channel trunking system) and Repeater Fail (if one repeater fails, the system remains operational with the remaining repeaters).

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

Audio adaptor

The XHIR-4P audio adaptor is designed to enable smartphones running professional LTE/PTT applications to function as regular handheld portable radios by enabling plug-and-play connection to well-established two-way personal audio accessories.

The product plugs into the earphone socket of most popular smartphones running a variety of PoC apps. The smartphone can be securely kept in the user's pocket, protected from the elements and safe from damage, drops and other everyday mishaps. Its design enables seamless connectivity with covert surveillance accessories, as well as devices designed for hospitality, casinos, event management, etc.

The IP54-rated adaptor has an internal lithium polymer battery that provides in excess of five days operation between recharges. Plugging the adaptor into a USB charger via the supplied charging cable enables a 100% recharge in less than an hour.

Pacific Wireless Communications Pty Ltd
www.pwcau.com

WIRELESS IN THE WILDERNESS

RURAL EDUCATIONAL CAMP GOES DIGITAL

Nestled alongside Lake Rotoiti on New Zealand's South Island's Nelson Lakes National Park, the Rotoiti Lodge Outdoor Education Centre has challenged, developed and inspired school students for almost half a century.

The lodge hosts 1200–1400 school students per year, introducing them to many different physical and personal challenges in some of the country's most stunning landscapes.

Coming largely from the upper South Island and Wellington regions, students get to experience such activities as high ropes courses, overnight camps, canoeing and high-altitude alpine camping.

A challenging landscape and large groups of students mean consistent levels of communications between lodge staff and teachers are required.

For the past 15 years the lodge has used reliable, robust and simple analog two-way radio handsets and base stations for communications — their functionality was well proven and they were simple for students and teachers to use.

However, lodge director Russell Ferens recognised how digital technology developments were providing greater capabilities than those possible with analog technology.

Groups and supervisors would benefit from having access to GPS tracking, text weather updates, private call ability and mapping data — all of which could provide valuable safety and planning information.

"We had dealt with Nelspecs in Nelson for over 10 years and we valued their advice on comms," said Ferens. "We had considered a few options to pursue, including using technology like SPOT as a backup. However, the subscription fee was payable in US dollars and we wanted access to more information with radios."

Satellite phones were also expensive to buy and make calls from. They offered limited use in heavy rainfall or snow storms, and require certain amounts of clear sky space to operate effectively.

"It soon became apparent to us the digital Hytera digital VHF radios … from Nelspecs had offered the best bang for our buck."

The equipment settled upon comprised ten, 10 W Hytera VHF digital handhelds, one 25 W base station, one 25 W vehicle-installed mobile unit and a computer with Smart Dispatch software installed. Smart Dispatch records all conversations onto a 2 TB hard drive.

Safety first

The radios' capabilities ticked all the boxes for the lodge's safety and information requirements:

- GPS technology provides tracking, logging and location capability.
- Text capacity means weather information can be cut and pasted

CREDIT = Stephen Holdaway / Flickr / CC

from the Met Service site and sent to all parties in the field; major shifts in the mountains' weather patterns are not uncommon, so the ability to update groups quickly was a welcome feature.

- The Hytera's ability to use side-channel capabilities to host one-to-one conversations between specific handsets without changing channels was also valuable for staff and teachers.

"We needed the ability to hold private conversations with individual leaders if there was a child in stress, or an incident," said Ferens. "Isolating the conversation reduces the stress throughout the other groups and ensures we can just focus on getting the correct information and minimising misunderstandings across the entire group about the incident."

Importantly, the ability of the Hytera system to accept bespoke software meant Nelspecs technicians were able to incorporate digitised mapping developed especially for the lodge's needs. This in turn is overlaid onto Google Earth, enabling clear, precise logging data on group movements and locations.

"The mapping software, linked through GPS, means if there is an incident the base supervisor does not have to spend time trying to tie down locations," said Ferens. "[The caller is] already clearly located, so the focus can be on the best way to get help in quickly, if required."

> FAILURE TO ENTER A CODE ACTIVATES AN EMERGENCY CALL TO THE LODGE BASE, AND REAL-TIME GPS DATA WILL SHOW EXACTLY WHERE THE PERSON IS.

An emergency call function on all handsets makes the lodge base station ring like a telephone, and if it goes unanswered the system starts calling preset mobile phones with an emergency message.

Ferens says after almost a year of use, visiting groups have had no problems using the technology.

"The majority of our users are visiting school students and staff, unfamiliar with two-way technology," he said. "I admit I was a bit nervous at first, moving from a simple two-way to a handset with an integrated keypad. However, we can lock off the keypad if not needed, just keeping the keys we do need active."

Positive feedback

Ferens notes greater confidence in the student guardians, knowing they have a very comprehensive information flow from base about weather and location, and the ability to communicate personally and directly.

"They also love the 'chirp' you get when the line is clear. You notice the communication flow is a lot smoother and comprehensive," he said.

Being IP67 waterproof to 1 metre for 30 minutes is another valuable feature appreciated in the mountain environment, where activities often focus around the lake.

As lodge director, Ferens also has peace of mind when managing staff across the vast area.

"We can send someone out alone, and we require them to enter a code over a specified time so we know they have logged in as being okay," he said.

Failure to do so activates an emergency call to the lodge base, and real-time GPS data will show exactly where the person is.

"Coverage is very good… helped by the wide open valleys we have, and our line of sight to where groups go," said Ferens. "However, you could boost it even more with a digital repeater."

The Hytera handsets also have an analog capability if groups go significantly further afield. Despite GPS not operating via analog, a longitude-latitude coordinate can still be generated.

A year after installation of 10 handsets, a base station and a mobile 25 W unit in the lodge 4WD, Ferens is happy that he has not needed to use the radio's emergency capabilities.

"These have proven to be very versatile, robust and easy-to-use units," he said. "They are not necessarily the cheapest, but the peace of mind they give me as director, for my team and for our teacher clients, is worth a lot in terms of less stress."

Nelspecs Ltd
www.nelspecs.co.nz

RF protector

The Novaris series of CEIA protectors are designed to protect high-power RF transmission and can be customised for applications from 1 up to 50 kW. The protector itself is able to withstand up to 100 kA direct-hit lightning strikes.

The power from large transmitters is enough to maintain the arc within the surge protector forming a temporary short circuit. To overcome this the CEIA protector can be configured with an optical arc sensor to detect the presence of arc within the protection unit. The detector momentarily power-cycles the transmission system to extinguish the arc.

The CEIA series of protectors are designed for MF, HF, VHF and most UHF transmission systems utilising 7/8″, 1-5/8″ and 3-1/8″ EIA coaxial connectors.

Novaris Pty Ltd

www.novaris.com.au

Power sensors

Keysight E9300B power sensors are designed for use with the EPM series of power meters, providing a convenient option to use just one power sensor across multiple modulation formats for those in the design, manufacturing and maintenance sectors of the RF and microwave communication industries. They are available to rent from TechRentals.

Designed for accurate average power measurements, the E9300Bs utilise flat calibration factors across their entire frequency range, as well as a low SWR. The combination of accuracy and adaptability means less equipment and better time utilisation.

Applications include: R&D and manufacturing of RF and microwave components for satellite, wireless and terrestrial communication systems; maintenance and repair of radio links for terrestrial and satellite communications from VLF to microwave, cable TV head-ends and broadcast TV transmitters; aerospace and defence R&D manufacturing; and service.

Features include: 74 dB dynamic range (-30 to +44 dBm); bandwidth range of 10 MHz to 18 GHz; operational at both low and high power levels (1 μW to 25 W); measures multitone and CW signals.

TechRentals

www.techrentals.com.au

Digital patrol radio

The Hytera PD412 is a compact and rugged two-way digital patrol radio with an embedded RFID chip to enable it to read information from an RFID tag and send the information out by radio. The patrol software enables the user to run reports on individual IDs, the radio or on each checkpoint.

The PD412 features analog and DMR mixed channel modes and is compliant with MIL-STD-810 C/D/E/F/G standards. In digital mode, its battery operates for at least 16 h under a duty cycle of 5-5-90 @1500 mAh. The unit is 112 x 55 x 31 mm and weighs 270 g.

The unit also features: preprogrammed text messages, one-touch call/text and VOX mode. Plus there's a development port for radio and RFID — the API enables third-party partners to further develop other helpful applications to extend the radio's RFID functionalities.

Hytera Communications Co. Ltd

www.hytera.com.au

RoIP gateway

Icom's VE-PG3 RoIP gateway is designed to enhance communication coverage of a radio network and the convenience of radio usage by leveraging IP networking technology with ease of implementation.

The VE-PG3 has two modes: converter mode and bridge mode. Converter mode interconnects calls between connected IP phones, analog phones and radio networks. Radio users can initiate phone calls using DTMF codes and can connect to other users via an IP phone or PTSN line. With an optional remote communicator, this creates an IP-based virtual radio on a PC and works as a simple dispatch system. Additionally, external equipment can be connected such as a public address system, sirens and warning lights. Bridge mode interconnects two or more RoIP networks over an IP network. The VE-PG3 can connect dispersed radio systems over the network and can provide cross-band communication between VHF/UHF, IDAS and NXDN digital and analog conventional radio systems. Further, when the IP network system is compatible with IP multicast routing, three or more VE-PG3s can be connected in bridge mode to provide site-to-multisite radio communications.

Icom Australia Pty Ltd

www.icom.net.au

UHF CB radio antennas

ZCG Scalar's ZN3 range of 477 MHz UHF CB radio antennas is aimed at the needs of 4x4 customers and comes in four types to cover a variety of situations.

The highly flexible 'quick fit' ZN3-77-04 series caters for situations where tall antennas may be subject to damage and is suitable for city use, while the medium-duty ZN3-77-10 is designed for mounting to the bull bar of smaller 4WD vehicles, utes, cars and trucks.

The heavy-duty ZN3-77-11 offers a good balance between size and gain, and is suitable for either hilly or flat country; and the super heavy-duty ZN3-77-12 delivers maximum transmit and high gain over flat ground.

Alternative mounting options, connectors and other installation accessories are all available separately.

ZCG Scalar

www.zcg.com.au

Some of the devastation in Nepal following the April 25 earthquake. Courtesy US Embassy in Kathmandu.

DISASTER RESPONSE

Australian-made radio equipment was deployed just in time for Nepal's earthquake recovery efforts.

In January 2015, NVIS Communications, Barrett Communications' North American system integrator, was awarded a US$1.4 million contract by the US Army Corps to provide 120 Barrett radio systems of various configurations to the Nepalese Army.

The contract was to be for both HF and VHF equipment that would be used by the Nepalese Army for disaster response and recovery, and was a gift from the US State Department to the Country of Nepal.

Barrett commercial equipment had previously been utilised by NGOs in Nepal, but this was to be the first supply of tactical equipment.

The contract included PRC-2090 HF Tactical Manpacks, PRC-2091 HF Mobile Vehicle systems, PRC-2081 VHF Tactical Manpacks and PRC-2082 VHF Tactical Mobile Vehicle systems including accessories, plus a 10-day training program. The delivery schedule was planned for the end of April 2015, with training to be conducted with the Nepalese Army late in the northern summer of 2015.

On the day the order was due to be shipped from the Barrett Communications factory in Perth, a magnitude 7.8 earthquake hit Nepal, causing significant, widespread damage.

Upon hearing of the earthquake, John Rosica, president of NVIS Communications, contacted the US Army Corps to expedite the delivery into Nepal and to make arrangements to travel to Nepal to provide the training so that the equipment could be used straight away. This was coordinated with the Nepal Signals Directorate, the US embassy in Nepal and Sivendra KC, the managing director of Icchu Mati International — Barrett's authorised dealer in Nepal.

Training began with the theory part of the program on 18 May. When the shipment arrived two days later the team was able to complete the hands-on training, including field training.

"When we were awarded the contract, we had no idea of just how relevant the award of this contract would be," said Rosica. "We are very pleased that we could assist on the ground in Nepal and are confident the Nepalese Signals Directorate is ready to put the equipment to use immediately."

NVIS has had lots of success supplying Barrett Communications equipment for large projects and customers, including the Nevada National Guard, the Los Angeles County Fire and Rescue Department, the Bonneville Power Authority (north-west US), Mark West Energy (US) and the US State Department.

Barrett told *Critical Comms* that it is continuously reviewing its technology offering to ensure it is meeting its customers' expectations and gave the example of the Rapid Field Deployment System (RFDS), which provides a deployable, simple-to-operate and flexible HF or VHF/UHF communications system mounted in a single transit case containing radios, power, cabling, lighting and external connections.

The solution is suited to occasions where there is a requirement to establish a communications system rapidly upon arrival in an austere environment. "All you have to do is connect it to an antenna, switch it on and it works," said Cameron Berg, Barrett's marketing manager.

Barrett Communications Pty Ltd
www.barrettcommunications.com.au

COMMS CONNECT 2015 SERIES

Conferences and exhibitions for critical communications users and industry

Melbourne – The Main Event

1–3 December 2015

Melbourne hosts the national conference and exhibition – the main event in the Comms Connect calendar. If you attend only one Comms Connect event each year, Melbourne offers the greatest breadth and depth of technology, access to expertise and networking opportunities.

- exhibition covering 3000+m²
- 1200+ attendees
- 90+ exhibitors
- 75+ expert speakers and panel members
- ARCIA annual gala dinner – 600+ attendees

The 2015 conference program will be published in August.

New in 2015 – the Capital City Conference Series

Working even closer with ARCIA in 2015, Comms Connect brings you the Capital City Conference Series. One-day, streamlined conferences for the time poor and those unable to attend the two- and three-day events. Purely educational, with no exhibition, these new initiatives run in conjunction with ARCIA's Industry Networking Dinners.

Next Instalment: Adelaide – 23 September, National Wine Centre

Melbourne Sponsors

Platinum

Hytera · AIRBUS DEFENCE & SPACE · sepura · bai The platform to communicate. · auria wireless

Gold

simoco · omnitronics · MOTOROLA · GMG · tait communications · ZETRON · rftechnology

Silver

CODAN RADIO COMMUNICATIONS for the long haul · KENWOOD Listen to the Future · ICOM · ICS · LPI · NEC

In association with

ARCIA

Media Partner

comms critical

Digital Partner

IT'S HOW WE CONNECT

Delegate Bag Sponsor

MINGARA

Supporting associations & media organisations

TETRA · DMR · RFUANZ · TCCA · DMR · TETRA APPLICATIONS · RadioResource INTERNATIONAL · dPMR · IWCE

www.comms-connect.com.au

Dual-mode radios

The Tait 9300 product family has grown to include an entry-level mobile radio and a portable radio. The TP9310 and TM9315 standard packages are able to operate on both FM conventional analog and DMR Tier 2 conventional networks in addition to simplex calls.

Built on the Tait Tough mission-critical TP9300 platform, the TP9310 portable radio features 16 channels, an IP67 rating, an integrated GPS software option, built-in man-down and lone worker features and encryption options. Built on the TM9355 platform, the TM9315 mobile radio features 100 channels, an IP54 rating for performance in demanding environments, high-quality audio with a built-in speaker, GPS capability (when a GPS antenna is connected) and encryption options.

Tait Communications

www.taitradio.com

Analysis software

Signal Hound has updated its free Spike Spectrum Analysis software by creating a variety of digital modulation analysis tools for its BB60C and BB60A USB-powered real-time spectrum analysers.

Spike software version 3.0.8 now provides constellation diagrams, symbol tables, error-vector magnitude (EVM) measurements and bit pattern matching analysis tools for a wide range of modulation types. Coupled with a Signal Hound BB60C or BB60A spectrum analyser, the updated Spike software includes real-time tools to analyse digitally modulated signals with bandwidths to 27 MHz and frequencies from 9 kHz to 6 GHz.

The 3.0.8 update unleashes more sophisticated signal analysis of common digital modulations present in cellular telecommunications, Internet-of-things (IoT), machine-to-machine (M2M) and other radio applications. Along with Spike's application programming interface (API) and graphical user interface (GUI), there is significant third-party customisation potential to best fit the software to a specific application.

Future versions of Spike will include sub-1 GHz wireless standard modulation tools that include ASK, FSK, GFSK, MSK, GMSK and OOK, as well as higher order modulation analysis tools for QAM64.

Silvertone Electronics
www.silvertone.com.au

Surge filter

The Novaris SFH series of high-current surge filters is suited to high-power RF transmission sites, where there is not enough power cabling distance within the control building to allow for a multistage protection approach.

The series contains two stages of fail-safe surge protection to create redundancy. These two stages are separated by a low-pass LC filter that emulates a large cable length, enabling surge protection co-ordination. The low-pass filter also has the added benefit of EMI, RFI and surge frequency filtering. The combination of these components creates a robust surge protection system and provides a low let-through voltage.

The series is available in 250 to 2000 A configurations with up to 200 kA of front-end protection.

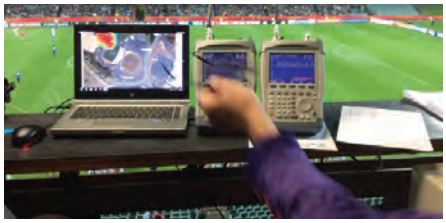
Novaris Pty Ltd
www.novaris.com.au

News

CROSSCOM ACQUIRED BY CSE GROUP

Crosscom, a founding partner of the Orion Network in Australia, is being acquired by CSE Group, a conglomerate that operates in the automation, telecommunications and environmental sectors. A public company, CSE is listed on the Singapore Exchange and operates a network of more than 30 offices across 20 countries. Globally, CSE's annual turnover is in excess of $387 million (SG$400m), with more than 1300 employees worldwide. In Australia and New Zealand, CSE Global employs 180 people generating an annual turnover of approximately $100 million.
More info: bit.ly/1LUK6Az

NZ RADIO UPDATE



In its latest industry update, New Zealand's Radio Spectrum Management (RSM) has detailed new capabilities for detecting "unlicensed radio communication signals anywhere and anytime in New Zealand". The authority has commissioned a new mass signal detection and analysis system, which enables its radio inspectors to scan multiple bands and return a table of active frequencies. RSM said the upgrade better equips the inspectors to detect unlicensed signals in a crowded spectrum, and improve frequency compliance audits and interference investigations.
More info: bit.ly/1H7HjNS

SATELLITE PTT

Melbourne-based Beam Communications has been appointed an official service provider for the Iridium Push-to-Talk satellite communications service. Iridium PTT comprises three components: the Iridium PTT service delivered through the Iridium Low Earth Orbit (LEO) satellite constellation; the Iridium Command Centre, the cloud-based management system where all radios and talkgroups are managed; and the Iridium PTT radios, including both the Iridium Extreme PTT as well as other satellite or hybrid PTT devices. Iridium PTT works with Iridium's existing constellation and is compatible with Iridium NEXT, the company's next-generation satellite constellation, which is scheduled to begin launching in late 2015 and to be completed in late 2017.
More info: bit.ly/1S69P7C

WIRELESS HEALTH CONCERNS

On Monday, 11 May, 190 scientists from 39 nations submitted an appeal to the United Nations, UN member states and the World Health Organization (WHO) requesting they adopt more protective exposure guidelines for electromagnetic fields (EMF) and wireless technology in the face of increasing evidence of risk. They say these exposures are a rapidly growing form of environmental pollution worldwide.

The International EMF Scientist Appeal asks the Secretary General and UN affiliated bodies to encourage precautionary measures, to limit EMF exposures and to educate the public about health risks, particularly to children and pregnant women.

The scientists have collectively published over 2000 peer-reviewed papers on the biological or health effects of non-ionising radiation, part of the EMF spectrum that includes extremely low frequency fields used for electricity, or radiofrequency radiation used for wireless communications.

The appeal highlights WHO's conflicting positions about EMF risk. WHO's International Agency for Research on Cancer classified radiofrequency radiation as a Group 2B 'Possible Carcinogen' in 2011, and extremely low frequency fields in 2001.

Nonetheless, says the group, the WHO continues to ignore its own agency's recommendations and favours guidelines recommended by the International Commission on Non-Ionising Radiation Protection (ICNIRP). The group says these guidelines have been developed by a self-selected group of industry insiders and have long been criticised as non-protective.

The appeal is calling on the UN to strengthen its advisories on EMF risk for humans and to assess the potential impact on wildlife and other living organisms under the auspices of the UN Environmental Programme, in line with the science demonstrating risk, thereby resolving this inconsistency.

"International exposure guidelines for electromagnetic fields must be strengthened to reflect the reality of their impact on our bodies, especially on our DNA," said Martin Blank of Columbia University. "The time to deal with the harmful biological and health effects is long overdue. We must reduce exposure by establishing more protective guidelines."

"ICNIRP guidelines set exposure standards for high-intensity, short-term, tissue-heating thresholds. These do not protect us from the low-intensity, chronic exposures common today," added Joel Moskowitz of the University of California, Berkeley. "Scientists signing the appeal request that the UN and member nations protect the global human population and wildlife from EMF exposures."

CREDIT: Lord Koxinga / Wikipedia / CC

SYSTEM SOLUTION

Taiwan's fire department boosts its dispatch capabilities.

Rapid economic development can be both a blessing and a curse. While it can greatly improve opportunities for those who live and work in an area, it can also result in an increase in population that has a major impact on local infrastructure and services.

Agencies responsible for protecting the health and safety of a growing community must find ways to respond to these changes or fall behind in their ability to meet their responsibilities. Such was the case recently for the Hsinchu County Fire Council (HCCFD) in Hsinchu County, Taiwan.

To keep pace with the region's growth, the HCCFD decided to replace its outdated communications equipment with Zetron's MAX Dispatch system. Not only is the agency the first location in Taiwan to install MAX Dispatch, but the system connected to an 18-channel NEXEDGE digital radio network is providing the HCCFD with one of the most advanced and flexible public safety communications solutions in Taiwan.

Hsinchu County and Hsinchu Science and Industrial Park (HSP) in north-western Taiwan covers roughly 1427 square kilometres and has a population of about 500,000.

In recent years, the establishment of the HSP, which straddles Hsinchu County and Hsinchu City, has had a dramatic impact on the area.

Developed in 1980 to foster scientific and technological development, the HSP is one of the world's key semiconductor manufacturing centres.

More than 400 high-tech companies established in the park employ approximately 150,000 people. In recent years, these companies have accounted for as much as 10% of Taiwan's gross domestic product.

The economic development the HSP has brought to the area has resulted in an average population increase of 12% annually in Hsinchu County. This has put a strain on its infrastructure and public safety agencies, including the HCCFD.

The HCCFD provides firefighting, rescue, ambulance and military support services for 13 districts. Even before the county's recent dramatic changes, the HCCFD's ageing analog dispatch system was falling behind in its ability to support the agency.

"The system was unable to provide the scalability, logging reporting and IP-based functionality that were becoming necessary for the HCCFD to manage operations effectively," said Gene Wong, Zetron Australasia's country manager in North Asia.

Selecting a system

Taipei-based Systemcom proposed a solution to the HCCFD's problem. The company had been providing and servicing the HCCFD's equipment for over 10 years, so it understood the agency's past needs, current pressures and future direction. In 2010, it suggested that the agency replace its existing dispatch equipment with Zetron's IP-based MAX Dispatch system.

At first, the customer was reluctant to make the change because it would mean transitioning to a console manufacturer it

DISPATCH SYSTEM

> THE SYSTEM IS EASY TO LEARN, WHICH REDUCES THE TIME, EFFORT AND COSTS REQUIRED FOR TRAINING.

had not used in the past. But the MAX Dispatch platform offered the affordable, next-generation, IP-based features and functionality the HCCFD was seeking, as well as the requisite integration to Kenwood's NEXEDGE radio network.

After taking into account Systemcom's recommendation, the HCCFD decided to purchase and install a six-position MAX Dispatch console system. A condition of the project was that the system would have to be localised to Chinese.

Two-stage process

The solution for the HCCFD was implemented in two phases. The first involved installing the MAX Dispatch system and connecting it to the NEXEDGE infrastructure. This phase went smoothly; the MAX Dispatch system integrated seamlessly with the NEXEDGE.

For the second phase, MAX Dispatch was expanded to include an additional position. This phase, too, went smoothly and routinely, and the project was completed in June of 2014.

Systemcom Manager Monika Tien said that the new system's performance and features far exceed those of the system it replaced.

"It is also delivering many useful new features, including improved file tracking and an instant-replay feature operators can use to double-check anything they may have missed during a call," she said. "What's more, the system is easy to learn, which reduces the time, effort and costs required for training. The fact that the system's user interface has been localised to Chinese is also very important to the customer."

The project has proved to be a great success for all of the parties involved, delivering the features, functionality and flexibility necessary for the HCCFD to rise to the challenges of growth and change. Because of this, the customer already has plans to expand the system over a LAN/WAN to create a multimode solution that will allow it to use MAX Dispatch at a second command centre.

Zetron Australasia
www.zetron.com

At $3.52 billion

do you want a piece of this pie?

By 2019 the global field service market is forecast to be worth $3.52 billion *

Field Service Business delivers the latest breaking news, product innovations & industry expertise to Australian service professionals managing, resourcing & enabling mobile workers.

Register now for your free email newsletter, print magazine or eMag: **www.fieldservicebusiness.com.au/subscribe**

* Feb 2015 research by Markets and Markets

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

Backhaul

Backhaul, August 2015 — the industry 25 & 10 yrs ago

Backhaul takes you on a trip down memory lane as we look at what was happening in the critical communications field 25 and 10 years ago.

25 YEARS AGO. The cover of the August/September 1990 issue of *What's New in Radio Communications* featured the IFR FM/AM 1600S Communications Service Monitor from Vicom. This device was the commercial version of the AN/GRM-114B developed for the US Army to test the SINCGARS frequency-hopping tactical radio. Elsewhere in the magazine, Kenwood Electronics was reported to be expanding its Australian operations with the addition of an $8m, 4000 m² warehouse at Australia Centre in Homebush, Sydney. A full-page Kenwood ad for the TK-230, TK-330, TK-705 and TK-805 radios was headlined "Move up to 1995's communications equipment!" In other news, the Philips Radio Communication Systems PRM80 mobile radio series had just won an Australian Design Award; coincidentally, those same radios were the subject of a $100,000 contract with the Philippines National Bank to establish a radio network to keep branches connected during not-infrequent natural disasters, with their auto identify and selcall features being particularly useful.

10 YEARS AGO. The Simoco SRM9022 and SRP9130 P25 radios featured on the cover of the July/August 2005 issue of *Radio Comms Asia-Pacific*. The 9000-series radios were multimode, being P25, MPT1327 and analog PMR. Inside the magazine, Bruce Jeffrey from Icom opined that "the imminent release of fully compliant APCO P25 standard equipment in Australia is arguably the most significant advancement in public safety radio communications since the allocation and national adoption of the present 64 UHF channels used by our state and federal police forces". Plus, the ACA (forerunner of the ACMA) announced that it had banned devices that could jam RNSS signals, and also published its 2005 Australian Radiofrequency Spectrum Plan, based on ITU recommendations.

Spectrum

PSMB is not the end state

One of the challenges that I have been grappling with as CIO of the Emergency Services Telecommunications Authority (ESTA) — Victoria's state-wide, all-agency emergency communications call-taking and dispatch service — is how we will use high-capacity public safety mobile broadband (PSMB) networks.

Currently in Victoria we have the Mobile Data Network, a 10-year-old private network specifically for public safety data services. It has evolved since commissioning, with data usage growing slowly in the first five years and then tripling the growth rate over the next three.

The mobile broadband networks will come, and many public safety organisations globally are developing business cases for this. Whether they leverage commercial networks or private networks, the challenge many have not considered is the same as mine and needs to be addressed — we all need to develop the business cases for public safety information management in order to create increased officer situational awareness and a common operating picture, ie, getting information into the hands of the officer in the field.

Access to information adds value in a wide variety of ways, but, typically, all opportunities can be categorised into three main areas: making better-informed decisions; discovering hidden insights; and automating business processes. In public safety there is little focus on automating business processes, but much in using and sharing a wide variety of information to enable commanders and officers to make better decisions with more refined data. These, together with analysis of multiple data sources to highlight changing situations and increase situational awareness, are very valuable objectives.

At ESTA we are considering what information we gather from our call-taking and dispatch services; how we can leverage business analytical tools to use the data; and how we can analyse patterns to better understand the nature of a situation. Then we can inform commanders and officers so they can devise strategies and tactics that prevent or mitigate future harm. The business case that we are focused on is how we get that into the hands of the commanders and officers in a way that is meaningful and valuable for them. The value comes from providing the ability to monitor, alert or support interactive operational decision-making using data about current conditions and historical activity.

Other sources of data become important in this process. Social media analytics, combined with historical and current ESTA data, help to build situational awareness. For the work we do to support fire services and natural disaster management, we need to bring the meteorological data into the analytical analysis. Then there are the multiple sources of other sensor data — CCTV, police records, smart homes, telemetric, biometrics and so on. These are all at some point going to contribute to the common operating picture and situational awareness that will be delivered by the PSMB network.

Building the business case for PSMB must be developed alongside the business case for public safety information management, creating increased officer situational awareness and delivering a common operating picture. The value will not be in the network but in how we use it to improve the service we deliver to the community and the safety of our officers in the field.

Deborah Weiss spent two years as CIO of ESTA and has recently taken up the role of COO.

Hytera Smart Dispatch System

Empowering Your Business

A well-run business starts with keeping its finger on the pulse of its team, fleet or resources. Hytera dispatch system offers versatile features like voice call, GPS, real-time tracking and geofencing, which enable you to have a complete picture of every asset around as easily as literally moving your fingers. Keep discovering this dispatch system, run an increasingly efficient business.

Key Features:

- Visualized dispatching
- Remote monitoring
- All types of voice call
- Text messaging
- Radio disable & enable
- Real-time tracking
- GPS positioning
- Phone interconnect
- Reporting and statistic

www.hytera.com.au marketing@hytera.com Hytera Communications (Australia) Pty Ltd

Hytera

Like old mate here, CRS Accessories' all new Compact Six Bay Universal Charger...

DOES THE JOB AT HALF THE SIZE!

Just like the world's smallest ever bodybuilder, CRS Accessories' new ***Compact Six Bay Universal Charger*** doesn't let size get in the way of top performance.

With all the features of larger units, this high quality charger serves up a six-pack of charging bays, suitable for a wide range of Kenwood, Motorola, Vertex and Icom 2-way radios. Plus it's priced to please.

And you won't get a bicep workout lifting our six bay charger, because at just 1.5kg it's a real featherweight.

CRS-UMBC6
Suitable for

ICOM
Vertex Standard
MOTOROLA
KENWOOD

Features

- Tri-Chemistry – able to charge Ni-Cad, Ni-MH and Li-ion batteries
- Small, lightweight and compact – Dimensions: 29cm x 19cm x 9cm
- Wall mountable
- Well priced
- 1 year warranty

Don't sweat!
Insist **on CRS.**

Phone 1300 307 334
www.crsaccessories.com.au

CRS ACCESSORIES