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9 Takeaways from CCW 2015

Curiosity about the technical evolution of mission-critical communications brought a record number of delegates to Barcelona, Spain, for Critical Communications World (CCW) 2015 in May. The augmentation of TETRA systems with Long Term Evolution (LTE) was paramount in the session topics as well as vendor offerings. Users of every size are trying to piece together the broadband puzzle to make sound procurement decisions regarding their mission-critical networks.

The information presented at the conference could fill volumes. I have condensed a few of the key takeaways from the sessions below.

1. Voice is still the most important piece of a mission-critical communications system. Users of mission-critical communications are conservative and cautious and will not jump on the voice over LTE (VoLTE) bandwagon until it is proven to be reliable. With the safety of entire communities at risk, this could take some time. There is simply too much at stake.

2. Broadband use for mission-critical communications is here to stay and will continue to grow. Currently, the primary use of broadband is for non-mission-critical data. The question that consistently surfaces is: When does non-mission-critical data become mission critical?

3. The economic feasibility of private LTE systems is limited. Most public-safety agencies will need to rely on commercial broadband networks for mission-critical data. Even with standards on the horizon, many users are skeptical of using commercial networks in emergencies. How long will it take *after* standards have been established and implemented for agencies to transition to commercial LTE for mission-critical data? There is also the looming question of who is liable when there is a system failure.

4. Incorporating mission-critical data into systems is going to take a lot of time and money. If it is done right, it can save money, reduce response time and save lives. If it is done wrong, it will open Pandora's box. Big decisions have to be made: What is mission-critical data? How long does it need to be stored? How can it be secured so it cannot be altered? The list goes on.

5. There is a lot of talk about BIG, smart data. The type of big data that can help avert an incident, reduce response time or solve a problem depends on the culture of the region in which it is implemented. It must be customizable and helpful. If it is not carefully planned and implemented, it could be daunting.

6. The distinction between mission-critical communications and critical communications continues to blur as more agencies coordinate with utilities, water and other critical industries that are vital to the survival of the communities in which they serve.

7. TETRA Enhanced Data Service (TEDS) is struggling for adoption as several vendors are taking the leap of combining TETRA with LTE and bypassing TEDS. This could prove problematic because of LTE

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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reliability issues. TEDS users would certainly like to see more competition for TEDS products.

8. The use of social media for mission-critical communications will continue to increase. Social media, in its many forms, is a viable, easy-to-access source of information for situational awareness that can't be ignored.

From left: TCCA's Phil Godfrey, Minna Nyman with RAKEL, Hong Kong Police Force's Jolly Wong, and Tor Helge Lyngstol with the Norway Directorate for Emergency Communication (DNK) discuss how networks and services may evolve during the next 15 years at Critical Communications World (CCW) 2015 in Barcelona, Spain.

9. The goal of an app is to be so intuitive users don't know they're using an app. If an officer has to think too much about how to use an app, response time will increase instead of decrease. The age-old rule applies: Keep it simple.

Broadband is creating a paradigm shift in the mission-critical communications industry. By all accounts, it is several years behind the commercial wireless market, but with good reason. When lives are on the line, the reliability of a system is paramount. Until standards are in place and proven, mission-critical broadband will be slow to adopt. Until then, non-mission-critical data will continue to be incorporated into systems because heaven knows, we are all connected at the hip to our smartphones. ■

Paulla Nelson-Shira, Publisher

EXPERIENCE IN DIGITAL COMMUNICATION SYSTEMS

With large infrastructures to manage and maintain, radio communication networks are essential to improve team work, increase the safety of the employees and improve productivity. Voice and Data communication, monitoring of data, interfacing with other types of communication networks and location tracking of people or vehicles can be achieved by one common radio network. Over the past years CONNECTEL has implemented a number of digital radio communication systems worldwide to the full satisfaction of customers from transportation, logistics and the Oil & Gas market as well as Government organizations.

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Sepura Buys Teltronic for US$144.5M

Sepura completed an agreement to acquire Spanish wireless voice and data company Teltronic for 127.5 million euros (US$144.5 million).

Sepura said the acquisition strengthens its position in Latin America and the United States and increases its scale to deliver larger projects and provide improved visibility of earnings. Sepura also noted Teltronic brings additional diversification to its business, including significant transportation revenue streams and a broader product offering.

Teltronic provides infrastructure, devices and software primarily for the public safety, transportation and utility sectors. The company operates in more than 50 countries, primarily in Latin America, North America and the Europe, Middle East and Africa (EMEA) region. The company generated revenue of 62.9 million euros (US$71.3 million) and adjusted operating profit of 8.4 million euros (US$9.5 million) in 2014.

Juan Ferro, Teltronic's CEO, will lead Sepura's systems and network business.

Sepura acquired the entire issued share capital of Teltronic through a partial draw down of a new debt facility of 120 million euros (US$136 million) plus the net proceeds of two new ordinary share offerings. The company used share offerings to fund the acquisition and pay costs and expenses associated with raising capital.

"This is a highly complementary and transformational acquisition, which will be immediately earnings enhancing," said Gordon Watling, CEO of Sepura. "It brings together two of the market's growing players, to create a market-leading digital professional mobile radio (PMR) company, with a broader offering and significantly enhanced capabilities.

"Teltronic's business will diversify our geographical reach, growing our footprint in Latin America and strengthening our existing presence in North America, specifically the U.S.; whilst expanding and diversifying our revenue streams accordingly. As the number and scale of digital radio networks around the world increases, we will have the breadth of portfolio and financial strength to compete for a significantly larger number of new contracts globally."

INTERNATIONAL

NEWCASTLE UPON TYNE, United Kingdom — The **TETRA + Critical Communications Association** (TCCA) announced that Mladen Vratonjic will be the new chair of the association. Vratonjic takes over from Phil Godfrey, who is retiring after a combined 14 years of service.

TCCA approved Vratonjic's appointment at its annual general meeting. He has 33 years' experience in telecommunications, including 10 in public safety. He was responsible for all telecommunications systems for the Serbian police and fire brigades, including the emergency call centers and Serbia's public-safety TETRA network.


Mladen Vratonjic

"On behalf of what has become a global organization with significant influence in the critical communications world, I would like to thank Phil for all he has achieved for the TCCA," TCCA CEO Phil Kidner said. "We welcome Mladen to a strong and stable association, which is looking forward to a future as successful as its past."

GENEVA — The **International Telecommunication Union** (ITU) celebrated its 150th anniversary 17 May. ITU is the oldest member of the United Nations (U.N.) system.

"ITU has earned its global reputation for resilience and relevance," said U.N. Secretary-General Ban Ki-moon. "Telecommunications — as well as information and communications technology (ICT) — drive innovation."

ITU was established 17 May, 1865, with the signing of the first International Telegraph Convention in Paris to facilitate the transmission of telegraphy across international borders. ITU was initially headquartered in Berne, Switzerland, but moved to Geneva in 1948 soon after it became a specialized agency of the U.N. in 1947.

In the future, ITU is focused on driving innovation together with its 193 member states and membership of more than 700 private sector entities and academic institutions.

EUROPE

BRUSSELS — Sixty European Parliament (MEPs) members co-signed an open letter sent to Commissioner for Digital Economy and Society Gunther Oettinger regarding the European emergency number 1-1-2. The letter focuses on the importance of the European emergency number and highlights key areas that require advancement, including the following:

- Awareness of the European emergency number 1-1-2 and the need to intensify efforts to inform EU citizens about the number that can save lives;
- Caller location, the problematic implementation of Article 26.5 of the Universal Service Directive (2009/136/EC) on behalf of many member states and the need to implement already available technology, such as advanced mobile location (AML), to provide better caller location in case of an emergency;
- The need to advance access for people with disabilities and the plans of the European Commission to do so;
- Cross-border cooperation and the

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Mission-Critical PTT Standards Process Moves Forward with OMA Specification

The Open Mobile Alliance (OMA) completed Push to Communicate for Public Safety (PCPS), a push-to-talk (PTT) specification for Long Term Evolution (LTE), and is working with the Third Generation Partnership Project (3GPP) to integrate it into public-safety LTE standards. The specification is the foundation for mission-critical PTT (MCPTT) for LTE.

PCPS version 1.0 includes PTT requirements, architecture, interfaces and protocol standards. 3GPP asked OMA to release copyrights to PCPS version 1.0, so the LTE standards body can incorporate PCPS into its LTE standards. 3GPP organizational partners ratified a legal agreement adopted by the OMA board April 7, said Frank Korinek, OMA board member and Motorola Solutions director of strategy and standards.

The agreement allows 3GPP to modify PCPS version 1.0 as needed within its standards process. 3GPP plans to add mission-critical PTT into LTE Release 13. PCPS evolved from OMA's commercially available PTT over Cellular (PoC) standard, developed at about the same time as LTE Release 8. PCPS version 1.0 includes updates to all underlying interfaces for compatibility with Release 12, including multicast capabilities.

"This copyright agreement will ensure that the specifications for LTE MCPTT get done," said Balazs Bertenyi, 3GPP Technical Specification Group Service and System Aspects (TSG-SA) chairman. "If the stakeholders hadn't shown the goodwill and enthusiasm that has been in evidence, we could have been facing delays in getting some of the specifications based on OMA PoC ready on time."

The next step to mission-critical PTT will be to improve PCPS' latency times for call setup and teardown under the 3GPP umbrella process. LTE Release 13, scheduled to be finalized next year, will start defining the underlying transport, service and application layers to be mission-critical capable. In addition, Release 13 will enhance proximity services or direct mode communications, as well as group communications. Work on LTE Release 14 will start this quarter and could include specifications addressing mission-critical video and data for push to communicate.

Both the U.S. First Responder Network Authority (FirstNet) and U.K. Home Office, which are pushing nationwide public-safety LTE initiatives in their respective countries, are members of OMA as governmental agencies. OMA enhanced its membership last year so all government agencies can join and participate for free.

Government agencies have no voting rights in OMA, but the group is looking at expanding what a government agency can do, including having voting rights, Korinek said.

need for better collaboration between member states and neighboring emergency services.

BRUSSELS — The European Parliament adopted legislation on eCall type approval requirements, giving the green light to deploy eCall services around the EU by 31 March, 2018.

eCall is an emergency call service that notifies emergency responders in case of a road accident. It is generated automatically via activation of in-vehicle sensors or manually by vehicle passengers.

The **European Emergency Number Association** (EENA) highlighted the following information. An eCall is identified in the network through the "eCall flag," which indicates the call is not a usual emergency call but an eCall, so it can be routed accordingly. However, few mobile network operators (MNOs) have implemented it so far. EENA urged MNOs to implement the "eCall flag" infrastructure well in advance to ensure high-quality performance and effective functioning.

The eCall service can be provided either by a public authority (1-1-2 eCall) or a private company or third-party service (TPS) as part of telematics services. The TPS eCall service is allowed under some conditions. EENA created an agreement template between TPS providers and emergency services authorities that will form the basis for negotiations between the two parties.

Some estimates suggest that 95 percent of cars will be equipped with both 1-1-2-based eCall and telematics services, such as TPS eCall. Legislation guarantees the eCall device under public mandate (1-1-2 eCall) should be inactive unless an eCall is activated. However, TPS eCall is part of a broader range of telematics services and, thus, its dormant status cannot always be taken for granted.

SØNDERBORG, DENMARK — Damm Cellular Systems announced an alliance with **Airbus Defence and Space**, a provider of TETRA radio terminals.

The alliance extends the market reach for both parties and strengthens Damm's position as a provider of infrastructure for critical radio and broadband communications, Damm officials said.

"With this alliance we make it easy for our system partners worldwide to provide a full solution with Damm infrastructure and Airbus terminals,"

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said Allan Detlefsen, chief operating officer (COO) at Damm.

LATIN AMERICA

SANTIAGO, Chile — The Chilean government reserved 700 MHz spectrum for public protection and disaster relief (PPDR). The spectrum will be formally allocated following studies that measure digital TV broadcasting in the adjacent band.

The Chilean government will reserve the 703 – 713 and 758 – 768 MHz bands for total or partial use by the Chilean government to meet PPDR needs, said Subsecretaria de Telecomunicaciones (SUBTEL), Chile's spectrum regulator. SUBTEL did not set a date for the digital TV studies.

Motorola Solutions said it will conduct a demonstration of solutions and devices designed specifically for public-safety Long Term Evolution (LTE) networks in Chile. The demonstration features different critical situations that first responders may face to illustrate the benefits that public-safety LTE technology offers to improve prevention, management and resolution of crime and emergency events.

ASIA

SEOUL, South Korea — A pilot public-safety Long Term Evolution (LTE) network launched in April in three South Korean cities and will continue through end-2015, said Dujeong Choi, project manager, public-safety communications testing and certification, South Korea's Telecommunications Technology Association (TTA).

The US$45 million pilot network launched in Gangneung, Pyeongchang and Jungsun with 205 base stations and 2,496 handsets. The pilot is testing and validating the country's planned nationwide public-safety LTE network.

South Korea's three commercial carriers are interested in bidding on the contract for the network, which will comprise three separate bidding phases — pilot, extension and completion. The Ministry of Public Safety and Security is the supervising entity for South Korea's public-safety LTE network.

The network will comprise about 12,000 base stations and around 200,000 mobile stations, including fixed mobile stations, smartphones, vehicle-mounted radios and two-way radios, in eight mandatory areas.

The network must also address interoperability with different vendors and legacy proprietary equipment such as VHF, UHF and TETRA. Implementation must also coincide with railway and maritime LTE networks, which will be planned separately.

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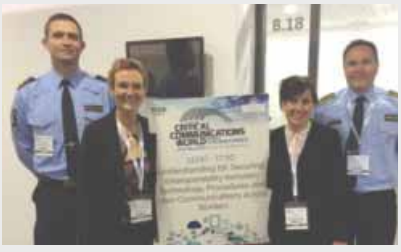
Norway, Sweden Move Forward on Border Interoperability Project

The Norwegian-Swedish Inter-System Interface (ISI) project is moving forward with additional testing. The joint development initiative between Norway and Sweden is establishing cross-border communications for public-safety agencies using the Norwegian Nødnett and Swedish Rakel national networks.

The project is a collaboration between network owners Directorate for Emergency Communication (DNK) and Swedish Civil Contingencies Agency (MSB), as well as network suppliers Motorola Solutions and Airbus Defence and Space. The project is associated with the EU-funded Inter System Interoperability for TETRA-Tetrapol Networks Project (ISITEP).

Motorola Solutions and Airbus conducted two tests this year. The testing included system configuration, as well as group call, individual call, short data service (SDS) and telephony call functionality. These are



From left: Swedish police officer Reine Lamkiewicz, Norwegian user implementation project manager Marianne Storrøsten, Swedish project manager Anita Galin and Norwegian police officer Henning Fjellet.

the most advanced tests involving TETRA networks from two manufacturers connected through ISI gateway technology.

Further interoperability testing is planned for this year followed by additional Nødnett, Rakel and end-to-end testing — including radio terminals and control rooms. DNK, MSB, Motorola Solutions and Airbus Defence and Space agreed to seek formal interoperability (IOP) certification to ensure the Norwegian-Swedish ISI solution becomes the benchmark for future international ISI projects.

With ISI, seamless communications during a rescue or other public-safety mission does not have to end at the countries' borders. That is becoming increasingly important as extreme weather events become more frequent and crime becomes more international.

A key lesson is that there are not just two public protection and disaster relief (PPDR) networks to be integrated. Radio terminals and control rooms must also be able to handle cross-border communications and foreign users.

The group is ensuring all technical and user preparations will be ready by the second quarter of 2016. A cross-border field exercise will be conducted during the second half of 2016.

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Going further in critical communications

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Evaluating Vendor Throughput Claims

The RFC 2544 standard can help communications managers verify wireless data transmission speeds before they update networks.

By Bill Whitmer

Wireless data radio manufacturers are not unlike data networking equipment manufacturers in that they all claim to have the fastest data transmission speeds and lowest latency. Experienced networking professionals know, however, that vendor performance claims are based on artificial laboratory conditions that use minimally configured boxes that are fed simple, repetitive data streams. Those test schemes are devised to squeeze out as many Megabits per second as possible. The big questions, given the expected vendor showmanship, are how can buyers compare the actual performance of devices or determine how they will truly perform in their environment?

The subject is becoming more important because the complexity of wireless data communications devices is increasing. The boxes aren't just passing data at the physical or RF layer; they are also performing tasks such as switching, routing, encryption, filtering and packet inspection. All of those tasks require more processor cycles, storage and resources than before. Buyers need to become educated to see beyond vendor claims. The devices have limitations, and it is wise to be informed before making an investment.

A standard or framework is needed for testing the devices that allows for objective comparisons. Fortunately, there is one — the Internet Society's Request for Comments No. 2544 (RFC 2544), "Benchmarking Methodology for Network Interconnect Devices." Although written in 1999 for wired devices, much of it is applicable to wireless backhaul point-to-point (PTP) equipment for microwave, as well as point-to-multipoint (PMP) wireless data systems including Wi-Fi and Long Term Evolution (LTE). Those devices are increasingly taking on greater data networking functions, such as routing and switching, and therefore, can be tested similar to their wired counterparts.

A standard or framework is needed for testing the devices that allows them to be objectively compared.

Buyers specifying wireless data communications devices should ask vendors if they have test results that are fully compliant or conditionally compliant with RFC 2544. A specification or cut sheet is not enough information to understand a device's data networking performance. The devices are too complex, and their performance can vary greatly based on their configuration and the type of data they are passing. In some instances, enabling one feature can cause a dramatic impact to central processing unit (CPU) cycles when it is implemented in software such that some basic switching functions may no longer be handled by specialized integrated circuits that normally perform those functions. Some vendors will produce RFC 2544-compliant test results, and some will not. The more they are requested, however, the more likely

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> ***Daniel Cole,***
> ***Director of Panola County Emergency Operations, Mississippi***

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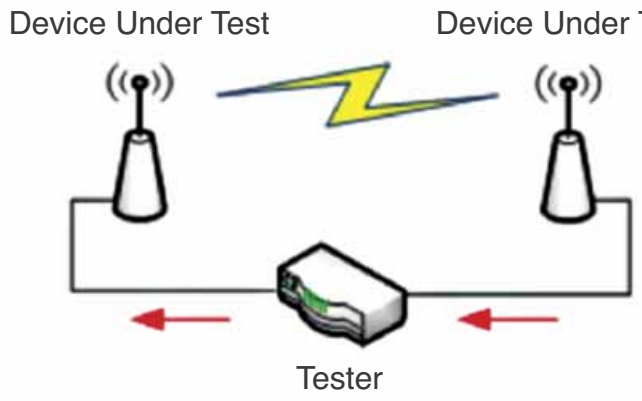
Recommended Setup for Wireless Devices



Figures courtesy Black & Veatch

the vendors will be to produce them.

All buyers should read and familiarize themselves with the RFC 2544 standard. It's a concise, 31-page document describing not only testing methods but also how the test results should be presented. The guidelines are divided into tiers labeled "must," "should" and "may" for flexibility. However, only implementations satisfying all must guidelines are considered compliant. Conditional compliance is the term used for implementations that satisfy all must guidelines but not all should guidelines.

Test Key Considerations

The recommended test setup for wireless communications devices includes a tester and two wireless devices each deemed by the RFC as a device under test (DUT). This setup allows performance tests to be run. Testing includes having a tester send Ethernet frames into one end using a variety of Ethernet frame sizes, frame types and speeds, and then counting and analyzing the output at the other end. Tester products send and analyze the frames and report on performance.

DUT configuration. One way RFC 2544 prevents vendors from exaggerating performance is requiring tested devices to be configured in a manner "following the instructions provided to the user." That sentence is important because it prevents a vendor from disabling or turning off all but the device's bare-bones frame-switching functionality as a means of boosting throughput or reducing latency. RFC 2544 goes on to say that it is "expected that all of the tests will be run without changing the configuration or setup of the DUT in any way other than that required to do a specific test." This is meant to prevent vendors from choosing an optimum configuration for each test and to prevent configuration tweaking between tests for the sake of performance optimization. Although simply stated, the configuration guidelines provide more realistic test results and require the configuration of the tested devices as part of the test results.

Frame rate, sizes, formats and types. The RFC describes the type of test frames to use, the addresses, and how the frame size should be varied to obtain the most accurate performance results. Be leery of test results that do not specify the frame type or size used to obtain them. It is too easy for vendors to choose a frame type or size that allows for the best throughput or latency performance, or even optimize their code for fastest processing of repetitive and duplicate test frames. The maximum frame test rate for input to the DUT should be equal to the maximum theoretical for the media or slightly higher for wireless devices. This higher rate will allow for the fact that some vendors employ various forms of compression. Appendix B of RFC 2544 lists the maximum frame rates for Ethernet; however, the maximum frame test rates for Fast Ethernet or Gigabit Ethernet (GbE) are built into the tester or are configurable on the tester.

Address learning and routing update frames. The RFC also requires that address learning and routing updates be sent five seconds prior to each test trial, and that these updates continue at their regular intervals during testing, just as would happen on live equipment. This helps determine the device's ability to simultaneously pass data traffic and perform basic control functions — absolutely necessary on live devices. In addition, tests should first include a single source and destination address pair, and then should be repeated with a varying but uniform destination address chosen out of a range of those dictated in the RFC.

Broadcasts and management frames. Broadcast frames should not be forwarded by routers but should instead be flooded to all available ports in switches. Most, but not all, microwave and PTP radios with Ethernet functionality function as the latter. It is logical that broadcast frames should be included in testing because they will be present in actual live traffic. RFC 2544 states that 1 percent of test frames should be addressed to the hardware broadcast address and should be evenly distributed, every 100th frame for example. In addition, simple network management protocol (SNMP) queries should be included at a rate of one per second, and the tester should verify responses. These tests more closely represent real-world conditions than disabling them, which might be done as a way of improving throughput and latency measurements.

Security filters and encryption. Routers and bridges have the ability to selectively block frames for security reasons. Wireless communications devices also have this feature. Because the feature is often used in production equipment, RFC 2544 states that it should be included in testing and recommends two specific tests. This should not be overlooked because it adds a small bit of complexity to the processing of each and every frame

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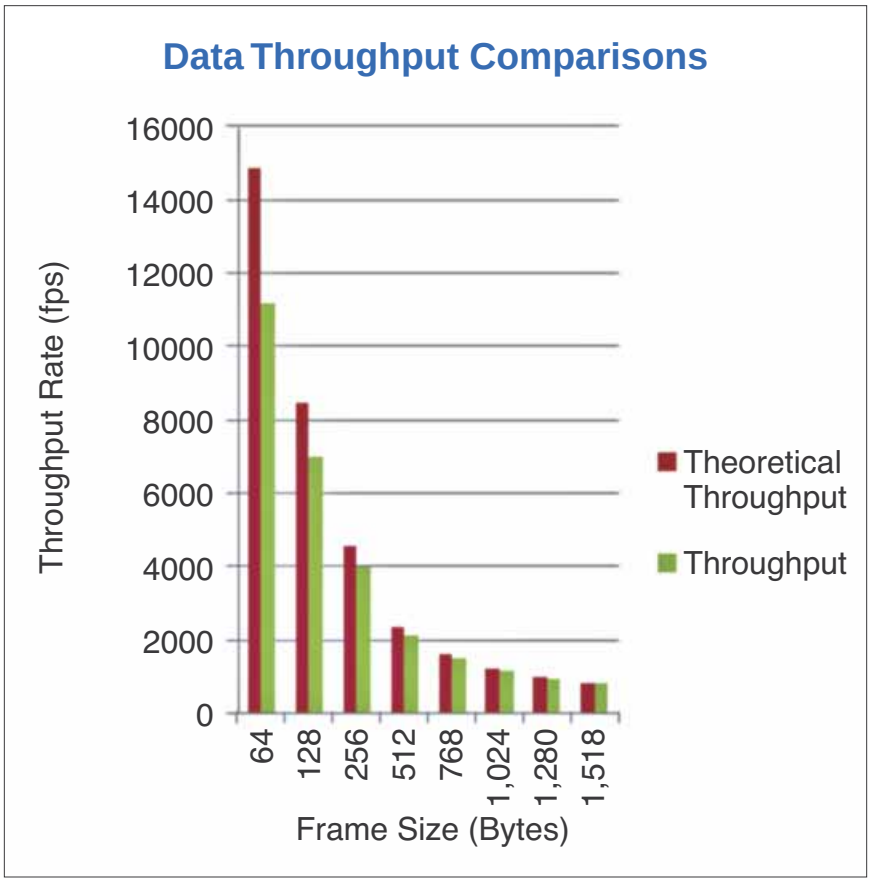

that will pass through the DUT and, therefore, impacts device performance. RFC 2544 specifically states that security issues are not addressed and therefore doesn't discuss encryption, as that would typically not be an issue for routers and switches within a secure data center or room. However, it would make sense that wireless communications devices would need to be run both with encryption turned off and on to gauge the performance impact. The fact that this would add processing to every frame transmitted and received would suggest that it may have a significant impact on performance.

Unidirectional, bidirectional, multiport and multistream. The devices should be tested with bidirectional traffic, as well as unidirectional traffic. If multiple distinct pathways are possible, from one interface card to another for example, each should be tested independently to verify performance. Devices with several ports should be tested in such a way that input and output ports are evenly distributed across the DUT architecture. Finally, you may test the device with multiport and multistream traffic, which means that incoming traffic may enter on any port and be directed to any other port. In such a case, all ports are considered input and output ports, and during such a test you must vary the data so it is directed to all other ports. This common sense test strategy mimics real-world Ethernet data characteristics, and the tests are preprogrammed into modern testers so they are not as difficult to conduct as they may sound.

Bursty traffic. Some tests should be performed with both steady state traffic and traffic consisting of bursts of frames to mimic actual network traffic. The objective is to determine the minimum interval between traffic bursts the DUT can handle before dropping frames.

Throughput. Perhaps the most important benchmarking test specified in RFC 2544 is that it measures the DUT's ability to pass data from one end to the other, known as throughput. This is done by sending frames through the DUT at a specific rate. The throughput is the fastest rate at which the number of frames transmitted equals those received. RFC 2544 stipulates that results should be placed in a graph where the X coordinate represents the frame size and the Y coordinate represents the frame rate.

Latency. After determining throughput, latency is measured per RFC 2544 by sending a stream of frames through the DUT at the determined throughput rate that should last for at least two minutes. After 60 seconds, the tester sends a frame that is time stamped after the frame is fully transmitted (timestamp A) and then compared with a similar receiving end timestamp (B). The latency for this trial is simply timestamp B minus timestamp A. The latency trial must be repeated 20 times with the reported latency value being the average of those 20 recorded values. Similar to throughput, the test is then repeated for each frame size and corresponding throughput and plotted in a table with a row for each of the tested frame sizes.

Frame loss rate and back-to-back frames. RFC 2544 offers straightforward procedures for frame loss rate and back-to-back frames tests. Frame loss rate is a measure of when the DUT will drop frames as a result of an overload condition. Back-to-back frames testing measures the DUT's ability to handle bursts of frames. The results of frame loss testing should be plotted on a graph, and the results of back-to-back frames testing should be recorded in a table with a row for each frame size tested.

System recovery and reset. The final test procedures outlined by RFC 2544 test the DUT's ability to recover from a system overload condition and the speed the DUT will recover from a reset. These are important considerations, and it is valuable to compare devices in terms of these metrics using standardized tests. In system recovery testing, the DUT is loaded with a stream of frames at a rate of 110 percent of the throughput maximum determined earlier in testing. After at least 60 seconds, a special

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time-stamped frame is sent, while at the same time, the stream of frames is reduced to 50 percent of throughput. The system recovery time is a measure of the time it takes for the time-stamped frame to be received back to the tester at the output of the DUT. The system recovery test should be repeated a number of times and the average of those values recorded and results reported as a table. System reset is tested by sending a stream of frames through the device while initiating a system reset. The reset time is the time it takes to reboot and begin passing frames again. The test should be repeated with various types of resets including software reset, hardware reset and a 10-second power interruption reset.

RFC 2544 and wireless. RFC 2544 was originally written for wired devices, such as routers and switches, and provides an excellent series of tests to better understand the data processing and forwarding abilities of these devices. RF matters are not included in the tests; however, it would not be unreasonable to expect that those could be repeated using simulated good and poor RF conditions by increasing attenuation or introducing noise to further gauge a wireless device's ability to forward data in all environments. RFC 2544 is the best standard we have to gain a better understanding of data processing performance of wired and wireless devices. Perhaps in the future it will be expanded to specifically include wireless devices, and some variation of RF conditions will be included.

Perhaps the most important benchmarking test specified in RFC 2544 is that used to measure the DUT's ability to pass data from one end to the other, known as throughput.

Simple specification sheets or cut sheets are too limited and subject to vendor interpretation to be of value in determining the data processing and forwarding abilities of wireless devices. All industry professionals need to ask for and expect to receive test results produced in a standardized way if they are to be of value in comparing vendor equipment. RFC 2544 is the de facto standard. ■

Bill Whitmer is a design engineer for Black & Veatch Telecommunications and a registered professional engineer (PE) in Kansas, United States. Contact him at whitmerb@bv.com.

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Middle East Explores Broadband

Professional mobile radio (PMR) will have increasingly closer coexistence and integration with Long Term Evolution (LTE) in several countries.

By Tony Gray

TETRA's adoption in the Middle East and particularly in the Gulf Cooperation Council (GCC) countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE), has reflected global trends. From TETRA's early deployments 10 years ago, GCC countries have followed typical adoption patterns, with public safety and security leading the way, followed by transportation and oil and gas operations.

As a consequence, TETRA networks operate throughout the Persian Gulf and beyond, sometimes several per country, and with different applications and users reflecting a broad range of critical communications sectors.

The UAE Example

One of the oldest and most nationally integrated examples of a TETRA implementation is in UAE. The individual emirates of Dubai and Abu Dhabi initially deployed separate emirate-wide public-safety TETRA networks shared by local police, fire and rescue, and EMS.

The networks were extended to cover the Northern Emirates, thereby providing nationwide service. Intersystem links were also established, allowing roaming and infrastructure sharing between the networks, and eventually a wide range of other municipal and public services, including transportation such as buses, trams and airport operations. Utilities have joined the networks as sharers.

A visitor who arrives at Dubai's airport and rides a tram downtown is under TETRA's control from airline gate to destination. Police, emergency service teams and municipal workers along the way also use TETRA.

With TETRA's inherent ability to operate securely and be managed in virtual network silos, the individual emirate security services in UAE retain privacy, control and management of their own resources. However, a government-owned private company, Nedaa Professional Communication, was established in Dubai to operate and maintain the TETRA service for all other nonsecurity users.

Elsewhere in the region, one of the largest oil extraction businesses in the world, Saudi Aramco, deployed TETRA extensively throughout its various oilfield operations across the Kingdom of Saudi Arabia.

Broadband Future

After more than 10 years of incremental implementations, multiple TETRA networks and applications exist throughout the Middle East. Day-to-day operation of security and emergency services, public transportation and utilities, oil and gas industries, and other critical public services rely on the secure voice and data capabilities afforded by TETRA.

However, in a region characterized by relative wealth and a willingness to innovate and pursue the latest technologies, there is keen interest about what comes next. Broadband initiatives during the past few years incorporating critical user features, such as group working, direct mode and push-to-talk (PTT) operation as part of Long Term Evolution (LTE) standards, have generated interest in the region.

Several Middle East administrations have already announced dedicated LTE spectrum assignments for future public safety and critical communications

broadband services. One is UAE, where the Telecoms Regulatory Authority (TRA) announced 10 by 10 megahertz in the 700 MHz band, plus additional assignments for direct mode and air-to-ground operation, for future public-safety LTE services.

Critical LTE Expectations

As users worldwide are discovering, the hype surrounding work underway in standards bodies, such as the Third Generation Partnership Project (3GPP) and the European Telecommunications Standards Institute (ETSI), to deliver critical LTE standards has set perhaps unreasonably high expectations for when suitably specified and standardized equipment might be available on the market.

The latest predictions point to the end of 2020 as the absolute earliest that the first generation of usable standardized equipment will start becoming available, and only then assuming all the specification work gets done and manufacturers decide to pick it up.

In the meantime, a few pathfinders have experimented with LTE-based broadband data services. One is the Ministry of the Interior (MoI) in the State of Qatar, which has owned and operated a TETRA network for public-safety users for many years. The Qatari authorities released dedicated spectrum in the commercial 800 MHz LTE band for use by a private network based on current LTE standards releases, which was installed by the MoI. The ministry learned many lessons from its work with critical applications for LTE, highlighting the fundamental need for critical features, such as group working and direct mode, before LTE can find wide acceptance in public safety and other critical services.

There is a long way to go before LTE solutions threaten TETRA's dominance of the critical communications market in the Middle East or anywhere else in the world. For the Middle East and Africa region, IHS projects the industrial, utilities and transportation sectors will continue to enjoy a more than 10 percent predicted compound annual growth rate (CAGR) between now and 2019.

TETRA is deployed and appreciated by users throughout the Middle East region and will continue to provide service for many years to come. However, increasingly closer coexistence and integration with LTE in various operational guises is inevitable, particularly in a region known for innovation and with critical LTE spectrum assignments on the rise. ■

Tony Gray is Middle East and North Africa (MENA) regional business director for P3 communications, a German engineering and consulting services provider. He consults on a variety of critical communications projects globally. Gray is a board member and director of the TETRA + Critical Communications Association (TCCA) and is past chairman of the TCCA's Critical Communications Broadband Group (CCBG). Email comments to editor@RRMediaGroup.com.

P25 App Targets Firefighter Safety

Photos courtesy South Australian Country Fire Service Promotions Unit

A South Australian company is developing an application to enhance situational awareness and asset coordination for strike team leaders.

By Jeff Perry

The South Australian Country Fire Service (CFS) provides first-line response to rural fires and road accidents across a 985,000 square kilometer area with 14,500 volunteer firefighters. During 2013 – 2014, CFS responded to 18,115 incidents. That figure has been steadily rising, increasing 38 percent during the past 10 years.

When fighting fires, crews are structured in a hierarchical fashion. Strike teams are coordinated by strike team leaders who respond to a sector commander, who in turn, works under the control of an incident commander. The incident commander is ultimately responsible to the state operations center.

CFS uses the UHF South Australian Government Radio Network (GRN) for command and control. The state government recently awarded Motorola Solutions a contract to upgrade the network, which comprises about 220 radio sites, from SmartZone technology to the Project 25 (P25) standard. For fireground communications, CFS uses analog VHF radios, predominantly in simplex mode to avoid tying up the GRN trunked network resources.

A separate recent contract awarded to South Australian company Tetracom calls for CFS to implement P25 digital radios and provide enhanced operational efficiencies and firefighter safety using a data application overlaid on its VHF P25 radios.

The application is intended to overcome difficulties with:

- Knowing the exact whereabouts of appliances under the strike team leader's control because of obscured visibility from smoke or undulating terrain.
- Maintaining better situational awareness of appliances that may be running low on water, reaching high cabin temperatures or other critical circumstances.
- Managing the best placement of appliances, taking into account the wind direction and fire front information that is available from other sources.
- Responding in the most efficient and timely manner to firefighters who are under duress or in an emergency situation.
- Recalling radio traffic events for post-incident analysis and training.

Proof of Concept

The data application contract calls for a proof of concept for a strike team leader application that will include a topographic mapping interface showing vehicle locations, a track of the fire front, wind direction, key status states such as low water

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Managing personnel and resources is a key function of the P25 application.

and emergency, radio traffic voice recording and the ability to send text messages. The application will reside on a wireless tablet that communicates with a Wi-Fi gateway in the strike team leader's vehicle. The gateway will interface to the vehicle's P25 radio, which will receive the data sent by appliances that are under the control of the strike team leader. The gateway will also be capable of interfacing to other communications devices, such as cellular modems or GRN radios, to provide access to the information at a remote location if necessary.

For the proof of concept, Tetracom will set up a strike team with all the hardware and most software features implemented so CFS can trial the concept at its training grounds. The application is being developed with the cooperation of critical communications provider Tait Communications, which will provide the fireground P25 equipment, and Omnitronics, which will provide a customized version of its RediTALK Air product along with the Wi-Fi gateway.

Standard P25 status messaging and GPS messages, which are sent from the appliances to the strike team leader's vehicle, will be the signaling used. The user interface will be structured to provide as much information as possible in a simple, clean and uncluttered format so users can easily identify the information needed to efficiently manage their resources.

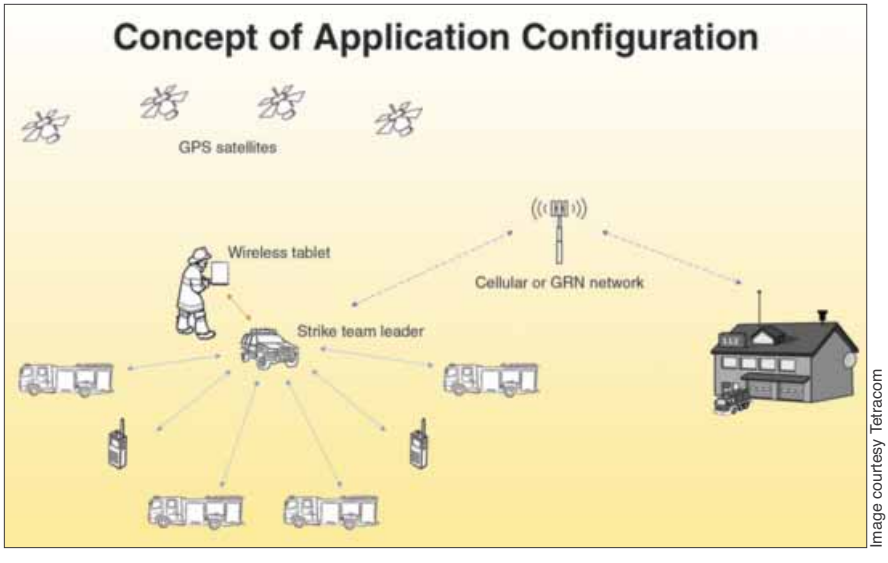


Image courtesy Tetracom

The application will reside on a wireless tablet that communicates with a Wi-Fi gateway in the strike team leader's vehicle.

The map will display vehicle icons using colors to signify each vehicle's status: green for normal operation, yellow for low water indication and red for an emergency/duress state. That simple differentiation will allow the strike team leader to prioritize resources and ensure optimum safety of all personnel.

In another purpose-driven development, Tait will implement software that will enable radios to display the relative position (distance and bearing) of a transmitting radio using P25 GPS information. That feature will be particularly useful in duress situations where strike team members need to locate a nearby team member who may be injured or requires immediate assistance.

The tablet will store audio files holding all voice traffic, enabling CFS to review how crews handled an incident and optimize training processes.

Once implemented, the system will simplify the role of the strike team leader and allow use of P25 technology to better manage the task of coordinating personnel and resources. That will result in more efficient, safer operations while operating on the fireground. ■

Jeff Perry is managing director of Tetracom. He has more than 35 years of experience in the communications industry and is the current convener of the Australian Radio Communications Industry Association (ARCIA) accreditation committee. Email comments to jperry@tetracom.com.au.

Airbus Defence and Space

The TB3hp is a small, high-power TETRA base station offering up to 50 percent more radio coverage than the TB3p, company officials said. The station provides up to 15 watts (W) of RF power with low power consumption. Despite its small size, the product offers the same features and reliability as the TB3-series TETRA base stations and can be installed in a vehicle to provide rapid deployment coverage. One- and two-carrier variants in multiple frequency bands are available.

www.airbusdefenceandspace.com

Barrett Communications

The 2050 high frequency (HF) base station transceiver combines current technologies with intuitive operation. The transceiver's upgradeable software-defined core provides extended service life. Teamed with other 2000 series products, the transceiver provides an ideal interface for email, fax, telephone and data connectivity within an HF network, as well as to international telephone networks and the Internet.

www.barrettcommunications.com.au

BridgeCom Systems

BridgeCom's 30- and 40-watt FM repeaters, repeater/controllers and repeater/controller combinations can create a wide-area logic trunked radio (LTR) network. The rack-mount repeaters are available for UHF, VHF and 220 MHz and include built-in 10-ampere power supplies, battery backup and community tone/code panels. A combination unit includes a complete repeater and LTR controller in a 2U rack. Features include linking of up to 20 channels, built-in ID validator and airtime logging. Combination units that connect multiple repeater sites to create seamless wide-area LTR trunked networks are available.

www.bridgecomsystems.com

Cobham Antenna Systems

Compact multiple input multiple output (MIMO) dual-polar base station antennas for the 2, 3, 4, and 5 GHz bands offer azimuth beamwidths of 60, 90 and 120 degrees with peak gains of 14 – 17 decibels isotropic (dBi). Vertical and horizontal polarized antenna elements are interleaved within a single aperture. The antennas provide reduced tower wind loading and lower installation, tower rental and transport costs compared with separate antennas, company officials said.

www.european-antennas.co.uk

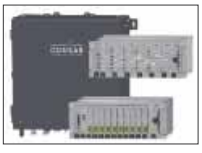
Codan Radio Communications

Stratus is a deployable Project 25 (P25)/Long Term Evolution (LTE) hybrid system that provides secure mobile voice networks. The product has the mobility of a subscriber unit in a lightweight, easily transportable infrastructure solution, ensuring complete system and network coverage from any location. The system can be deployed in minutes and consists of a repeater, power center and rapid antenna. The network automatically establishes connections with P25 subscribers, smartphones, the server and P25 Digital Fixed Station Interface (DFSI) consoles.

www.codanradio.com

Comlab

Comlab digital repeater units support up to five frequency bands in an active cooled housing and up to three frequency bands in a passive cooled housing. The repeater is ideal for onboard applications, outdoor coverage extension, and in-building and in-tunnel applications. Digital filtering allows operation in channel or band selective modes. Fiber-fed remote and radio repeater unit configurations are available. Features include flexible digital filtering, 50 MHz to 2.7 GHz band support, 19-inch and outdoor housing options; 25 and 40 decibel-milliwatts (dBm) output power per band, 16 channels or sub-bands per module, up to 10 decibels (dB) optical loss, and GPS-based polygon functions.



www.comlab.ch

Damm Cellular Systems

Designed for a fully distributed IP system and scalable from single to large multisite networks, Damm's base stations come integrated with voice and data logging, dispatcher and network management. Open application gateways ensure seamless integration into third-party applications. The BS418 indoor base station supports up to 16 carriers at one site and the BS421 indoor base station supports up to four carriers. The BS421 features an IP65 enclosure and can be mounted directly in the mast, providing full dual-receive diversity for optimal sensitivity and offering a built-in duplex filter with an antenna output power of 10 watts (W).

www.damm.dk

Digital Paging, Golden Sab

The Apollo wireless repeater extends coverage of in-house paging systems. One- and 5-watt (W) output modes provide up to 4 kilometers of extra broadcast power. Multilayer support allows up to seven repeaters. The RP-125 is compact and encased in a machined aluminum housing. The only programming required is specifying the frequency at which the message will be received and transmitted. With multilayer broadcasting, each repeater can be changed to a different frequency as the message passes through the device.

www.apollopagers.com

EF Johnson Technologies

ATLAS 4500 multimode station is a small, fully software definable,

IP-based linear base station operating in Project 25 (P25) Phases 1 and 2. The station features full spectrum coverage in VHF, UHF, 700 and 800 MHz in bandwidths of 12.5-kilohertz for analog

and FDMA P25 Phase 1 and 6.25 kilohertz for Phase 2 TDMA. P25/analog conventional, P25 trunked and simulcast modes are supported. The station features a compact 2RU chassis, as well as alternating current (AC) or direct current (DC) power input.

www.efjohnson.com

Etherstack

The SFFR-6 tactical repeater is a small, self-powered transportable Project 25 (P25) base station. The IP67-rated Go Box provides full P25 base station capabilities and can be networked with other units or back into fixed infrastructure via IP, 3G, Long Term Evolution (LTE) or satellite Broadband Global Area Network (BGAN) and Viasat configurations. Weighing less than 9.1 kilograms, the repeater contains

two high-power, hot-swappable batteries that can be recharged from the unit's 90 – 250 volts alternating current (VAC) and 10 – 24 volts direct current (VDC) inputs. The repeater includes output power of 1 – 15 watts (W), is software controllable and supports an HTML-based configuration. The product operates in the 136 – 174 and 380 – 520 MHz bands and supports dual-mode P25/analog, P25 Digital Fixed Station Interface (DFSI), Inter RF Subsystem Interface (ISSI) and Console Subsystem Interface (CSSI).

www.etherstack.com

Fiplex Communications

Digital simplex repeaters from Fiplex operate in the VHF, UHF, and public-safety 700 and 800 MHz bands. Digital signal processing

(DSP) and field programmable gate array (FPGA) technologies provide indoor coverage extension to radio equipment operating in simplex mode and allow precise operation compared with traditional analog systems. Channel selective operation allows handling of up to 12 channels simultaneously. Simplex repeaters are compatible with Project 25 (P25), TETRA, Tetrapol, Digital Mobile Radio (DMR), NXDN and conventional systems.

www.fiplex.com

Harris Public Safety and Professional Communications (PSPC)

The MASTR V base station provides secure, digital trunked communications for mission-critical applications across 700 and 800 MHz,

VHF and UHF bands, operating on the company's secure and scalable Project 25 (P25) IP network. The station incorporates P25 digital voice and data using a signal processor for maximum design versatility, paired with an easy-to-use software interface that provides flexibility, simplified setup and easy remote maintenance. Operating modes include P25 conventional, trunking and linear simulcast.

www.pspc.harris.com

Hytera Communications

The RD622 is a compact, indoor Digital Mobile Radio (DMR) and analog dual-mode repeater embedded with a power supply and

optional mini duplexer. The product's design supports wall-mount installation with alternating current/direct current (AC/DC) power. Auto switch between analog and digital modes allows for an easy digital migration. Two repeaters can be interconnected to provide interoperability between UHF and VHF. Multiple sites can connect via IP along with the RD982 to support flexible wide area and large building coverage. The unit can be integrated with Hytera Dispatch System or other third-party GPS dispatching software.

www.hytera.us

Icom

The IC-FR5200H/FR6200H is a 50-watt (W) 100 percent full-duty cycle, 32-channel VHF/UHF repeater/base station combining analog FM and IDAS digital modes with auto-sensing function. The IDAS

digital mode uses 6.25-kilohertz narrowband FDMA technology and offers a choice of the NXDN digital protocol or the European Telecommunications Standards Institute (ETSI) digital Private Mobile Radio (dPMR) protocol, with common hardware. The optional UC-FR5000 network/trunking controller board provides NXDN Type-D trunking capability and IP network connectivity, or the repeater can be connected to the Fylde MultiLingo controller for dPMR Mode 3 trunking.

www.icom.co.jp/world

Kenwood

NEXEDGE entered the next phase in its evolution with Second Generation (Gen2) models, including the NX-5000 series, in combination with new software products. The maximum number of sites

has increased from 48 to 1,000, and at least 24 individual networks can be connected even if they use different system codes. The products provide full compatibility with current equipment. Gen2 features meet the demanding requirements of large businesses to create digital trunked networks.

www.kenwood.com

Kirisun Communications

The TR850 is a Digital Mobile Radio (DMR) product with ergonomic design and digital functions. The product increases management efficiency and responsiveness in emergency situations, with IPSC connecting 32 repeaters simultaneously. The DMR provides cost-effective migration from analog to digital. A unique cooling design

combines a built-in heat pipe with an intelligent control fan, preventing overheating. The product can be configured to analog, digital or mixed mode. When configured to mixed mode, the repeater dynamically switches between analog and digital depending on the received call type.

www.kirisun.com

LMR Systems

The SVR P250 Project 25 (P25)-compatible synthesized vehicular repeater has been on the front line of critical communications for more than a decade and helps thousands of police, fire and public-safety officials stay in control. The company's repeaters are compatible with many of the top mobile radio brands including Motorola Solutions, Kenwood, Tait Communications, Hytera Communications and Simoco.

www.lmrsystems.com

Midland Radio

Midland Project 25 (P25) VHF, UHF and 700/800 MHz stations offer 100 percent continuous duty at 5 – 110 watts (W), providing a remote site operation reliability rate of greater than 99.9 percent, company officials said. The units are channel programmable for digital, conventional or mixed mode and can be programmed for base station or repeater operation. The low standby current draw feature extends operation of battery and solar-powered equipment, reducing service and maintenance issues. IP and tone remote interfaces are available. Base Tech series radios feature a five-year warranty.

www.midlandusa.com

Motorola Solutions

The reliability and serviceability of the full-featured ASTRO 25 system makes it ideal for mission-critical systems. The product meets demand for IP networks and narrowband radio operations with the high-performance GTR 8000 base radio/expandable site subsystem. The GTR 8000 offers software-based upgrades and migrations, no single point of failure, hot swap hardware, front access serviceability and integrated battery charging. The compact design enables everything from analog conventional to advanced Project 25 (P25) TDMA trunking on the same hardware.

www.motorolasolutions.com

Radio Activity

KAIROS is a compact and rugged transceiver based on soft radio

technology. A Linux core allows applications from a single repeater to Digital Mobile Radio (DMR) Tier 2 and Tier 3 multisite systems, including POCSAG and tunnels applications, using synchronization via PTP1588. The transceiver is optimized for simulcast operation,

supporting IP and narrowband RF links between base stations. The product supports session initiation protocol (SIP) and Real-time Transport Protocol-IP (RTP-IP) ports for dispatch and phone applications. Available in desktop, 19-inch rack and wall mount accessories, the product operates in the 66 – 88, 136 – 174, 350 – 400, 400 – 470, 450 – 527 and 841 – 961 MHz bands.

www.radioactivity-tlc.com

Radiodata

The DIPRA BS2400 Digital Mobile Radio (DMR) Tier 3 base station operates as a single or multicarrier solution and supports multifrequency networks and simulcast. The base station is part of the DIPRA system, which supports full duplex, private automated branch exchange (PABX) and public-switched telephone network (PSTN) interconnect, mixed voice and data services, supervisory control and data acquisition (SCADA), recording interface, subscriber management and authentication,

Advanced Encryption Standard (AES) 256, intelligent fallback mode and other features for utilities, public transport and first responders. The product is available for major professional mobile radio (PMR) frequency bands, including 68 – 88 and 146 – 174 MHz.

www.radiodata.biz

Royal Communications International

MICOM high frequency/single sideband modulation (HF/SSB) transceivers operate in the 1.6 – 30 MHz band and come standard with

embedded automatic link establishment (ALE), 200 simplex or half-duplex channels and 1,000 ALE channels. The product complies with Mil-Std-810F and electromagnetic interference (EMI) requirements, and meets many regulatory standards. The unit can be controlled, operated and programmed from a remote location via RS-232, IP, leased phone line or fiber optics. The base station transceivers are rated at continuous-duty transmission for voice and data at 125, 500 and 1,000 watts (W).

www.royal-communications.com

Schnoor Industrieelektronik

The TTRK TMO repeater extends radio coverage in TETRA networks and is designed for outdoor operation with a special housing, in-building and tunnel coverage. Modern digital signal processing (DSP) technology provides functionality as a band or channel selective repeater. A high-power amplifier enhances coverage in a wide range of facility footprints to optimize total system costs, company officials said. Using a Web browser, the repeater can be configured remotely

or on site and can be accessed via a wired or wireless modem. Simple network management protocol (SNMP) allows communication with an operation and maintenance center (OMC), which can configure and control up to five alarms.

www.schnoor-ins.com

Selex ES

The ElettraSuite VS 4000 is a TETRA Enhanced Data Service (TEDS)-capable mobile radio providing wideband data connectivity and boosting most advanced data applications such as image/video transmission. The FPG3 Plus front panel provides a built-in Wi-Fi hot spot capability, allowing the TEDS wideband connectivity to be

extended to handheld devices. Ready to support dual-mode functionality to allow soft migration from conventional FM to TETRA, saving costs and operational effectiveness, the unit fulfills demanding mobile communications requirements of mission-critical users supporting direct mode operation (DMO) repeater/gateway, air interface, end-to-end encryption features and integrated GPS receiver.

www.selex-es.com

Simoco Group

Simoco expanded its Digital Mobile Radio (DMR) offering with the SDB680 base station/repeater. Part of the Simoco Xd range, the product delivers 6.25-kilohertz-equivalent digital communications at 50-watt (W) transmit power with 100-percent transmit duty cycle. A common hardware platform supports analog, DMR Tier 2 conventional and Tier 3 trunked modes and features session initiation protocol (SIP) telephone connectivity. The unit offers full compliance with European

Telecommunications Standards Institute (ETSI) DMR standards in the VHF and UHF frequency bands. The device can be interconnected over an IP backhaul to form wide-area radio systems without any additional or centralized switching components.

www.simocogroup.com

Spectra Engineering

Spectra Engineering completed interoperable tests on MX800 Project 25 (P25) base stations with various P25 console brands covering U.S., European and Australasia markets. Extended controls manage audio and data messages via consoles with compliance to the P25

Digital Fixed Station Interface (DFSI) standard, offering interoperability between base stations and consoles of different makes and ensuring easier equipment selection based on needs, performance and budget. An extension to the company's modular design is an IP-based network capability where all radio sites sync and link automatically, forming a multicast IP-mesh network without additional or external voting hardware.

www.spectraeng.com.au

Swissphone

The DiCal-ITC2100 1 – 50 watt (W) high-end radio base station provides dispatch in synchronized POCSAG paging alert networks.

The product is a fundamental component of the company's DiCal wireless alerting system. The integrated base station controller together with the DiCal-PNC III server builds a unique network architecture for large paging networks.

www.swissphone.com

Tait Communications

The 9300 and 9400 series base station and repeater platforms cover multimode operation, analog, digital, conventional and trunking. The

variety of choices ensures a quality investment with a secure, smart and easy migration path for future growth, company officials said. The company's Enable products are integrated and work with major industry partners to offer an open standard customer service solution.

www.taitradio.com

Teltronic

The CeCoCo series offers an integrated end-to-end solution for next-generation 9-1-1 (NG 9-1-1) and 1-1-2 (NG 1-1-2), combining call attendance, geographic information system (GIS), records man-

agement and radio dispatch in a single application. The powerful architecture provides cost-effective scalability from small local dispatch offices to large regional call centers. The series enables standards-based information sharing between different agencies and organizations, critical for quick and accurate response to emergency situations, company officials said. First responders and support units can rely on high reliability and a fully fault-tolerant architecture designed to remain up and running in tough situations.

www.teltronic.es

Wireless Pacific

RDX Pico is a small, commercially available, self-contained Project 25 (P25) suitcase repeater. Designed to allow instant deployment in

most radio environments, the repeater allows six configurations and features MERLAN P25, a method to instantly deploy IP-connected end-to-end encrypted multisite P25 networks. The 8.5-ampere hour (Ah) built-in battery management system provides more than 12 hours of operation at a 10-percent duty cycle and can be recharged by any available 8 – 30 volts direct current (VDC) power source or alternating current (AC) power. RF output power is set to 5 watts (W) to ensure balanced talk-in/talk-out to field portable units. The product weighs less than 4.5 kilograms and provides global Internet connectivity from any LAN, Wi-Fi or 3G network.

www.wirelesscorpltd.com

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www.radioandtrunking.com

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Data Ecosystem and ATEX Radio

Motorola Solutions introduced a technology ecosystem to transform data into real-time intelligence that helps public-safety and mission-critical personnel stay ahead of events, company officials said. The ecosystem uses a smart analytics platform and the company's Real-Time Intelligence Client to proactively manage incidents; the WAVE Work Group Communications platform to ensure intelligence reaches the right place; and the Dimetra IP 8.X platform to provide enhanced security, increased capacity, TETRA Enhanced Data Service (TEDS) and unified application services for TETRA and Long Term Evolution (LTE) networks.

The MTP8000Ex series is a digital two-way TETRA ATEX radio designed for use in

potentially explosive environments. The radio features class 3L transmit power, enhanced receiver sensitivity, a color-changing indicator that notifies users when coverage is available, and support for wired and wireless connectivity. The company also released an ATEX-certified active noise canceling (ANC) remote speaker microphone (RSM) accessory to pair with the radio.

www.motorolasolutions.com

TETRA Portable and Speaker Mic

Sepura introduced the SC2020, a TETRA portable that comes Long Term Evolution

(LTE) data ready. The radio features a high-resolution screen that easily deploys applications and is viewable in all light conditions, including direct sunlight. The device also features 2-watt (W) audio capability, water-porting technology for strong audio in heavy rain, an IP67 rating and a class 3 TETRA engine.

The ULTRA CSM is an IP67-rated

TETRA controller speaker microphone (CSM) designed for use in harsh environments such as mines and firegrounds. The device's polycarbonate casing can withstand flash temperatures of up to 180 degrees Celsius. Water-porting technology allows the device to withstand continuous heavy rain.

www.sepura.com

Intrinsically Safe Portable and Broadband Suite

Airbus Defence and Space launched the

THR9 Ex intrinsically safe TETRA portable designed for demanding operations in harsh and explosive environments. The radio provides high volume level and audibility, company officials said. The device is lightweight and has battery life of more than 15 hours.

The Tactilon Suite allows users to add broadband capacity to existing professional mobile radio (PMR) networks in a secure and controlled manner. The network can be based on a dedicated broadband network, a commercial service or a combination of both. The multinetwork availability feature eliminates the need to make separate deals with different network operators, company officials said. Management of the network can be fully centralized or provided through distributed provisioning, allowing individual user organizations to manage their own subscribers and security needs.

www.airbusdefenceandspace.com

TETRA Portable and Digital Trunking

Hytera Communications introduced the SmartOne unified communications platform, which allows dispatchers to quickly command multiple users in different networks using seamless communications through optimized network interconnection. The platform integrates computer technology, public-switched telephone networks (PSTN) and professional mobile radio (PMR) networks to allow multisystem intercommunication for two-way radio users, public network users, dispatchers and commanders. A unified application programming interface (API) allows integrators to develop more flexible and customized applications for end users.

Hytera also introduced the ultra-slim Z1p TETRA portable radio that has transmit

power of 3 watts (W) and offers air interface encryption (AIE) and end-to-end encryption (E2EE) for secure communications and tamper-proof protection. The device features a 4.6-centimeter color display and a waterproof design that meets Mil-Std-810 and IP67 requirements. Other features include GPS, programmable buttons, and an integrated device interface for audio and data capabilities.

www.hytera.com

DMR Portable

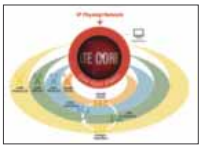
Simoco launched the LinX 200 portable that meets Digital Mobile Radio (DMR) Tier

2 standards and operates in both digital conventional and analog modes. The radio supports analog to digital network upgrades, company officials said. The portable supports individual, group and emergency calling, and has an emergency alarm and four programmable side buttons that enable personalization.

www.simocogroup.com

Interoperable Core

Etelm introduced an integrated system that uses a Long Term Evolution (LTE) evolved



packet core (EPC) to combine LTE, TETRA, analog and Digital Mobile Radio (DMR) technologies over the same core. The system comes with a full intersystem interface that allows base stations from different technologies and vendors to interoperate over one network, which reduces costs and prevents users from being locked into one technology or vendor, company officials said.

www.etelm.fr

Hybrid Base Station

The BS422 outdoor base station from **Damm Cellular Systems** offers TETRA, Digital Mobile Radio (DMR) Tier 3, TETRA Enhanced Data Service (TEDS) and analog technologies in an integrated system. The base station allows users to choose the technology that fits their current needs

and scale the system as needs change, as well as combine multiple technologies into a coherent system, company officials said.
www.damm.dk

TETRA-LTE Base Station and Railway Signaling

Teltronic launched the TETRA + Long Term Evolution (LTE) deployable base station, which can be quickly deployed wherever a new coverage area is needed, company officials said. As a TETRA base station, the platform features two carriers and delivers a TETRA carrier plus an LTE eNodeB while in dual configuration. The product can function standalone or as a remote site connected to an existing network.

Teltronic also launched a TETRA solution for railway signaling composed of onboard TETRA equipment for data management and the company's eNEBULA

radio infrastructure. The product provides a complete and integrated solution for end-to-end communications that ensures system availability and quality of service (QoS) parameters, company officials said.
www.teltronic.es

Smartphone PTT Mic

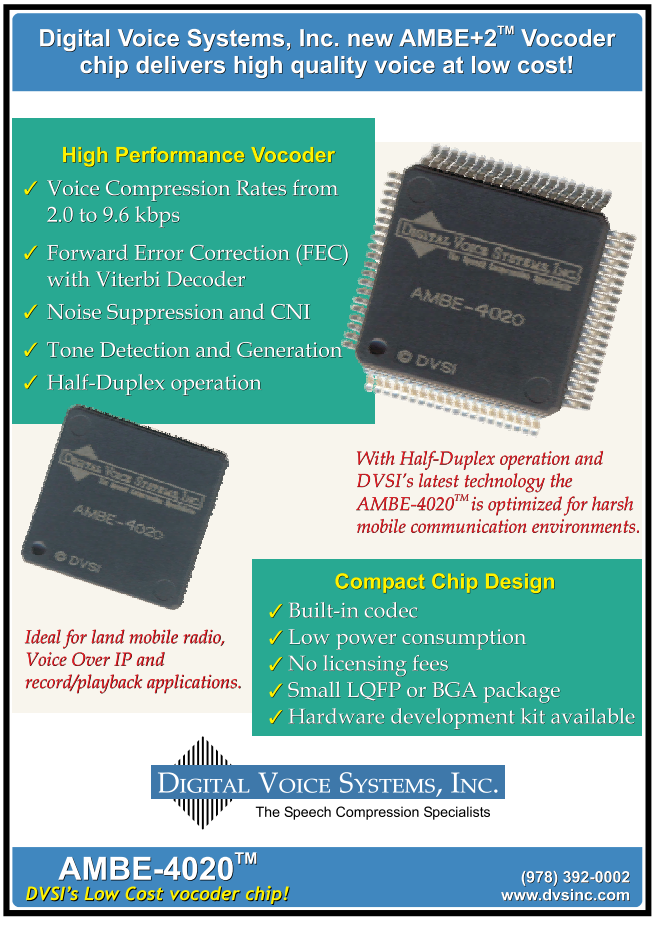
Wireless Pacific introduced the X10DR-LTE-4P microphone that allows a mobile phone running a Long Term Evolution (LTE) push-to-talk (PTT) application to function similar to a handheld portable radio. The device plugs into the headset socket on most smartphones that run PTT applications. The rugged device has an IP55 rating and comes with a 3.5-millimeter audio headphone jack for quiet, secure communications.

www.wirelesscorpltd.com

DMR Connection Platform

Vertex Standard introduced the eVerge EVX-Link system, which allows radios to communicate in most situations. The system can connect Digital Mobile Radio (DMR) devices and be installed in a variety of places from a high-rise building to a large campus to geographically separate sites. Users don't need to replace existing infrastructure or employ a repeater with the system. The product works with any DMR platform.

Vertex Standard also updated its EVX-530 and EVX-5300/5400 series of radios to include an enhanced display, better message control and privacy, enriched coverage and connection monitoring. Other additions include direct mode, transmit interrupt, site roaming, 256-bit Advanced Encryption Standard (AES) and DTMF for digital modes. The radios are



submersible and weatherproof.
www.vertexstandard.com

Digital Radio Gateway

The DRG600i digital radio gateway from **Omnitronics** can access up to six simultaneous talk paths and share those paths among multiple dispatch consoles. The device connects to radio infrastructure using Ethernet and forms a natural firewall between the two networks. The gateway's flexibility makes it easy to integrate with IP infrastructure, company officials said. The device is suited for Tier 3 trunking applications, such as Digital Mobile Radio (DMR) and NXDN, but it can also provide multichannel access to Tier 2 systems.

www.omnitronicsworld.com

Portable Command System

ZTE Trunking Technology introduced a portable emergency command system, which can be integrated with the company's ZiLTE multimedia broadband trunking system to support video/voice trunking call, video surveillance, video conferencing, and high-definition (HD) image upload and distribution. The small, lightweight system features rich service and high integration, making it suitable for multimedia command and dispatch service during emergency response, company officials said. The system can also be interconnected with a command center via IP network, private land mobile network (PLMN) or very small aperture terminal (VSAT).

www.ztegota.com.cn

Radio Communications Platform

CONET launched Mobile Command Flightcase, which combines communications standards with the capabilities of the company's UC Radio Suite. The product enables direct connectivity between different manufacturers' digital hand radio terminals, as well as public and private mobile radio networks, company officials said. Features include WLAN and GSM routers for platform-independent direct data transfer; GPS tracking of TETRA hand radios and smartphones; voice and data recording; and apps for Android, iOS and WindowsPhone tablets and smartphones. The product weighs 11 kilograms, measures 5.63 by 2.26 by 3.49 centimeters and is powered by 12- or 230-volt (V) circuits.

www.conet.de

Mesh Network Core

Rajant announced its BreadCrumb ME4 multiple input multiple output (MIMO) mesh network nodes received certification for use in the European Union, United Kingdom and other countries that conform to CE standards. When deployed with other nodes, the product creates a private wireless mesh network that can use multiple radios to perform multiple functions concurrently. Each node is independent with full transport capabilities and supports the Internet of Things (IoT) and machine-to-machine (M2M) communications.

www.rajant.com

Mobile Computers

JLT Mobile Computers upgraded its line of rugged computers by integrating support for dual-band 802.11 ac, allowing the computers to achieve data speeds of up to 867 Megabits per second (Mbps). The upgraded computers also support more channels and higher bandwidth for better reliability and lower latency, company officials said. Integrated Bluetooth enhanced data rate (EDR) 4.0 simplifies pairing with Bluetooth peripherals. The VERSO series comes with the option to specify Long Term Evolution (LTE) WAN connectivity with fallback capability to 3G and GSM.

www.jltmobile.com

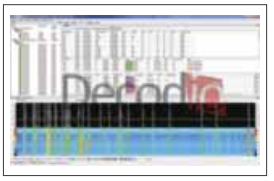
Fire Service Pagers

The lightweight s.QUAD pager from **Swissphone Wireless** provides 20 – 50 percent better coverage than other pagers, company officials said. The device features enhanced message reception, smartphone compatibility, alerts at a decibel (dB) equivalent to a jackhammer, waterproof design and extended battery life. The product was built to meet the demands of the fire service and measures 8.12 by 6.35 by 2.16 centimeters, making it easy to wear. Other features include a high-resolution 200-character display, a high number of alert addresses/cap codes, selection and switching profiles, a multicolor alert LED and a five-stage signal strength display.

www.swissphone.com

Spectrum Monitoring Software

Decodio's spectrum monitoring software is based on software-defined radio (SDR) technologies and offers customizable network analysis and voice logging functionalities. Real-time, over-the-air (OTA) monitoring of up to 256 simultaneous channels over a bandwidth of 50 megahertz provides detailed insight into various network quality metrics, and an advanced user interface coupled with a Web-based platform allows for easy access to detailed call history and network activity reports, company officials said. The product can define automatic triggers and alarms for long-term monitoring and supports major professional mobile radio (PMR) protocols.



www.decodio.com

Satellite Asset Manager

Globalstar launched the SmartOne C, a simplex asset manager with an accelerometer that alerts owners to any unexpected motion, such as theft attempts. The device dynamically reports asset status and monitors faults, enhancing operating efficiency across different metrics, company officials said. Motion sensors, comparative

GPS positions and custom-configured sensors gather and transmit asset status information. The product uses four 1.5-volt (V) AAA lithium batteries, has a battery life of 1.5 years and automatically switches to battery backup if necessary.
www.globalstar.com

In-Building DAS

Zinwave announced the UNIaccess line, which integrates Edgewater Wireless' WiFi3 technology into the company's Unitivity distributed antenna system (DAS) solution. The product addresses high-density network environments, such as stadiums, arenas, hotels and college campuses, company officials said. The platform supports any combination of services between 150 MHz and 2.7 GHz on a single hardware layer, as well multiple frequency division duplexing (FDD) and time division duplexing (TDD) Long Term Evolution (LTE) services simultaneously.
www.zinwave.com

DAS Antennas

Cobham Antenna Systems announced a line of dual-polar C-band antennas that cover the 4.4 – 5 GHz frequency band. The

antennas incorporate interleaved elements, which provide dual vertical and horizontal polarization within a single compact, rugged and stable radome. The products can replace two single polarized multiple input multiple output (MIMO) antennas for cost savings, company officials said. The antennas can also be configured for installations in an aerodynamic blade for airborne applications.

The company also announced that accurate and measured antenna performance data for a selection of its distributed antenna system (DAS) antennas is now available in iBwave's online components database for users designing or planning an in-building network. The selection includes omnidirectional, bi-directional and directional antennas for both passive and active DAS systems for LAN, Wi-Fi, GSM, professional mobile radio (PMR) and TETRA applications.
www.european-antennas.co.uk

TETRA Combiners

The PRO-ISO-PHY-TETRA-6 combiner from **Procom UK Systems** can combine six TETRA radios into one antenna, while the

PRO-ISO-PHY-TETRA-8 can combine eight TETRA radios into one antenna. The combiners offer 25 watts (W) of maximum power per station, selective helical duplex filters and high-performance isolators to provide greater than 60 decibels (dB) of isolation between ports, and typical low insertion loss between -11.5 and -13 dB. The products measure 4.83 by 1.76 by 2.4 centimeters, weigh 11.4 or 12.6 kilograms, are IP62 rated, and come in a tray for rack mounting.
www.procomuk.co.uk

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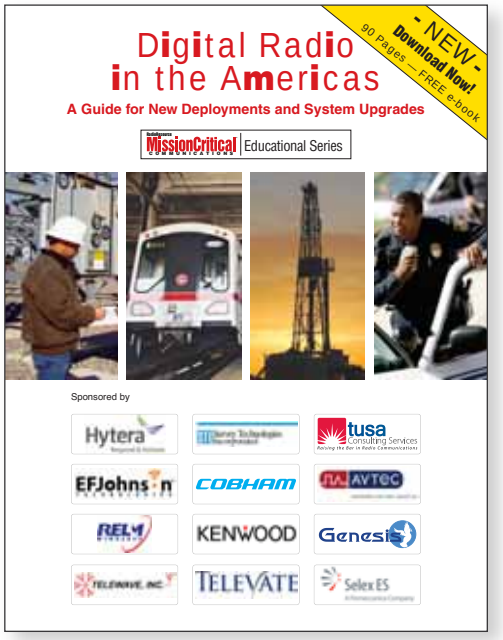

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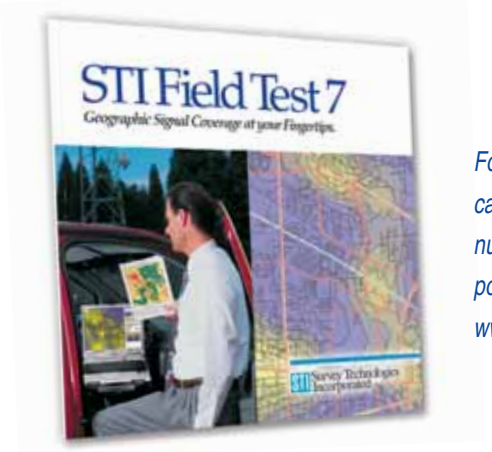

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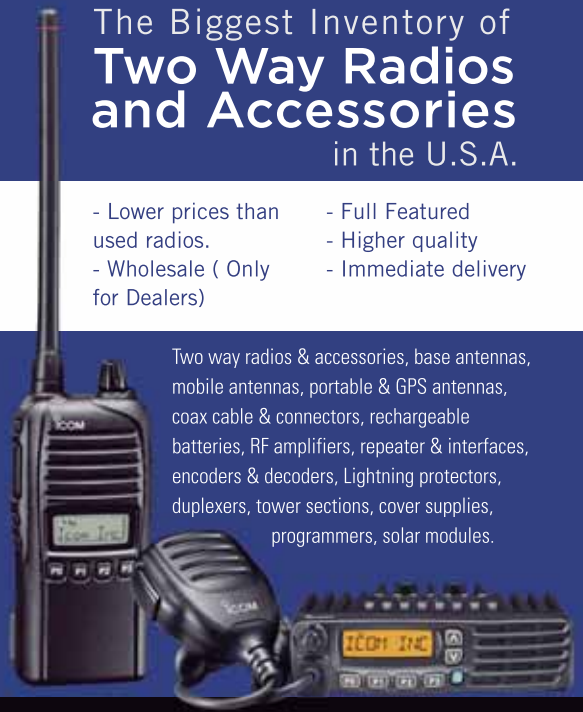

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❑ B Distributor, Agent, Importer, Exporter, Rep
❑ C Commercial Trunked Radio and Other Wireless Service Providers
❑ D Government/Public Safety/Military
❑ E Business/Industrial/Transportation User
❑ F Communications Manufacturer/OEM/Software Developer
❑ 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 _____

Q315

Godfrey Shares His Views on TETRA's Future as Vratonjic Named Next Chairman of TCCA

Phil Godfrey is stepping down from his role as chairman of the TETRA + Critical Communications Association (TCCA), a position he has held since 2004. Godfrey answered questions about his successor and the future of TETRA in this interview with *RadioResource International*.

How many years have you been at TCCA?

I have actually chaired the association twice. I was one of the founding members of the association in 1994 while working for Philips and was elected chair in 1998 for a three-year period. I was asked to take the position again in 2004 and have been there ever since. To have seen the association grow from the original six members to a thriving organization of 160 members and to see TETRA deployed in more than 135 countries is hugely satisfying and an achievement of all those who have been involved in creating the TETRA standard and promoting the technology worldwide.

How was your successor determined?

During the past few months, the board of the TCCA has undergone a rigorous recruitment process and identified a number of excellent candidates. The board decided that Mladen Vratonjic was their preferred candidate and recommended him to the members at the annual general meeting. Vratonjic was officially named chairman in May. Vratonjic was head of the telecommunications department for the Serbian Ministry of Interior and has many years' experience in critical communications. He has also been involved with Europe's Emergency Number Association (EENA) and is well qualified to take over this role.

I would like to take the opportunity to thank the chief executive and all the board members who I have worked with during the past 17 years. Our association has a mixture of industry, network operators and users, and we try to maintain that diversity on the board. The willingness of board members to put their company interests to one side and work together to further the interests of our members has made the job a great deal easier.

What is the biggest challenge for TETRA in the short term?

TETRA is not alone in the digital mobile radio marketplace, and much interest has been generated in the possible use of voice over LTE (VoLTE) for critical communications. Indeed, the TCCA is working with the standards makers to help develop these future technologies. However, it is easy to become distracted by potential future solutions. Our biggest challenge, therefore, is to ensure that the mobile radio market continues to recognize that TETRA is the best technology for mission-critical voice and data. We need to keep promoting the technology around the world.

Where do you see the most growth for TETRA?

Overall, the installed base of TETRA terminals has grown by more than 10 percent during the past year. Europe is a relatively mature market for TETRA but there is already evidence of replacement business taking place, with Belgium, Finland and the Netherlands announcing contracts to replace their early TETRA networks with new networks, also based on TETRA. However, Asia and the Americas have significant potential for TETRA, and the association will continue to address these markets. While public safety remains the largest user of TETRA, we find that TETRA is particularly well suited to the transport industry as well with buses, trams, light rail and airports being the most interesting sectors.

How do you view TETRA's future in North America?

It is a pity that users in North America have been denied access to the technology for so many years, but it is great to see that problem finally resolved, and I am grateful to the FCC for making that happen.

Although late to the market, I see plenty of opportunities outside of public safety as there is no other technology that has TETRA's functionality, either now or in the foreseeable future. Already some of the major transport companies in the U.S. have adopted TETRA, and it is ideal for utilities, fuel and power companies, mining firms and even the military. Although a great deal of work is going into Long Term Evolution (LTE)-based solutions, we see TETRA continuing to offer a unique capability for many years to come.

How do you plan to enjoy your retirement?

Actually, I am trying to avoid the word retirement as I still feel that I have a contribution to make in the industry. It will be good to slow down a bit though, and I am keen to get my golf handicap down. Photography is a particular interest of mine and one that can be surprisingly time consuming. For the summer months my wife, Jackie, and I have taken up dinghy sailing and have joined a local sailing club so I doubt that I will be short of things to do! ■

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