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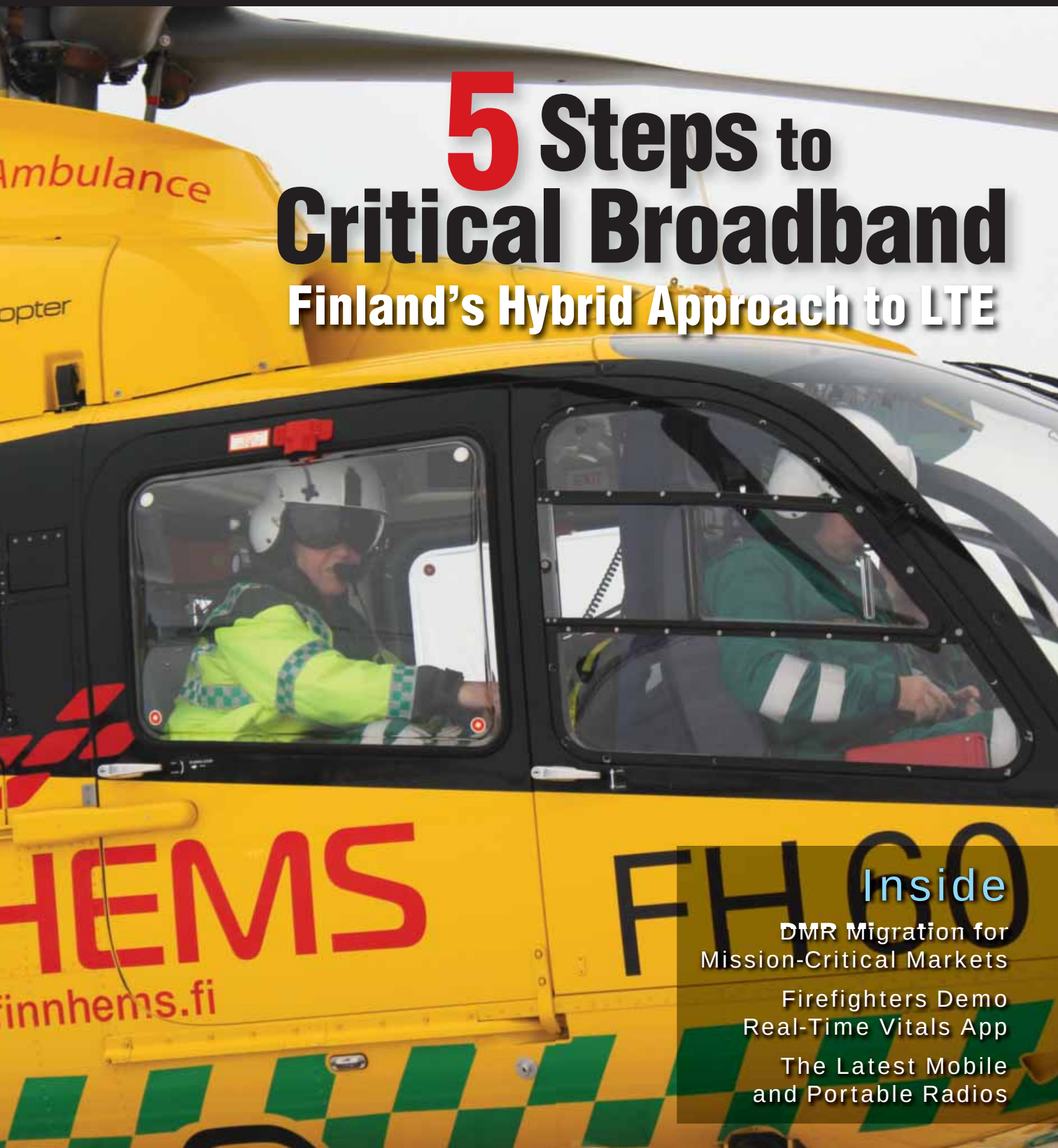

5 Steps to Critical Broadband

Finland's Hybrid Approach to LTE

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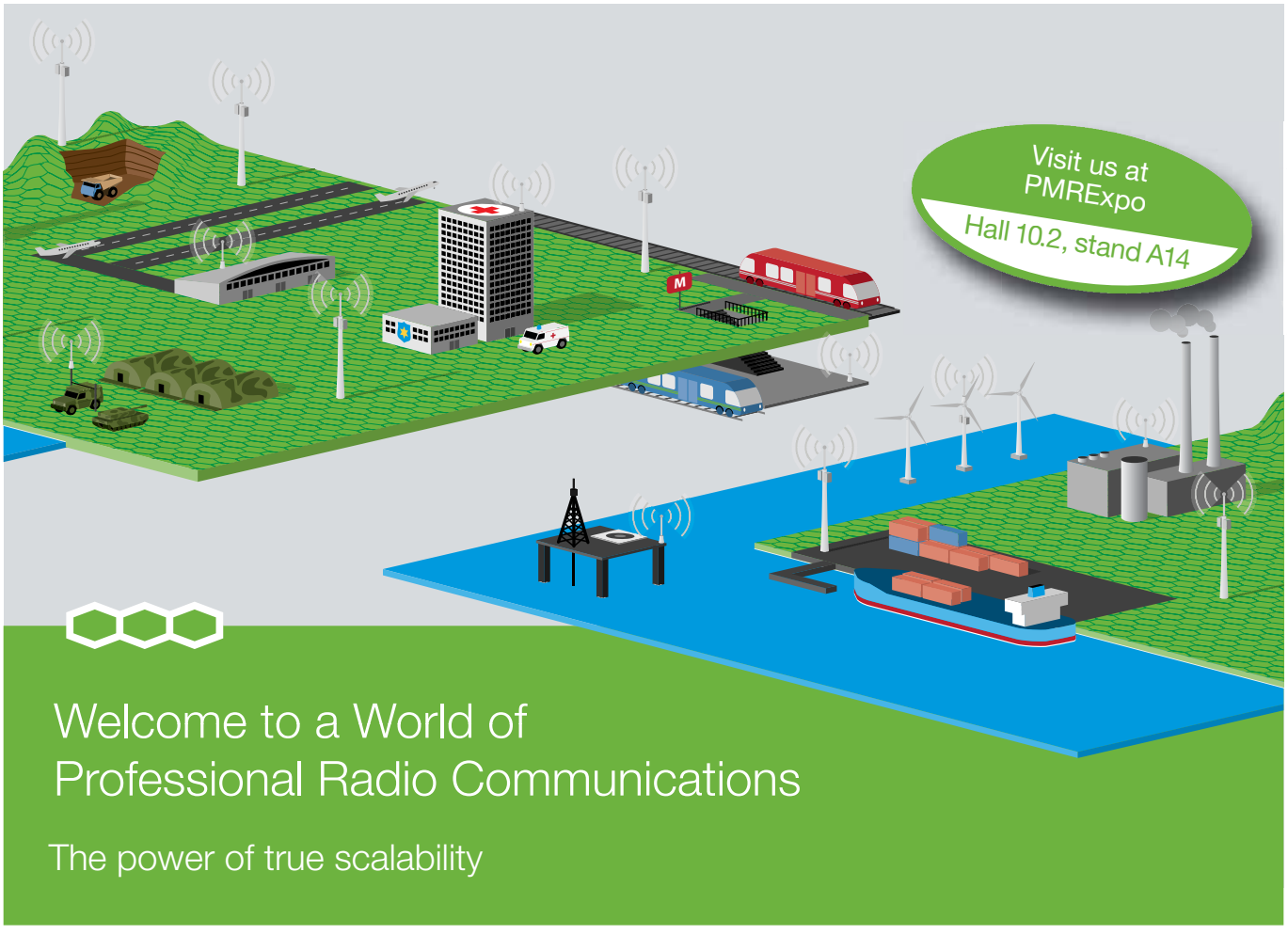

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Cover photo courtesy Maria Kuula, State Security Networks

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A Global Public-Safety LTE Band?

Another country, South Korea, selected the 700 MHz band for public-safety broadband services. The Asian country has set an aggressive timeline to deploy a nationwide network for first responders by 2017. See the "World News" story on Page 12.

South Korea's announcement follows the United States, which also set aside 20 megahertz of 700 MHz broadband spectrum for public safety. In 2013, the United Arab Emirates (UAE) set aside spectrum in the 700 and 800 MHz bands for broadband services and said 2 by 10 megahertz of spectrum could be designated for public protection and disaster relief (PPDR) applications.

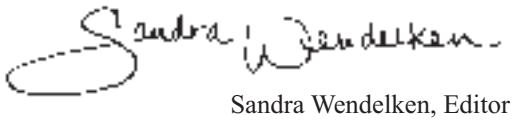
Europe is the large unknown PPDR broadband spectrum territory, with a decision not expected until at least November 2015 at the International Telecommunication Union (ITU) World Radiocommunication Conference (WRC). Formal European PPDR spectrum recommendations are expected next year from industry spectrum groups, with both the 400 and 700 MHz bands under discussion. See Page 10 for more details on Europe's PPDR LTE spectrum debates.

The more countries that deploy Long Term Evolution (LTE) at 700 MHz for public-safety services, the larger the market will be, potentially driving costs down and competition up. A global PPDR spectrum band will provide improved interoperability, cost and features, among other benefits for public-safety users around the world.

In the meantime, European countries are taking innovative approaches to addressing current and short-term needs for LTE services. Finland's hybrid approach is discussed in detail for the first time in the article beginning on Page 18. The coming years will determine which countries' paths to broadband will be the most effective in terms of cost, coverage and reliability. It will be interesting to compare the timelines to critical broadband in various countries and regions with different scenarios.

We value your opinions! Please email your feedback to me at swendelken@RRMediaGroup.com.

Another year is coming to a close; we welcome your input for our coverage during 2015.



Sandra Wendelken, Editor
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RadioResource INTERNATIONAL

RadioResource International delivers wireless voice and data information for mobile and remote mission-critical operations for professionals who reside or do business outside the United States and Canada. The magazine covers private and trunked mobile radio, wireless data, location technologies, public safety communications, microwave radio, satellite, paging/messaging, remote monitoring, and other wireless applications. Editorial content is international in scope and encompasses emerging technologies, industry reports and trends, innovative applications, product information and comparisons, news, standards, and troubleshooting tips.

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INTERNATIONAL

Mission-Critical PTT Set for LTE Release 13, Release 12 Freeze Likely in 2015

Work is underway on mission-critical voice for the Long Term Evolution (LTE) standard in Release 13, set for finalization in the third quarter of 2016. In addition, the freeze for LTE Release 12, which includes several public-safety features, could be delayed to the first quarter of 2015, according to industry sources.

The functional freeze date is when the standard is considered finalized and no further changes or functions can be added to that release. LTE Release 12, also called LTE Advanced, includes proximity services (ProSe) or direct mode communications and group communications or push to talk (PTT).

Release 12 was expected to be complete in December but it might slip to quarter one 2015, sources said. The delay likely won't have a large impact on public-safety broadband efforts, said European and U.S. officials.

"Any delays to standardization, whilst they are a concern, are unlikely to have a significant impact to most countries," said Phil Kidner, TETRA + Critical Communications Association (TCCA) CEO. "A notable exception is the United Kingdom, which does not currently own its own network and is looking to replace its current arrangements when its existing contracts expire.

"Most European public-safety users are very happy with their existing networks and are looking to enhance them rather than replace them. One of the first countries to implement a nationwide TETRA network is now updating that network for critical communications and purchasing broadband services from public providers. This model is being followed by other countries."

The First Responder Network Authority (FirstNet) is the U.S. organization working to build a nationwide LTE network for public-safety and critical infrastructure industries. "We understand that [3GPP officials] are working toward a December target date but may need additional time," said FirstNet spokesman Ryan Oremland. "We should know more next month but don't expect it to have a substantive impact on FirstNet's work if Release 12 should move to the next meeting cycle."

Mission-critical PTT (MCPTT) requirements definition is ongoing in Release 13, and architecture work just started, according to a presentation by Balazs Bertenyi, chairman of Third Generation Partnership Project (3GPP) Technical Specification Group (TSG) Service and System Aspects (SA) at the 3GPP Critical Communications Workshop 26 – 27 August.

The MCPTT feature emulates functions provided by professional mobile radio (PMR)/LMR systems. The feature is mainly for group call support, but private one-to-one calls will be supported too. MCPTT will work in both on-network and off-network scenarios, but not all functions will be available when a device operates off-network. It is designed to support mission-critical use, but the feature can be deployed in non-mission-critical scenarios.

MCPTT will include regular group calls, broadcast group calls where the initiating user expects no response, groups calls based on priorities such as emergency group call that could pre-empt other calls in progress, and private one-to-one calls.

Both of the Release 12 critical communications features will be further developed in Release 13.

PARIS — Airbus Defence and Space plans to divest its professional mobile radio (PMR) and commercial satellite communications services activities following a detailed portfolio assessment.

The European-based company defined space (launchers and satellites), military aircraft, missiles, and related systems and services as its future core businesses. "These are the areas in which the division will further invest to strengthen its leading position," a company statement said.

Some business areas were identified as divestment candidates because they do not fit the strategic goals and for which the company sees possibilities to increase its development potential. The statement said the company's commercial and para-public communications business including PMR will have better chances for growth and market success in different ownership structures. Airbus Defence and Space further intends to sell some of its subsidiaries and participations, including Fairchild Controls, Rostock System-Technik, AvDef, ESG and Atlas Elektronik.

Further industrial alternatives will be explored to best develop and position the security and defense electronics businesses for future growth and value creation.

"The portfolio decisions for Airbus Defence and Space are the logical follow-up to our group strategy review in 2013," said Tom Enders, CEO of Airbus Group. "They will foster the strengths of the division and, hence, will result in an even stronger focus on our group's core activities, aeronautics and space."

The company reorganized three former business entities — Astrium,

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EUROPE

European Public-Safety Broadband Spectrum Debate Continues

The debate about the best spectrum band in Europe for public-safety broadband services continues with formal recommendations to be released next year.

The FM49 working group within the European Conference of Postal and Telecommunications Administrations (CEPT) will recommend three frequency options for public-safety broadband in the 400 and 700 MHz bands. The report is on track to be released for public consultation in 2015. Officials from the European spectrum community said the World Radio Conference (WRC) in November 2015 is its best and unique chance to get a dedicated spectrum allocation for Long Term Evolution (LTE) deployments for public safety.

FM49, which recommends radio spectrum for public protection and disaster relief (PPDR), is developing the draft Electronic Communications Committee (ECC) Report 218 on the harmonized conditions and spectrum bands for implementing future European broadband PPDR systems.

The report will include the results of the ongoing spectrum compatibility studies in SE7, a working group that addresses compatibility and sharing issues of mobile systems. SE7 received seven contributions on

Courtesy ASTRID

PPDR at 400 MHz from the United Kingdom, Airbus Defence and Space, Arqiva and IRT specific to PPDR at 400 MHz.

SE7 also discussed eight input contributions on PPDR at 700 MHz from Thales, Bouygues Telecom, EBU, IRT, Arqiva and ANFR. SE7 amended the draft ECC report, taking into account input contributions.

FM49 is also discussing the pros and cons of developing an ECC decision or recommendation as a harmonization measure for the regulatory approach as requested by the ECC. Such a deliverable may accompany the draft ECC report 218 in the public consultation, likely to take place in February 2015.

The ECC said the deliverable will not identify a single harmonized solution but rather provide a set of options that could also be combined by administrations at a national level, which will include:

- Deployment/network type (commercial, mobile virtual network operator), hybrid or dedicated structures
- Frequencies/bands (technical compatibility studies will be limited to 400 and 700 MHz)
- Use of the 400 MHz bands
- Use of blocks within the 2 by 30 megahertz pairing of the 700 MHz band
- Use of guard band and duplex gap in the 698 – 703 and 753 – 758 MHz (with a conventional duplex) or 733 – 736 and 788 – 791 MHz (with a conventional duplex) band, noting that direct mode operation may be also foreseen. Technical conditions should ensure the protection of digital terrestrial TV (DTT) below 694 MHz.

The FM49 and SE7 working groups met via the Web 30 September and have in-person meetings scheduled in November. FM49 also identified the need to exchange information between PT FM49 and PT FM54, the professional mobile radio (PMR) group, and recommended a joint session at the next meetings 11 – 12 November in Helsinki, Finland.

Airbus Military and Cassidian — into one single organization. This target was achieved 1 July. Cassidian was renamed Airbus Defence and Space in January.

CHRISTCHURCH, New Zealand — Tait Communications acquired long-time Brazilian partner **SGM Telecomunicações**. São Paolo-based SGM will become the regional hub for the company's Latin American operations, joining Houston, Brisbane and Vienna as major overseas offices.

SGM, originally established as a spin-off from Philips Electronics in the late 1990s, will be rebranded as Tait Communications. The transaction is being funded from Tait's existing cash and working capital facilities.

SGM is also a reseller for a number of other critical communications vendors' technologies.

The two companies have previously won numerous analog and digital communications contracts across Brazil's 27 states and throughout Latin America.

"Brazil is one of the world's growth economies, and the opportunities for us are significant," said David Wade, Tait Communications acting CEO. "SGM has existing clients, contracts, cash flows and people, which means we are acquiring relationships, capability, revenue and earnings to add to our overall financial performance," Wade said. "Strategically, this makes far more sense than a green field start-up."

LONDON — A survey of U.K. emergency services professionals in the police and paramedic services showed strong approval of the use of body-worn video cameras. Most respondents said the technology offers tangible benefits to users and the public.

The survey, conducted on behalf of the U.K. Emergency Services Show, found 92 percent of police officers are in favor of body-worn cameras being used by police officers across the United Kingdom. Among paramedics, 72 percent were in favor of their colleagues nationally wearing cameras, and 92 percent were in favor of the police wearing them. Of those questioned, more than half (56 percent) of police and a quarter of paramedics (25 percent) also said they had already had

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ASIA

South Korea Plans for Dedicated LTE Public-Safety Network by 2017

By Michelle Zilis

In July, the South Korean government adopted plans to build a broadband network dedicated to public safety using Long Term Evolution (LTE) technology to be deployed nationwide by 2017. The plan calls for 20 megahertz of dedicated spectrum in the 700 MHz band, although the specific frequencies have not been defined yet.

"The April's Sewol ferry disaster brought attention to the urgent need for establishing a nationwide public-safety broadband network for sharing information and communicating among public-safety agencies," said Dujeong Choi, Telecommunications Technology Association (TTA) of Korea. Choi is a member of the National Task Force for Korea Public Safety Broadband Network under Ministry of Science, Information and Communications Technology (ICT) and Future Planning (MSIP).

On 16 April, the Sewol ferry carrying 476 people capsized off the Korean coast. There were 172 survivors. Response efforts were hindered by a lack of interoperability from responding agencies.

The goal of the project is to build an integrated network that supports various multimedia services and coincides with the evolution of technology trends, Choi said. In principle, the network will be used for voice and data. Multiple options are being considered as an interim solution for mission-critical voice services before the mission-critical push-to-talk (PTT) standard is finalized, which is slated for Release 13 of the LTE standard from the Third Generation Partnership Project (3GPP), he said.

The MSIP selected the technology and recommended the frequency band and establishment method. A new agency, By Ministry of National Security, will soon be announced and charged with national security matters, including the network. Until that is established, the Ministry of Security and Public Administration (MOSPA) will oversee the network plans.

Close to three months after the plan's inception, the government is in the request for proposals (RFP) process to select a company to create the information strategy plan (ISP). The proposal submission deadline was 30 September 2014. The ISP creation timeline is scheduled for October 2014 – 31 March, 2015. The ISP will address many important questions, including expected cost, network site specifics and vendor involvement.

The specific frequency band will be decided soon, before the ISP work, by a government authority known as the National Frequency Police Control Committee, said an MSIP official. And while a funding source has not been identified yet, the government will invest in the network build costs 100 percent, the official said.

The private, dedicated network will be used by about 200,000 users from 324 mandatory agencies including police, fire, EMS, Coast Guard, military, provincial administrative offices, electricity, gas and the forest service.

Currently these mission-critical organizations all operate their own voice-oriented networks on a variety of frequency bands and a variety of technologies including TETRA, iDEN, VHF, UHF and AM/FM. "Therefore, they are not interoperable with each other," Choi said. "That's why the Korean government wants to deploy a unified/integrated nationwide public-safety network so that every mandatory agency can communicate with each other."

The network will be always operational, rather than just during emergencies and will be designed to provide full coverage to the nation, the official said. The network will be rolled out in phases, focusing on the rural provinces first. Phase one will be established in the Gangwon Province, which is where the 2018 Winter Olympics, Pyeongchang, is located. The network will then be extended from rural to urban.

Phase two will cover other provinces, and phase three will cover metropolitan cities. Rural areas will get the network first because unlike the urban areas that already have unified LMR networks based on TETRA technology, the rural areas do not currently have a unified network.

The aggressive timeline places phase one to begin in 2015, phase two to roll out in 2016 and the completion of phase three in 2017. At that point all eight provinces, one self-governed province, seven metropolitan cities and one self-governed city that make up South Korea will have access and coverage on the network.

personal experience in using body-worn cameras.

More than two-thirds (68 percent) of police officers agreed or strongly agreed that body-worn cameras made them feel safer while doing their jobs. More than 70 percent also said the technology gives the public greater confidence in the police. Six in 10 (61 percent) respondents thought body-worn video cameras will speed up the justice process. They were a little less convinced that wearing cameras would diffuse potentially violent situations, although 44 percent said they would, but 26 percent said they wouldn't.

Police officers cited the independent evidence gathering provided by video as a key benefit and the potential for resolving "his word against mine" situations. They also liked the ability to record the arrest of violent offenders and disorder.

Paramedics saw benefit in video for recording violent patients or patients who refused treatment, as well as saying the cameras offered a form of

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protection to paramedics working on their own. They also saw the potential to relay information from the field to doctors, helping to speed up diagnosis and potentially life-saving treatment.

The survey, conducted in June, was completed by 516 emergency services professionals.

LATIN AMERICA

YOKOHAMA, Japan — JVC Americas and **Kenwood U.S.A.**, subsidiaries of Japan-based JVCKenwood, merged to form a single subsidiary, **JVCKenwood USA**. The merger is part of a global integration strategy initiated by JVCKenwood in 2012.

The merger completes a process first announced in April and is designed to enhance operating efficiencies and spur innovation throughout the company. The two entities will consolidate their business and financial resources under the new company.

"The merger of our two companies will accelerate innovation across all divisions by the sharing of technologies and expertise, and will provide efficiencies in logistics and back-office operations," said Kazuhiro Aigami, president, JVCKenwood USA. "This has been carefully planned and executed to drive innovation and growth within the Kenwood and JVC brands and their respective product divisions."

JVC and Kenwood will remain two distinct brands in their respective user markets and sales channels for each brand. JVC and Kenwood sales and marketing of Car Electronics are already located in Long Beach, California. Sales and marketing of Communications and Security will be located in Suwanee, Georgia. Sales and marketing of Audio and Video products and Professional Camera will remain in Wayne, New Jersey. JVCKenwood USA headquarters will be in Long Beach.

MIDDLE EAST/AFRICA

WELLINGBOROUGH, United Kingdom — The Middle East and Africa are set to see double-digit growth in the TETRA market during the next five years.

"The industrial, transportation and utilities TETRA segments are all projected to experience double-digit growth during the next five years, building on more than 70,000 shipments of TETRA devices in the Middle East and Africa in 2013," said Thomas Lynch, IHS associate director, critical communications group. "There are already a number of projects to trial and use Long Term Evolution (LTE) in the region — not just in public safety but in oil and gas and transportation."

"There are more than half a million TETRA users in this region, with significant progress in trials to assess the suitability of LTE," said TETRA + Critical Communications Association (TCCA) CEO Phil Kidner.

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FREESIC Creates Gateway for Interoperability Across Borders

The European Union (EU) project Free Secure Interoperable Communications (FREESIC) was designed to enable interoperable emergency communications regardless of borders via a communications gateway. The project, which began in February 2012, concluded following a field test in June and a final report submitted to the EU Project Office at the end of July.

"The FREESIC field test was held on 5 June in Luxembourg, and it successfully demonstrated the various FREESIC capabilities to an international end-user audience representing seven different EU countries," said Daniela Macáková, EU project manager, Ardaco. Ardaco is one of nine members that made up the project consortium.

The project wanted to enable highly secure and cost-effective interoperability across European communications infrastructure. The driving technology is a universal, open-standards gateway with customizable adapters that enable third-party infrastructures to connect to the FREESIC Unified Communication Network.

"The FREESIC project proposed a solution with several innovative aspects, such as a network-of-networks concept as well as a generic WEB 2.0 (do it yourself) approach," said Macáková. "From the user perspective, network management tasks will be facilitated through the collaboration site based on Web 2.0 components that allow end users to configure their own interoperability attributes.

As long as the system integrator developed an adapter to FREESIC, agencies can use whatever devices they operate to connect with other agencies already connected to the network, Macáková said. To set up interagency talk groups, an agency can use the collaboration website, which is akin to a social network of public protection and disaster relief (PPDR) organizations, similar to sites such as LinkedIn, she said.

The 5 June live demonstration achieved multiagency cross-border interoperability via push-to-talk (PTT) capabilities integrated from Tetrapol, VoIP and analog systems in five countries, the Czech Republic, Poland, Luxembourg, Spain and Slovakia.

Respondents identified possible use applications, activities the technology would allow and benefits.

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Finland's 5 Steps to Critical Broadband

Photos courtesy Maria Kuula, State Security Networks

VIRVE, the Finnish TETRA operator, is looking to the future by implementing a hybrid network approach to LTE services.

By Jarmo Vinkvist, Tero Pesonen and Matti Peltola

The Finnish TETRA operator, VIRVE, has identified steps to eventually offer critical voice and broadband data that will be delivered by a government-controlled hybrid of dedicated and commercial Long Term Evolution (LTE) networks by 2030.

The country has identified three trends that are driving the need to re-engineer how public-safety communications is managed. Changes in the communications culture have been enormous in recent years, because of the impact of the Internet and advances in mobile communications.

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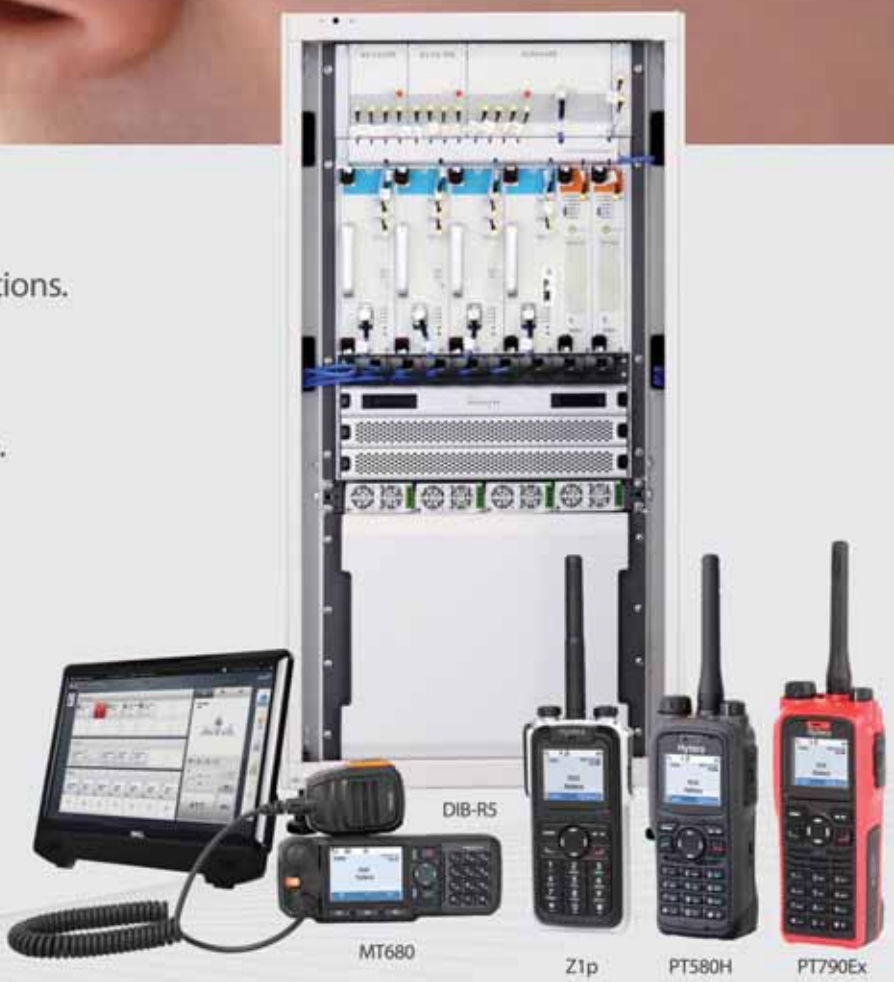

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The VIRVE network is based on TETRA technology and is used by emergency responders.

The natural ways of communicating are more versatile than ever before. This offers public safety great opportunity to develop new field operational ways of working, but at the same time, it is a significant challenge to meet the expectations of the next-generation employees and society.

The second major trend is the depopulation of rural areas — 80 percent of Finland's entire population inhabits only 20 percent of the area. This causes great pressure to public-safety service in both rural regions because of the cost and in urban areas due to the high capacity demand. The working methods from the past are no longer affordable, and greater efficiency is a must.

The third trend is increased vulnerability because of the unprecedented dependence on information networks, power supply and global events. Human errors and cyber attacks can push a society from balance. Thus securing only the communications aspects of public safety is not enough — many operatives in the field of critical infrastructure need to be included. No one can manage alone anymore or without always-available data applications.

VIRVE

In the late 1980s, Finland began a process to drive the efficiency and the service level of public-safety communications. By the millennium all agencies ranging from social services to defense forces shared the same national authority TETRA network — VIRVE — that provides critical voice and messaging services. Soon after, the hundreds of local and agency-specific emergency response centers were reduced first to 15 and then to six centers that now share units for the entire country.

The VIRVE network operator belongs to the fully government-owned State Security Networks Group that has the task of securing the critical leadership of the Finnish society and the information society services in all conditions. Alongside group and individual critical voice communications, alarming, positioning and further data services run on the network using the narrowband TETRA data capabilities. One network for all and one device for critical voice and data has set a highly effective standard. The railway sector is now considering moving from its dedicated GSM-R voice network to use the joint VIRVE network.

VIRVE

Network Technology: TETRA
Base Stations: 1,350+
Users: 70,000+
Main User Groups: Fire and rescue, police, ambulance services, social services, military, border guard, custom and emergency response centers

The VIRVE network works well and the user satisfaction is high, but the future is not staying still. Despite the great advances, more needs to be achieved. A number of European countries face the same situation. Nationwide digital narrowband authority networks live up to their promise and many times more, yet they have limitations. Demand for high-speed broadband data services is evident.

"Shared critical communication structure with other governmental agencies is not only very economical, but also excellent for cooperation," says General Ilkka Korkiamäki, chief information officer (CIO) of the Finnish Defense Forces and a State Security Networks board member.

The 5 Steps to LTE

The goal — to be able to conduct critical voice and data communications using broadband technology — is clear. A reasonable time window for the transition from TETRA to broadband begins with the availability of critical voice services over Long Term Evolution (LTE) early next decade and ends when the current TETRA network reaches its end of life — somewhere in the first half of the 2030s. Building out the nationwide TETRA coverage took several years, and it was even longer until all the separate analog systems were shut down. Thus, a long period of parallel networks with narrowband TETRA services and LTE broadband must be turned into an asset instead of a burden. Using the best of both technologies in five evolutionary steps can do this.

Step one is to set up a data

Finland's Timeline for Broadband Rollout

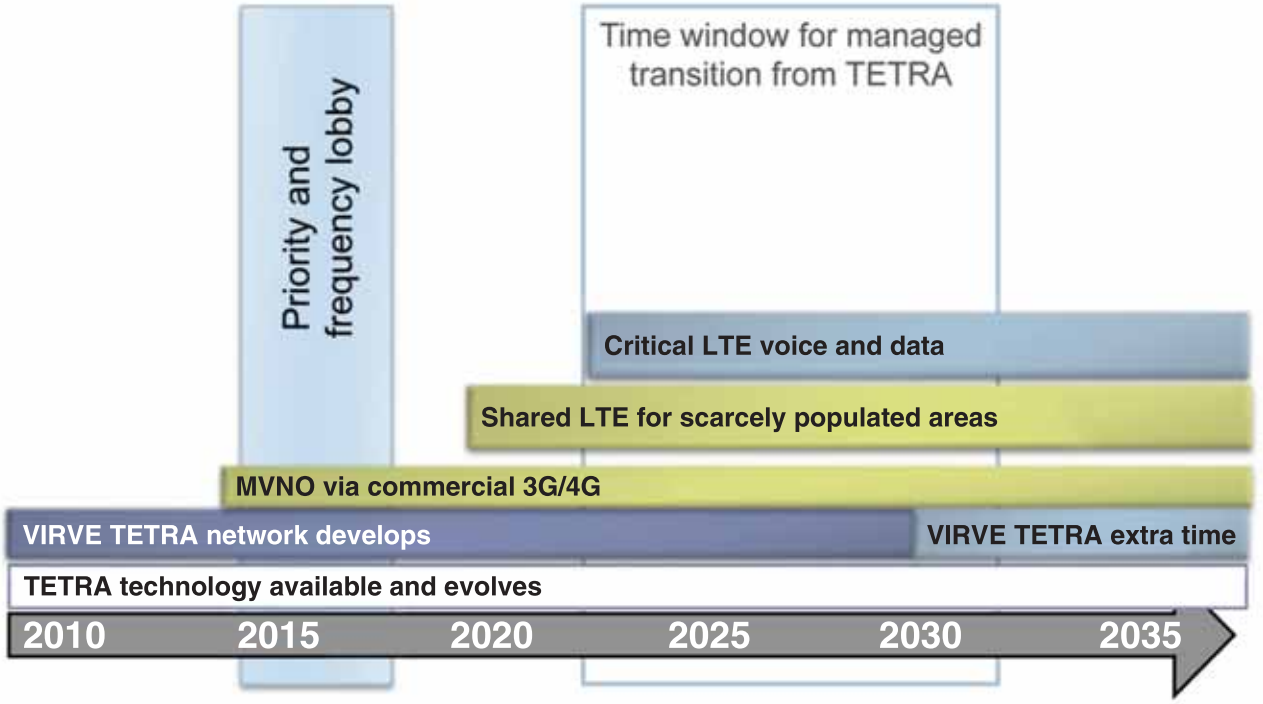

Image courtesy Tero Pesonen and State Security Networks

mobile virtual network operator (MVNO) to address the increased everyday data requirements. This will be accomplished by extending the subscriber and services provisioning system to support provisioning users on a broadband network. At first an official can use externally purchased subscriber identity module (SIM) cards, but eventually the second step will be to own and control subscribers in the LTE core.

In this second step, the critical voice and messages will run in the narrowband network, and high-speed non-critical (but secure) data will run in the commercial broadband network. The natural follow-up — step three — is to expand the owned LTE core to an owned dedicated broadband radio access in chosen locations, providing critical-grade data services.

Once the critical voice over LTE standardization is ready and the TETRA supplier supports group call over LTE functionality in the TETRA side, then the two networks can be connected, which will be the fourth step. This way the large development investments in TETRA group communications functionalities, such as prioritization, could be used. Then the same voice services are available both in narrowband and broadband — in the dedicated networks on critical service levels and in the commercial operators' networks up to the levels they can provide.

Nationwide digital narrowband authority networks live up to their promise and many times more, yet they have their limitations. Demand for high-speed broadband data services is evident.

The final fifth step is dismantling the TETRA radio access once broadband service availability and reliability meets public safety's requirements. In some — most of all rural — areas, this might take place first when the narrowband network spare parts stock runs out.

During these five steps, the narrowband TETRA network will transform to a TETRA critical voice service server, the operator will gain knowledge and understanding about how to operate a broadband network, and users will have access to high-speed data service that enables them to benefit from data applications and to develop information-centric ways of working.

"Without VIRVE we would not have been able to get where we are now — the flexible path to critical broadband enables us to get where we want to go," says Janne Koivukoski, deputy director general for rescue services Finnish Ministry of the Interior (MoI) and the chairman of the VIRVE steering committee.

The goal is to conduct critical voice and data communications using broadband technology.

Finland

Area: 338,000 square kilometers
Population: 5.5 million
EU Member State
EU Schengen-land border: 1,340 kilometers

Hybrid Network

The most economical solution to establish a communications network for critical users is based on a hybrid of dedicated network(s) in incident-rich areas where the population is located and to rely on commercial networks in the scarcely populated areas, provided that there is coverage available. Here the economic value is determined by the number of additional saved lives because of a dedicated authority network. The impact to the increased national security of dedicated broadband networks in the rural border areas, for instance, is not considered. In praxis this suggests to build dedicated broadband networks in urban areas as well as alongside the main highways. In the areas where coverage is still needed, but it is not economical for any single network operator to commercially build it, it makes sense to build the coverage using shared broadband base stations.

The substantial benefit in this solution is the in-built flexibility in terms of scope and funding. The greater the available funding or need for dedicated security, the more quickly the dedicated network can be built. On the other hand, during years of tight budgets, extension of a dedicated authority broadband network can be slowed, and commercial networks can be used more instead.

Prerequisites

There are prerequisites for moving forward to a critical broadband era, including technology, frequency spectrum and increased network availability and reliability within the used commercial networks.

A long period of parallel networks with narrowband TETRA services and LTE broadband needs to be turned into an asset instead of a burden.

Before the transition from the current narrowband network, a technology that corresponds to the higher requirements needs to be available. LTE standardization gives high hopes for this, but critical public-safety-grade voice services will not be available in a multivendor fashion until the next decade.

To deploy a radio technology, the frequency spectrum must be made available. There is always a shortage of spectrum, thus it is a highly valuable asset. The United States and South Korea already selected the 700 MHz band for public-safety data. In Europe there is an opportunity in the similar band because of the digital dividend. One can expect that the newly available spectrum will be allocated to the telecommunications use, but the struggle to dedicate some of it for public-safety needs is yet to be won. It must be harmonized with the other European Union countries so the market size is big enough to improve the economics for public safety.

A hybrid solution aims to benefit from the commercial broadband networks. However, to be able to use them at all, the networks must meet fundamental authority requirements such as capability to guarantee authorities' priority access at all times in addition to the increased network availability and reliability. They also need to support and enable the standardized critical communications features. Because there is evidence that providing services to the demanding public-safety customers is not lucrative to commercial operators, the easiest and probably the most effective way is to include these authority requirements into a spectrum license.

Once that decision is made and sufficient frequencies are allocated, Finland has the flexibility to evolve from TETRA to critical broadband

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There are prerequisites for moving forward to a critical broadband era, including technology, frequency spectrum and increased network availability and reliability within the used commercial networks.

on its own chosen schedule during the next decade, advancing the scope according to the funds made available.

Immediate Actions

The primary national action is to ensure the availability of the dedicated radio frequencies on the harmonized frequency band. Alongside this, the authority requirements need to be included in commercial frequency licensing terms before submission. Every effort needs to be taken to support the international public-safety community in the critical LTE standardization and market building to ensure the future technology availability.

The noncritical broadband data service needs to be offered via a data MVNO to the user community to boost development and to start gaining experience with the operator. And the VIRVE TETRA network needs to be well maintained with additional services, capabilities and users groups. ■

Jarmo Vinkvist is the CEO at VIRVE operator Suomen Virveverkko. He previously served as the chief operating officer (COO) in the group's parent company, State Security Networks.

Tero Pesonen is a critical communications professional at TietoPiiri and since September the TETRA + Critical Communications Association (TCCA) Critical Communications Broadband Group (CCBG) chairman. Pesonen has a long career in developing critical communications operational models and related technology within Nokia and EADS/Cassidian (now Airbus Defence and Space), and in 2013 he became an independent consultant.

Matti Peltola is senior consultant at MAPELCON and former chief technology officer (CTO) and country manager of EADS Secure Networks. He previously worked in various senior management positions within Nokia. He is finalizing his dissertation on mobile network access for public-safety organizations. Email comments to editor@RRMediaGroup.com.

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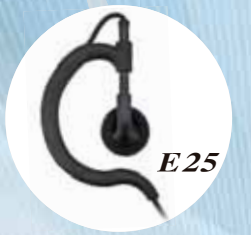

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Digital Migration for Mission-Critical Markets

Utilities and oil and gas firms are upgrading their communications networks from analog to digital to take advantage of the benefits of Digital Mobile Radio (DMR).

By Luis Perez Bermejo

A variety of reasons contribute to the rapid migration of many mission-critical communications users from analog to digital networks, including specific benefits of digital networks in utility, gas and petrochemical markets. The migration to digital offers a number of technological improvements such as spectral efficiency, improved voice quality at greater range, better privacy and sophisticated application possibilities. However, the main reason for the change is the smooth transition in product replacement. The technology is often nondisruptive, allowing the replacement to happen gradually.

Two-Way Radio Milestones

The first successful two-way radio system, operated between a fixed station and radio transceivers installed in police cars, was implemented by the New Jersey Police Department in 1933 in the United States. However, 10 years earlier, in Australia, the Victoria Police were

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Analog equipment can be partially replaced with digital radios in a network, initially using those digital radios in an analog mode.

the first in the world to use wireless (Morse code) communications in cars. Handheld radio transceivers were extensively used during World War II.

The transistor, another important milestone, was believed to be developed at the Bell Labs in 1947. In 1958, Motorola introduced the world's first vehicular two-way radio with a fully transistorized power supply and receiver.

The first two digital radio networks were introduced by the end of the 1980s and beginning of the 1990s, in France for the National Gendarmerie and in the United States for the New Hampshire Police. After this, there were two important technology milestones based on the introduction of two standards, TETRA for the European markets and Project 25 (P25) for the American markets. Because of complexity and the high cost of these new digital network standards, the first networks implemented were for public safety, as well as utility, gas and petrochemical companies. These sectors all had the necessary funds to invest in safer communications networks and the specialists with the proper skills to operate the technology.

Digital Mobile Radio

Recently, several new standards have been introduced in the two-way radio world, one of which is Digital Mobile Radio (DMR). DMR uses Time Division Multiple Access (TDMA) technology with 12.5-kilohertz channel spacing. The DMR standard has proven cost effective for many users.

Migration to digital of large-scale professional users is the challenge. DMR products allow users to migrate from analog to digital seamlessly. Analog equipment can be partially replaced with digital radios in a network, initially using those digital radios in an analog mode. DMR is a nondisruptive technology and allows the use of new digital radios with current analog functionality, offering easy transitioning to digital with all its advantages.

Digital radios offer many advantages over analog radios, including improved voice quality at greater range, better privacy, sophisticated call-control features and the ability to easily integrate data applications. For the public administration, the gain in spectral efficiency could increase the availability of resources for additional users and services.

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Utilities and Oil and Gas Firms

There are many advantages related to the implementation and/or migration to digital under the DMR standard. For many users, the most important benefit of a digital radio is to make the existing licensed channels more efficient. For others it is the increased battery life or advanced features and flexibility associated with reduced equipment cost. Some users, such as utilities and oil and gas industries, have specific needs for migrating to digital. For these industries, the main advantage is the possibility to implement several advanced features and applications in communications networks.

Digital Radio Markets

Although radio markets vary around the world, markets and standards could be divided according to three main categories:

- Public Safety and Mission Critical
- Professional and Business Critical
- Consumer and Short Range Industrial

The ability to support dual-mode operation allows communications between new digital radios and older analog radios, operating as a nondisruptive technology for end users. The integration between voice and data also plays a major role in these industry sectors, because many use supervisory control and data acquisition (SCADA) systems. DMR can work as the connection between the remote terminal unit (RTU) and the control centers. The online access to different SCADA measuring points enables remote control, command and monitoring of complex processes.

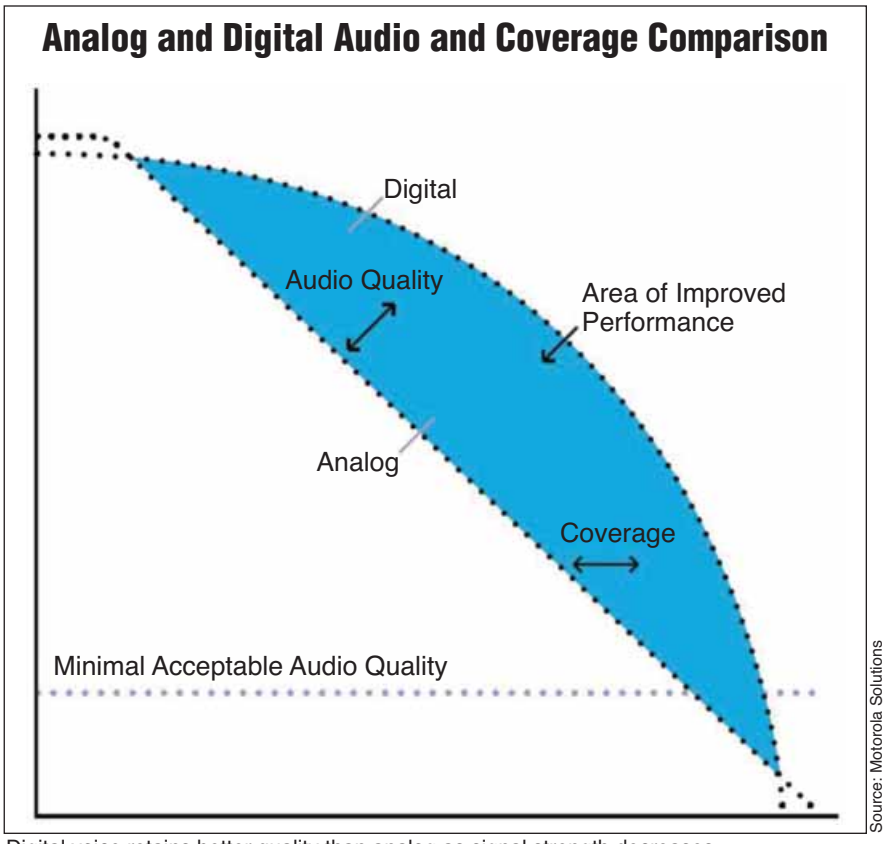
In the utilities industry, the dispatch service is essential to in-house operation. Monitoring personnel in wide areas, including GPS location and emergency calls, provides additional security to the staff. The individual ID number of each DMR radio allows the radio to be registered in the system for control and monitoring purposes, which significantly improves the efficiency of the dispatcher. A DMR system is adaptable to any network implemented inside utilities, even in ATEX potentially hazardous environments, while still ensuring the flexibility to expand and upgrade according to future needs.

Users can connect data centers to the communications system because they are servers where the performance data of work zones are stored in real time, such as location of radios, text messages, emergency calls, alarms of SCADAs and more. This will allow remote operators to easily analyze data by controlling

and monitoring the situation of an area and highlighting potential problems before outages occur. The ability to communicate between workers and their supervisors through VoIP, as well as through the public telephone network is another benefit worth mentioning.

As stated, the advantages to migrate from analog to digital for many critical infrastructure firms include spectral efficiency, improved voice quality at greater range, better privacy and sophisticated application possibilities, and a smooth transition in the product replacement. DMR is a nondisruptive technology for the digital migration. ■

Luis Perez Bermejo is president of the Radio-communication Commission of the Spanish Electronic Industry (AETIC), and president and CEO of Radiotrans. He has degrees from the University Rey Juan Carlos in Madrid. Email comments to editor@RRMediaGroup.com.



Digital voice retains better quality than analog as signal strength decreases.

Photos courtesy Frances Oliver

Firefighters Demo Real-Time Vitals App

Three firefighters climbed 1,103 stairs of the Sky Tower in Auckland, New Zealand, while a P25 network program monitored their physiological readings.

By Tanmay Bhola

A live demonstration of the BioLink solution at the 2014 Firefighter Sky Tower Stair Challenge in Auckland, New Zealand, revealed the extreme levels of physiological stress that firefighters competing in the challenge endure.

The 10th annual Firefighter Sky Tower Stair Challenge raised more than $884,000 for Leukemia & Blood Cancer New Zealand (LBC).

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Photo courtesy SkyCity Auckland

Sky Tower

15,000 cubic meters of concrete

2,000 tonnes of steel

660 tonnes of structural steel, including 170 tonnes in the mast

Firefighter Physiological Response

Firefighter	#1	#2	#3
Time to complete challenge	12:36	15:26	19:25
Max heart rate (bpm)	197	196	197
Average heart rate (bpm)	186.3	182.6	190.3
Max core temp (°C)	38.3	39.1	39.7
Average core temp (°C)	37.9	38.3	38.8
Max activity (VMU)*	0.71	1.06	1.08
Average activity (VMU)*	0.35	0.27	0.22
Max peak acceleration (g ±16)	1.69	5.59	1.33
Average peak acceleration (g ±16)	0.82	0.58	0.48

*< 0.2 = static, < 0.8 = walk jog, > 0.8 = run

The firefighters raced up 51 flights of stairs wearing a full firefighting kit and breathing apparatus weighing up to 25 kilograms. More than 180 brigades and stations were represented in the challenge.

BioLink monitors, in real-time, an individual's physiological signals, including heart rate, breath rate, movement and core temperature. These signals are communicated via a wireless network to an agency's control center where software built specifically for an incident response scenario will provide an alert if that person's physiological readings fall outside a predefined safe range.

During the stair challenge 17 May, three firefighters wore a monitoring device as they climbed the 1,103 Sky Tower steps wearing a full firefighting kit. Participants were monitored as they competed in the challenge in the same way that a fire agency's control center would monitor firefighters in the field and alert them if they were ever in physiological danger such as heat stress.

Signal Strength Tests

First BioLink was tested to ensure it would work inside the 328-meter tall Sky Tower — the tallest freestanding structure in the southern hemisphere. Access to a local voice and data-capable Project 25 (P25) digital network to operate the device was secured. We carried a laptop, two TP9400 portables and a BioHarness provided by technology partner Zephyr. The runner wore the BioHarness, and the portable radio was clipped to his belt. The physiological readings were transmitted across the radio network, allowing users to monitor heart rate, core body temperature and activity through custom software.

Standing in the rain at the base of the tower, we ran two test scenarios to simulate what would happen on event day. For the first scenario, we planned to test voice quality only. The runner called to the base of the tower on his radio every few floors as he climbed the 51 flights of stairs within the tower.

The voice element is important because if a firefighter is under too much physiological stress, the monitor needs to tell the firefighter that it's time to slow down the pace. The voice came through loud and clear, and the received signals were strong up and down the tower. Voice testing also included sampling received signal strength at the base, an indicator of quality and how well the system would work.

The second scenario tested how well the device transmitted data from within the high-strength reinforced concrete walls of the tower. The software was set to transmit data every 5 seconds. The runner


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A firefighter collapses over the finish line after successfully completing the challenge.

wore the harness, carried his radio and raced up the stairs at full speed to closely simulate what would happen on the event day. The software on the laptop at the base of the tower showed his heart rate, core body temperature and activity as he climbed the tower.

Once the exhausted runner reached the top of the tower, the receive signal strength showed strong good signal strength the entire way up the tower. There was a slight dip just below the observation deck where there are additional structural supports, but even through the thickened concrete and steel, we received data without loss of information. The testing was complete, and we were comfortable that we could expect no loss of data at any time as the firefighters climbed the tower.

Live Demonstration

It was a 5 a.m. wake-up call on event day. At the base of the Sky Tower, we set up the laptop and 40-inch screen outside so that onlookers could see the live demonstration as well. More than 700 firefighters from New Zealand, Australia and the United States began arriving for the competition of a lifetime.

We met the firefighters participating in the demonstration early that morning and quickly kitted them with the radios. They each had used the device for about a month prior to the event to monitor their progress during training. We quickly saw what a difference wearing a firefighting suit made. The core body temperature of one competitor rose to 37.9 degrees Celsius under the fire-resistant suit even before he started moving.

We programed individual limits for each firefighter for heart rate, breathing rate and core temperature. Our first firefighter was in the second squad of 10 firefighters to make the climb. He soon headed off inside the tower base where we no longer had visual contact with him. We could tell whether he was moving or standing still by looking at his readings. Once he was given the green light to start the race, we knew he was moving based on his visual memory unit (VMU) reading, and it didn't take long for his heart rate to jump above 160 beats per minute (bpm). During the next 10 minutes and 7 seconds, his heart rate peaked at 197 bpm from a resting rate of 65 bpm, his breath rate hit the red zone and his activity oscillated in time with him travelling up and between flights of stairs. The device was working just as we hoped it would.

As our second and third firefighters competed, their families and workmates were able to watch their performances in real time, seeing how far they tested the limits and for how long. We were able to visualize, based on their readings, exactly what they were doing without being able to see them. For instance, when the VMU jumped above 1.0,

Too often, it's not until long after the fact — when it's too late to intervene — that an individual becomes aware of just how much stress his or her body is under.

The core body temperature of one competitor rose to 37.9 degrees Celsius under the fire-resistant suit even before he started moving.

we could see that the sprint for the finish line was on.

It was reassuring for the families to stay connected to their loved ones as they competed in the challenge and to see their heart rates and body temperatures come down after they crossed the finish line. One competitor said he felt reassured knowing that we were monitoring his levels of physiological stress.

What We Learned

From the demonstration we saw that each firefighter tested the limits of physical endurance. In one case we felt the need to intervene and let the competitor know via voice command that we were concerned about his readings. He responded and slowed his pace. Too often, it's not until long after the fact — when it's too late to intervene — that an individual becomes aware of just how much stress his or her body is under.

Comparing data collected from the training session of one firefighter with the recordings on event day, we saw that despite establishing a training regime that closely simulated the event, his level of physiological stress increased during the competition in terms of core temperature and breathing rate.

When emergency services workers see the solution, they are able to come up with new use cases. Whether it's better understanding what an individual's limits of endurance are, establishing how long a tank of oxygen will last in certain conditions or responding to man-down incidents, they can see how these types of solutions can help improve safety for first responders. ■

Tanmay Bhola is a design engineer and BioLink product owner at Tait Communications. His field of expertise is developing multibearer critical communications solutions for emergency services. He has been with Tait for four and a half years. Bhola works closely with the University of Canterbury's Wireless Research Centre, supervising research and development (R&D) projects and usability research. He holds a provisional patent in multiple bearer radio systems. Email comments to editor@RRMediaGroup.com.

Product Expo: Mobile and Portable Radios

Airbus Defence and Space

The TETRA paging device P8GR is designed to meet the needs of fire brigades, relief organizations and critical infrastructure operators. The pager is easy to deploy and combines good availability, even in areas where coverage is poor, with battery autonomy and robustness, all in a compact format, company officials said. In contrast to standard analog paging devices, the TETRA pager enables secure two-way communications between the control center and the operational units. The device offers the essential TETRA features for alerting, such as group calls, enabling units to plan and carry out missions in real time.

www.airbusdefenceandspace.com

Barrett Communications

The Barrett 2090 is a ruggedized portable high frequency (HF) 1.6 – 30 MHz transceiver, with a maximum of 30 watt PEP. The unit is lightweight, weighing 5.2 kilograms, with a 10 ampere-hour (Ah) battery. The product features built-in Automatic Antenna Tuner for use with a wide range of portable antennas. The unit can be equipped with automatic features such as automatic link establishment (ALE), Selcall, Telcall and Secure Call, automating the process of calling or linking within a network or into a public-switched telephone network (PSTN). The portable can also be equipped with an HF data modem for advanced data, email, chat and Internet gateway connectivity.

www.barrettcommunications.com.au

Codan Radio Communications

The Envoy smart radio is intuitive, reliable and advanced. With clear and dependable high frequency (HF) digital voice and data communications, users can communicate anywhere, anytime, without the need for existing infrastructure. A true software-defined radio (SDR), the device delivers new capabilities through software upgrades. With Ethernet and USB connectivity, a large high-resolution color display and multilanguage user interface — combined with performance, reliability and support — the smart radio is a new standard for digital HF communications, company officials said.

www.codanradio.com

EF Johnson Technologies

The Viking portable (single band and multiband) and mobile radios feature versatility, interoperability and seamless deployment. Vikings can simultaneously operate on SmartNet/SmartZone, Project 25 (P25) Phase 1 trunked/conventional and P25 Phase 2 systems. The radios, equipped with industry-leading noise cancellation, can be configured with Armada fleet management software.

www.efjohnson.com

Exelis

The Communications - On The Move (C-OTM) transportable provides a quickly established automated command center. The unit gives deployed users quick access to their existing radio and telephony communications equipment. The easy-to-use touchscreen allows a range of audio sources to be automatically routed, patched and conferenced. The unit is portable and compact enough to be taken as carry-on luggage. Functionality includes monitor and transmit radio nets, intercoms, patching/crossbanding, phone to radio, disparate frequencies and cellular communications. The unit removes the barriers of stove-piped communications and is suitable for organizations looking to reduce incident response times.

www.c4i.com

Harris Public Safety and Professional Communications (PSPC)

The XG-75P portable radio is easily customizable and is available in a variety of colors and options including an easy-to-read display and knobs that are easily adjusted by users wearing heavy gloves. The single-band radio operates in the VHF, UHF-L, UHF-H, 450 – 512 MHz and 700/800 MHz frequency bands and is future ready with Project 25 (P25) Phase 2 capability in a future software release. The XG-25M mobile radio features Bluetooth functionality and is ready for operation in narrowband frequencies. The radio offers exceptional audio performance in a rugged and compact design as well as a remote mount, which allows users to detach the control head so that the mobile radio unit can be installed anywhere in a vehicle.

www.pspc.harris.com

Hytera Communications

The PD362 is an open standard Digital Mobile Radio (DMR) capable of providing quality voice communications in a small pocket-sized design approved to IP54 and Mil-Std-810 testing. The 2 ampere-hour (Ah) battery yields about 12 hours in digital mode and can be easily charged via Micro USB port. The compact antenna design and PC and metal frame makes the radio sleek and lightweight. It is an ideal radio solution for small organizations looking for a cost-effective way to migrate to clear digital communications.

www.hytera.us

Icom

The IC-F3260D/F4260D series is a 5-watt, 512-channel VHF/UHF handheld

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radio that combines analog FM and IDAS digital modes with auto-sensing function. The IDAS digital mode uses 6.25-kilohertz narrowband FDMA technology and offers a flexible choice of the NXDN digital protocol or the European Telecommunications Standards Institute (ETSI) digital Private Mobile Radio (dPMR) protocol, with common hardware. The radios feature rugged IP67 dust and waterproof protection, integrated GPS receiver, man-down and lone-worker safety, voice scrambler, full dot-matrix display, 800 milliwatts loud audio and voice activation (VOX) capability. The series is available in 10 keypad and simple keypad versions.

www.icom.co.jp/world

Kenwood

The NX-5000 series supports multiple common air interfaces (CAIs) — Project 25 (P25) Phase 1 and 2 and NXDN — plus FM analog. A desired CAI can be selected at will, giving users the freedom to migrate at their own pace, whether going fully digital, undecided about which digital system to pick, or maintaining both digital and analog in a system. The series is ready to serve in all public safety, public sector and commercial roles with flawless performance and advanced feature sets, company officials said.

www.kenwood.com

Motorola Solutions

The APX 3000 Project 25 (P25) portable radio is designed for covert, discreet communications. The radio design removes traditional elements — the keypad, display, speaker and microphone — to create a slim, compact unit. The radio ships with an IMPRES 3-Wire Surveillance Kit, and a variety of optional wireless Bluetooth accessories are available for flexibility in how the radio is worn or hidden.

www.motorolasolutions.com

Sepura

The Sepura series of portable radios is the cornerstone of the company's Digital Mobile Radio (DMR) line. With an IP67 environmental protection rating, the series offers ruggedness and robustness, coupled with advanced functionality and high-quality audio. The series features products in UHF and VHF frequencies and offers two distinct variants — full keypad and without keypad. The full keypad model features a color screen and is designed for users who require full access to a wide range of functionality. The model with no keypad and display is designed for users requiring access to basic functionality. Easy to use with gloved hands, the radio also features colored inserts to enable differentiation between teams or groups of users.

www.sepura.com

Simoco

Future-proof and resilient, Simoco Xd is a complete end-to-end Digital Mobile Radio (DMR) system including mobiles and portables with integrated IP dispatching. The hardware is software upgradable from Tier 2 to Tier 3 and scalable from a single base station to large networks. The digital portable, available in two variants, is an intuitive, robust handheld radio designed with a range of digital features to support users. The portable includes internal GPS, man-down and lone-worker options. The mobile brings the same intuitive interface to vehicles and features flexible installations.

www.simocogroup.com

Tait Communications

The TP9400 is a small Project 25 (P25) Phase 2 capable portable that offers multiple operating modes including analog, 12.5-kilohertz P25 Phase 1 FDMA conventional/trunked, upgradable to 6.25-kilohertz (equivalent) P25 Phase 2 TDMA trunked, and linear simulcast modulation (LSM) constant envelope quadrature phase shift keying (CQPSK) decode capability. The portable provides operation in VHF and 700/800 MHz frequency bands, minimized risk with multimode operation for staged migration, as well as greater vendor choice, increased competition and interoperability with adherence to the P25 standards and software upgradability to P25 Phase 2. The portable offers efficient operations with encryption, voice and data, simulcast support and pre-set status messages, security-focused fleet management with over-the-air rekeying (OTAR) and Tait Key Fill Device (KFD) support. The portable is engineered for demanding environments with IP67 rating and new water-shedding grill.

www.taitradio.com

TecNet International

The TPD-1000 series brings durability and affordability to Digital Mobile Radio (DMR) portables in the VHF (136 – 174 MHz) or UHF (400 – 470 MHz) frequencies. The radio offers 1,024 channels, standard 2 ampere-hour (Ah) battery and an easy-to-read LCD display for day or night. Additional features include choice of analog or digital per channel, text messaging compatibility with other brands and IP67 compliance. Other features included oversized push-to-talk (PTT), volume and channel selector knobs, and analog signaling that includes two-tone, MDC-1200 and dual-tone multifrequency (DTMF).

www.tecnetusa.com

Teltronic

The HTT-500 handheld features 3 watts of RF output for improved coverage, 1

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WWW.DAVIDCLARK.COM

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watt of audio and more than 18 hours of battery power. The radio features Bluetooth connectivity, a tamperproof E2EE module, a WAP browser, GPS and man-down capability. The radio is tough and durable, yet small and lightweight, with an intuitive graphical color interface, company officials said.
www.teltronic.es

Unimo Technology

The recordable radio PZ-100/400NWR is available in the 136 – 174 MHz and 400 – 470 MHz bands. The lightweight, rugged portable radio complies with IP67

and automatically records and generates files during normal transmit and for more than 100 hours. File names consist of the related date and time. All the recorded files can be played back on the radio and by PC after the files are downloaded.
www.unimo.co.kr

Vertex Standard

The eVerge EVX-530 series Digital Mobile Radio (DMR) portable radios are

now available in North America with intrinsically safe (IS) radio options, SGS certified to the requirements of American National Standards Institute (ANSI)/UL913 fifth edition for use in Class I, II, III, Division 1; Groups C, D, E, F, G; Temp T3C hazardous locations. The IS radio option must be ordered with the FNB-V134LIIS-UNI battery, part of Vertex Standard's exclusive Universal Charging system.
www.vertexstandard.com/lmr

Wireless Pacific

The XIB-TA multiuser interface for the X10DR secure wireless microphone allows up to nine users to access one mobile

radio. The enhanced functionality means that an entire crew in a fire truck can communicate over the radio system while at the same time talking among themselves, at a fraction of the cost of usual mobile solutions. The long-range wireless speaker microphone allows mission-critical mobile radio users the freedom to leave their vehicles while staying connected to team members and dispatch control rooms via the vehicle's high-powered mobile radio. The unit performs like a remote speaker microphone connected to the mobile providing full push-to-talk (PTT) transmit, receive and emergency call functionality to ensure ease of operation with minimal or no user training.
www.x10dr.com

DMR Radios

Hytera Mobilfunk expanded its Digital Mobile Radio (DMR) portfolio with new radios. The PD5 series, including the

PD565, is available in Europe and offers an LCD, up to six programmable keys and up to 512 channels. Additional features include one-touch functions, support of several expanded analog signal modes, basic encryption, scrambler function, voice calling options and pseudo trunking. The MD655 and MD655G also are available in Europe and include GPS functionality. Featuring a slim and compact design, the radio is controlled via a handheld microphone, expanding the installation options inside vehicles. The radio includes optional analog or digital operation, data services such as text messaging, voice call options including group and broadcast, secure encryption and upgradeable software.

www.hytera-mobilfunk.com

Analog Handhelds

The IC-F1000 series portables from **Icom** feature built-in motion sensors, channel announcement function, loud audio and a rugged waterproof and dustproof chassis. The radio's slim casing can withstand sub-

mersion in 1 meter of water for 30 seconds and prevents ingress of powder, dust, sand, mud and other debris. The waterproof battery pack provides 14 hours of typical operating time. Available in VHF and UHF versions, the radios have three interface options including no display, a display with four keys or a display with a full dual-tone multifrequency (DTMF) keypad. The radio detects states of motion or lack of motion and can send an emergency signal accordingly. A programmable man down and lone worker emergency function sends an alert when the radio is left in a horizontal position or not operated for a period of time. Channel announcement allows users to make radio adjustments without having to look at the device. Security is ensured with a built-in inversion voice scrambler with up to 16 selectable codes.

www.icomuk.co.uk

DMR Base Station

Simoco launched the SDB680 Digital Mobile Radio (DMR) base station that supports analog and DMR Tier 2 and Tier 3 modes with session initiation protocol (SIP)

connectivity, as well as an open standards application interface. The base station operates on an IP backbone and delivers wide-area communications to multiple user groups. IP connectivity allows organizations to have a flexible, low-cost system that does not require centralized switching components. Two-slot TDMA digital technology is provided in a 12.5-kilohertz

channel at 50 watts (W) transmit power with 100 percent transmit duty cycle.
www.simocogroup.com

LTE Tactical System

Airbus Defence and Space released a Long Term Evolution (LTE) tactical system that provides first responders and security forces with independent, secure broadband radio communications for transfer of data in emergencies and in areas with no radio coverage. The product can supplement Tetrapol voice communications and provides similar coverage to the Tetrapol Tactical Cell from Airbus, company officials said. The system is designed to be deployed in minutes by two people. The system includes two small boxes that weigh 50 kilograms. The radio relay function is performed by one of the two boxes, while the second box contains the radio management system, allowing users to integrate data application servers and link to long-range communications networks. An optional third box contains a clean energy source, such as solar panels.
www.airbusdefenceandspace.com

Rugged Handheld Computer

The Nautiz X8 from **Handheld Group** provides reliable data collection capabilities in challenging environments. An IP67 ingress protection rating ensures protection against dust and sand, and the product can withstand immersion in water. The product meets military test standards for overall durability and resistance to humidity, shock, vibration, drops, salt and extreme temperatures. The device features a 4470 dual-core 1.5 GHz processor and offers 1 Gigabyte (GB) of memory, 4 GB of flash memory and a 5.2 ampere-hour (Ah) Li-ion battery that lasts up to 12 hours on a single charge. Operating system options include Android 4.2.2 or Windows Embedded Handheld 6.5.3. An 11.9-centimeter ultrabright capacitive multitouch screen with chemically strengthened Asahi Dragontrail glass offers brightness and protection in a variety of field conditions. The unit has an ergonomic design and weighs 490 grams.

www.handheldgroup.com

Control Room System

CONET Group released the UC Radio Suite, a communications and information platform that provides integration between analog and digital internal communications and TETRA networks, and between TETRA and Long Term Evolution (LTE) systems. The system features a Web-based intuitive dispatcher interface with comprehensive search and real-time status of communications and end devices; direct connection of radio devices to VoIP networks, including provision of push-to-talk (PTT) functionality at desktop phones; general connectivity of analog and digital radio to the IP network via an LMR gateway; connection of control rooms to emergency call lines; integration of geographic information of major providers with endpoint localization and real-time status information; and integration of Internet-based private branch

exchange (PBX) telephone systems.
www.conet.de

Lightweight Antenna

The Mantis-LT from **Vislink** includes a Ku band feed and materials for the company's Mantis MSAT satellite data terminal. Available with either a 90- or 120-centimeter (CM) reflector for Ku-band transmit and receive operation, the unit allows users to package their own hardware into the

portable terminal design and is suitable for use as an ultra-lightweight, quick-deploy flyaway antenna. The product can be paired with a variety of Vislink uplink products for additional data and video applications. Featuring a collapsible design, the 90-cm antenna can be stowed in a backpack-style case, while the 120-cm option fits in two cases that can be joined together.
www.vislink.com

Timing Antenna

The TW3740/TW3742 multiconstellation Global Navigation Satellite System (GNSS) timing antennas from **Tallysman Wireless** are wideband antennas that provide reception for all upper L-band GPS, GLONASS, BeiDou and Galileo signals and associated augmentation signals. Both models provide enhanced multipath signal rejection using the company's Accutenna technology, which provides low axial ratio and

improved phase center accuracy. The high gain properties make the antennas ideal for timing applications in telecommunications, data communications and electricity distribution industries. A prefilter provides high out-of-band rejection of possible interference from collocated transmitters. An IP67-compliant enclosure and metal base ensure reliable performance in a variety of conditions.
www.tallysman.com

Omnidirectional Antenna

Procom announced an ultra-wideband omnidirectional, low-profile indoor distributed antenna system (DAS). The UWB-I 380-6000 antenna supports a variety of protocols including TETRA, Long Term Evolution (LTE), Wi-Fi and WiMax. The multiband antenna features a discreet ceiling mount design and operates between 380 MHz and 6 GHz with maximum power of 50 watts (W).
www.procomuk.co.uk

GSM-R System

Huawei's GSM-Railway (GSM-R) wireless network 5.0 Abis over IP passed an independent compliance and reliability test. The test was witnessed by TUV Rheinland. The product simplifies operational demands by consolidating two transmission networks into one. Operators with existing IP infrastructure can build a parallel GSM-R network without additional cost and merge existing GSM-R networks into a single IP-based transmission system. Consolidating the transmission networks reduces or eliminates the operation of a separate time division multiplexing (TDM) network, uses fewer spare parts and reduces employee training costs. Traditionally, connectivity between trackside GSM-R base transceiver stations and the centralized GSM-R network elements such as base station controllers requires the use of Abis protocols that need to be established through transmission TDM-based networks. However, with rising demand for data communications, many TDM-based systems have been supplemented with dedicated IP-based transmission networks to maximize performance, increase flexibility and enable better access with lower operating expenses, company officials said.
www.huawei.com

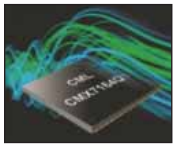
Surveillance Radar

Selex Elsag launched the Gabbiano TS-80 PLUS surveillance radar system. Weighing 44 kilograms, the product provides high-resolution Synthetic Aperture Radar (SAR) and Inverse Synthetic Aperture Radar (ISAR) for protection, patrol and surveillance missions. The product works over ground and sea, and along coastlines, and it can be installed in a range of platforms using its modular design. Solid state technology maintains performance levels from previous models but saves weight and increases

mean time between failure (MTBF) to 2,500 hours. A 360-degree antenna group with wide-elevation scan, a 1-meter-wide flat antenna plate and 80 watts (W) of power provide for long-range surveillance.
www.selex-es.com

Wireless Data Modem

CML Microcircuits added 16 frequency shift keying (FSK) modulation to the CMX7164 multimode wireless data modem portfolio. The upgrade enhances the flexibility of the modem integrated circuit (IC), allowing telemetry systems to evolve into higher data throughput without the need to move to a linear modulation scenario, company officials said. The product covers constant envelope and linear modulation schemes including Gaussian minimum shift keying (GMSK)/Gaussian frequency shift keying (GFSK); 2-, 4-, 8- and 16-level FSK; 4-, 16- and 64-quadrature amplitude modulation (QAM); and customer-specific modulation schemes.
www.cmlmicro.com



Network Functions Virtualization

RAD launched distributed network functions virtualization (D-NFV) capabilities into its Megaplex-4 Next-Generation Multiservice Access Node widely used by power utilities for substation connectivity, protection and automation communications. The product enables power utilities to integrate capabilities such as routing, firewall and encryption with operational transport functions on a single platform, company officials said. The product runs software-based functionality on an x86 server module, reducing the number of physical network devices.
www.rad.com

Unusual Activity Detection

NEC launched the Multi AGencies, 1 Concert (MAG1C) system that analyzes information from a variety of sources, as well as data from temperature, humidity and scent sensors to detect signs of unusual activity. The system is designed to strengthen sharing of information among government ministries, offices and related organizations as part of NEC's Safer Cities strategy. The systems are compatible with data analysis engines, allowing them to provide advanced analysis of big data, such as automatic data analysis, relevant analysis between incidents and risk prediction functions.
www.nec.com

Bluetooth Interface

BlueTalk from **Imtradex** is a Bluetooth interface that connects devices with a headset. The product supports version 2.1 and includes secure, simple pairing. Compatible with a variety of headsets and Bluetooth-enabled mobile phones and devices, the product includes a built-in talk button. A

built-in wireless send button can include one button for push-to-talk (PTT) functionality only, two buttons for PTT and full duplex or four buttons with other options. A Li-poly battery provides long battery life, and a water-resistant membrane keyboard protects against dirt and water.

www.imtradex.com

4G LTE Router Platform

CalAmp introduced the Fusion-LTE 4G router platform for European public safety, transportation and rail applications. The

platform reduces latency for data-intensive applications including streaming video, vehicle area network, positive control, data record access and intelligent dispatch. The Long Term Evolution (LTE) router can operate on two independent 4G networks, allowing multicarrier access and user-defined failover criteria to improve reliability. Outside of 4G coverage, the product automatically reverts to 3G or 2G operation. Embedded Wi-Fi and Ethernet connectivity allow the router to function as a communications hub in the field, connecting multiple devices and equipment locally to enable file sharing. Onboard GPS facilitates communications and navigation services.

www.calamp.com

Interference Analyzer

Narda Safety Test Solutions upgraded the Ida 2 interference and direction analyzer to generate persistence spectrums to detect interference hidden beneath strong signals and trace on the spot. The display shows the changing useful signals and the underlying interference signals at the same time. The product captures persistence spectrums with a usable bandwidth of up to 22 megahertz. Various triggers can be set to capture brief events, and unknown interferers can be identified because of resolution bandwidth (RBW) down to 0.1 kilohertz and time resolution as fine as 1 microsecond as well as level characteristics vs. time at up to 32 nanosecond resolution. To produce a persistence spectrum, the product writes a certain number of spectrums computed from a stored inphase/quadrature (I/Q) data set one on top of the other. The colors indicate how often a particular level value occurred. Persistence spectrums resemble the afterglow effect spectrums produced by older spectrum analyzers but are more precise and informative, company officials said.

www.narda-sts.com

3G ALE Upgrade

Codan Radio Communications upgraded its 3G automatic link establishment (ALE) long-range communications waveform to provide quicker voice and messaging and a more robust communications link. With the upgrade now available on the Codan 2110 series Manpacks, the ALE offers up to 250-character text messages direct from the

radio. Features include GPS position send/request for tracking purposes, advanced encryption standard (AES) 256 bit data traffic encryption and configurable operation for pre-defined or self-learning networks for ease of network maintenance. The Codan Adaptive Signaling Technology (CAST) waveform ensures maximum throughput by adapting the modulation scheme to the prevailing channel conditions.

www.codanradio.com

Product Catalog

Cobham released a catalog of its commercial and military satellite communications products and services. The catalog contains details about high-performance satellite feed chain, reflector and flat-plate antenna products. A range of horn-based and splash plate feed systems is available for prime focus and single- and dual-offset antennas covering all key satellite communications bands, including C, SHF, Ku, DBS and Ka-band frequencies. Linear and circular polarization feed changes are included in two-, three- and four-port configurations. The catalog includes part numbers and configurations for all standard feed chain and reflector antenna systems. Two high-efficiency X-band flat plate array products are also available, one for portable satcom terminals and another for satcom-on-the-move (SOTM) applications.

www.cobham.com

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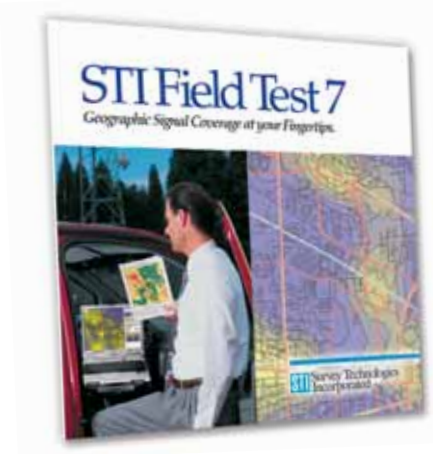

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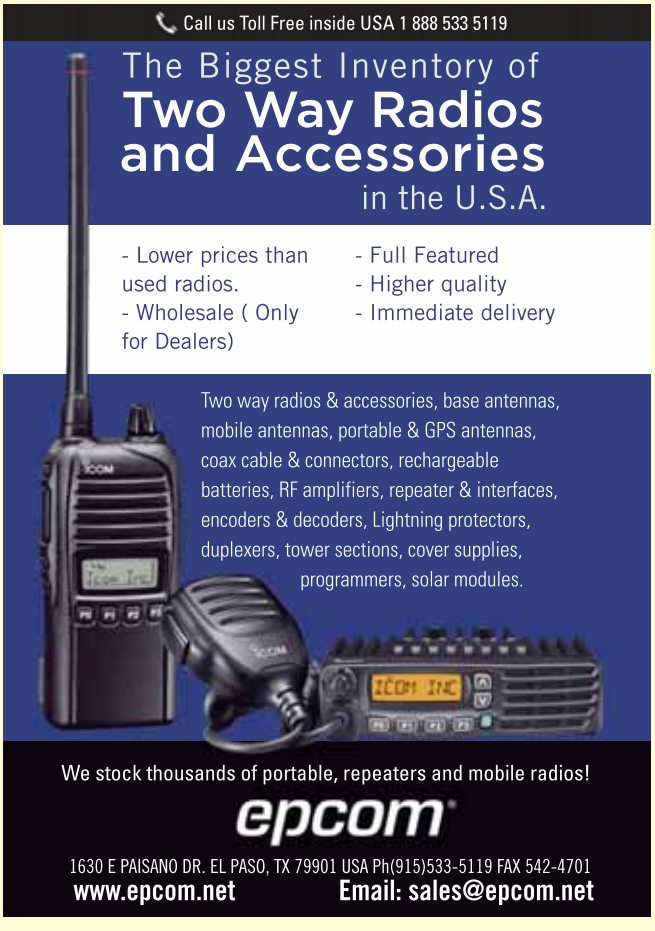

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4 – 6 November: CBTC World Congress, London. Global Transport Forum: www.globaltransportforum.com/cbtc-world-congress

11 – 12 November: British APCO Autumn Event, Newcastle, U.K. British Association of Public-Safety Communications Officials (BAPCO). www.bapco.org.uk

11 – 13 November: LTE Africa, Cape Town, South Africa. Informa Telecoms & Media: http://africa.lteconference.com

12 – 13 November: Future LTE Public Safety Systems, Munich. Arico Technologies: www.arico-tech.eu

20 November: In Case of Emergency, an ETSI Summit on Critical Communications, Sophia Antipolis, France. European Telecommunications Standards Institute (ETSI): www.etsi.org

25 – 27 November: PMRExpo, Cologne, Germany. PMRExpo: www.pmrexpo.de

26 – 28 November: SmartRail Asia, Bangkok. Global Transport Forum: www.globaltransportforum.com/smart-rail-asia

2 – 3 December: Transport Security Expo, London. Nineteen Events: www.transec.com

7 – 10 December: ITU Telecom World, Doha, Qatar. International Telecommunication Union (ITU): www.itu.int

9 – 11 December: Critical Control Rooms, Madrid. TETRA + Critical Communications Association (TCCA) and IIR: www.tandcca.com

15 – 17 December: International Microwave & RF Conference (IMaRC), Bangalore, India. Institute of Electrical and Electronics Engineers (IEEE): www.imarc-ieee.org

2015

5 – 6 February: Mobile Deployable Communications, Prague. SMi Group: www.smi-online.co.uk

10 – 12 March: PTC World Congress, Orlando, Florida, United States. Global Transport Forum: www.globaltransportforum.com/ptc-world-congress

16 – 20 March: International Wireless Communications Expo (IWCE), Las Vegas. Penton Media: www.iwceexpo.com

31 March – 1 April: British APCO (BAPCO): Manchester, U.K. British Association of Public-Safety Communications Officials (BAPCO): www.bapco.co.uk

1 – 2 April: Microwave & RF, Paris. Bureau International de Relations Publiques (BIRP): www.microwave-rf.com

7 – 9 April: LTE Latin America, Rio de Janeiro. Informa Telecoms & Media: http://latam.lteconference.com

22 – 24 April: EENA Conference, Bucharest, Romania. European Emergency Number Association (EENA): www.eena.org

29 – 30 April: APCO Australasia, Melbourne, Australia. Association of Public-Safety Communications Officials (APCO) Australasia: www.apcoaust.com.au

19 – 20 May: SmartRail Europe, Amsterdam. Global Transport Forum: www.globaltransportforum.com

19 – 21 May: Critical Communications World with TETRA World Congress, Barcelona, Spain. TETRA + Critical Communications Association (TCCA) and IIR: www.criticalcommunicationsworld.com

23 – 25 June: LTE World Summit, Amsterdam. Informa Telecoms & Media: http://ws.lteconference.com

16 – 19 August: APCO Conference & Expo, Washington. Association of Public-Safety Communications Officials (APCO) International: www.apco2015.org

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❑ C Commercial Trunked Radio and Other Wireless Service Providers
❑ D Government/Public Safety/Military
❑ E Business/Industrial/Transportation User
❑ F Communications Manufacturer/OEM/Software Developer
❑ G Engineering and Consulting Firm
❑ Z Other—please specify _____

3. What is your function?
❑ A Corporate/Senior Management
❑ B Operations/Administration Management
❑ C Technical/Engineering Management
❑ D Sales/Marketing
❑ Z Others Allied to the Field—please specify _____

4. Do you recommend, specify or purchase mobile communications equipment or services?
❑ A Yes ❑ B No

5. Is there any servicing of mobile communications equipment at your location?
❑ A Yes ❑ B No

6. In what areas of the world do you do business? (mark all that apply)
❑ A Western Europe
❑ B Eastern Europe
❑ C Middle East
❑ D Asia
❑ E Australia/New Zealand
❑ F Africa
❑ G Mexico/Central and South America
❑ H United States/Canada

7. What wireless technologies does your organization plan to use/buy over the next 2 years? (check all that apply)
❑ A Conventional Two-Way
❑ B Cellular/Personal Communications
❑ C Paging/Messaging
❑ D Mobile Data
❑ E SCADA/Telemetry
❑ F Microwave radio
❑ G Trunking
❑ H Location Technologies
❑ I Tone Signaling (ANI, Encryption, etc.)
❑ J Interconnect
❑ K Satellite
❑ L CAD
❑ M Wireless Broadband
❑ Z Other _____

Q414

By Hamish Duff

Australia's Diverse PMR Market

The professional mobile radio (PMR) market in Australia is growing steadily and plays a critical role in the delivery of a range of public and private sector activities, advancing the Australian economy. A study commissioned by the Australian Radio Communications Industry Association (ARCIA) estimated the number of PMR licenses allocated by the Australian Communications and Media Authority (ACMA) at 65,000, with around 1.5 million active users.

Two-way radio communications are widely adopted in the mining, utilities, transport, public safety, farming and government sectors — and despite technological change driven by the rapid rise of mobile telephony and smartphones — PMR remains a necessary and deeply embedded technology.

The radio communications industry is deeply enmeshed in the development and operations of resources projects, both operational sites and those in development. Resource projects in excess of $300 billion in investment are in development, with each having radio communications requirements that are more than $100 million overall. Although the new technologies being developed for many of these new projects are based on Long Term Evolution (LTE) and mobile broadband, the underlying requirement is still for dedicated voice radio networks as the essential communications link.

According to the survey results, professionals used radio equipment an average of 47 times a day during operational events and 22 times a day in "nonoperational or event" periods. Emergency service users were close to double this average, while small business users were somewhat less. More than 55 percent of the respondents regarded PMR as "absolutely critical and essential" for the delivery of their organizations' services.

Australia is an open market with all technologies and brands of equipment. The survey identified that many PMR users are still highly dependent on traditional analog services. Analog services will continue to play an important role for the foreseeable future as the costs of implementing technological change would be substantial for many organizations.

However, with the more recent advent of low-cost digital devices, the transition to digital systems and services is in full swing. Of 400 corporate radio users surveyed, 53 percent of respondents agreed that digital technology would be critical in the future.

Among digital users, TETRA, Project 25 (P25) and Digital Mobile Radio (DMR) are popular, each with its own benefits and industry preferences. The emergency services sector dominates the P25 platform, with key decision makers historically favoring its encryption platform. DMR is growing in popularity and is the technology of choice for the commercial sector — rapidly gaining traction within the energy, government and industrial sectors as a low-cost, reliable solution.

In the DMR space, Motorola Solutions' MOTOTRBO technology is a leading choice with a wide range of products, applications and partners. Motorola Solutions in Australia estimates that about 40 percent of radio users have migrated to digital during the past five years, driving a rationalization of its analog portfolio. Other DMR manufacturers such as Hytera Communications, Tait Communications and Simoco are rapidly catching up with new networks, products and services in development.

Australia is now host to one of the largest commercial digital mobile radio networks globally — The Orion Network. This partnership was founded by a group of communications experts and is underpinned by a MOTOTRBO platform.

"Digital radio does enhance workplace safety, and with the growing emphasis on occupational health and safety compliance, this technology is proving to be a crucial tool in helping business to manage complex workplace compliance issues with automation and easy-to-operate user features," said Melanie Arnott, founding director of The Orion Network. "Integrated GPS is a key function that many users are demanding, with organizations finding new ways of using this technology to report on key business activities to deliver outcomes never before possible."

The survey generated two sets of estimates of economy. The former is demonstrably conservative. The equipment valuation method yields an economic benefit estimate of $1.99 billion per annum while the time valuation method yields $3.72 billion. Compared with this is the opportunity cost of the spectrum used for PMR.

The ability to demonstrate the economic benefit that arises from allocating spectrum to PMR services in Australia is of the utmost importance — without this knowledge, we run the risk of overlooking a critical communications market that underpins the backbone of Australia's ability to deliver critical social services and smooth running of basic infrastructure — let alone our ability to compete on a global level. ■

Hamish Duff is president of the Australian Radio Communications Industry Association (ARCIA) and a founding director of The Orion Network. With a career in communications spanning more than 30 years, Hamish is skilled in engineering communication solutions to support the needs of users. Email feedback to editor@RRMediaGroup.com.

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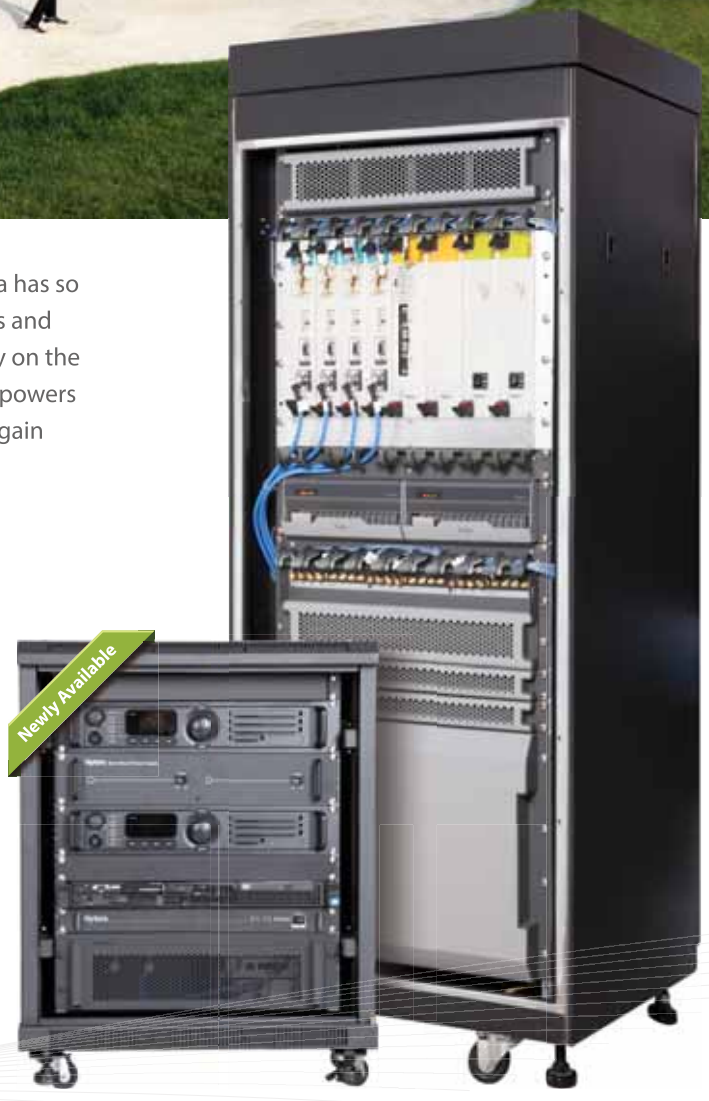

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