View Digital Magazine Online

RadioResource INTERNATIONAL

www.RRImag.com | Quarter 2 2010

THE GLOBAL INFORMATION RESOURCE FOR MISSION-CRITICAL COMMUNICATIONS

TETRA World Congress Issue

Transportation Radio Solutions

User Needs Dictate Technology Choices

Inside

Europe Pushes for Broadband Spectrum

A TETRA and DMR Comparison

3 Critical Steps to Frequency Planning

OUR JOB IS TO SECURE YOUR MISSION

Secure, integrated and interoperable "turn-key" radio mobile networks:

- TETRA
- Simulcast
- DMR
- Wireless broadband
- GSM-R

SELEX Communications, a Finmeccanica Company, supplies secure, integrated and interoperable networked solutions for governmental, civil and military applications. 100 years of experience in military and civil sectors to meet customer requirements and exceed their expectations.

www.selex-comms.com

SELEX Communications
A Finmeccanica Company

Radio Base Station/Repeater solutions

NEW!

MX800 – Digital APCO P25

- Analog now – upgrade to digital later
- 100 Watt output power now available

MX800 – Expanding System Solutions

- Digital APCO P25 base and repeater
- Analog system trunking base and repeater
- Transmitter power levels to 100 Watts
- Extensive options

MX921 – Power Efficient

- Very low current receiver – 58mA
- Extra high sensitivity
- Optimized for solar systems
- System base and repeater

MX920 – Economical

- Low cost
- TX rating same as MX800/921
- Internal space for PSU, duplexer or battery
- Vertical tower case option

SPECTRA ENGINEERING
9 Trade Road, Malaga,Western Australia, 6090
Phone: +61-8-9248 2755 · Fax: +61-8-9248 2756 · Web: www.spectraeng.com.au · E-mail: info@spectraeng.com.au

we don't just build base stations—we redefine them.

RadioResource INTERNATIONAL

Quarter 2 2010

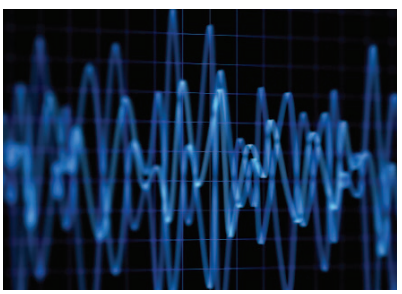
CONTENTS

Vol. 24, No. 2

18 Radio Solutions for Transportation
The best technology options for planes, trains and buses depend on specific user requirements. *By Lindsay A. Gross*

26 A TETRA and DMR Comparison
Both standards have advantages for users upgrading to digital technologies. *By Roberto Marengon*

32 Technology Secures UAE Grand Prix
A new Formula One race track ties video surveillance to command centers. *By Siva Sivakumar*



41 Europe's Broadband Spectrum Strategy
European agencies are working to establish a harmonized frequency band for public-safety broadband services. *By Thomas Weber*

48 3 Critical Steps to Frequency Planning
Three steps can help economically design RF hardware with minimum interference and risk at frequencies below 700 MHz. *By Bryan Corley*

How to contact us: www.RRMediaGroup.com or

Editorial	Sales	Subscriptions
edit@RRMediaGroup.com	info@RRMediaGroup.com	lfriday@RRMediaGroup.com
Phone: +1 303 792 2390 ext. 20	Phone: +1 303 792 2390 ext. 10	Phone: +1 303 792 2390 ext. 15
Fax: +1 303 792 2391	Fax: +1 303 792 2391	Fax: +1 303 792 2391

IN EVERY ISSUE

Dispatch 6
TETRA continues its push into the U.S. market. *By Sandra Wendelken*

World News 8

Product Expo: Site and Test Equipment 54

New Products 59

Events 68

Global Forum: Emerging Markets 70
The Philippines gains an updated typhoon communications system. *By Matt Heggli*

READER SERVICES

Classifieds 64
Advertiser Index 69
Subscription Form 69

www.RRImag.com

DIGITAL EDITION
Access feature-rich, interactive issue

View Magazine Online

ONLY Online
Exclusive online editorial features

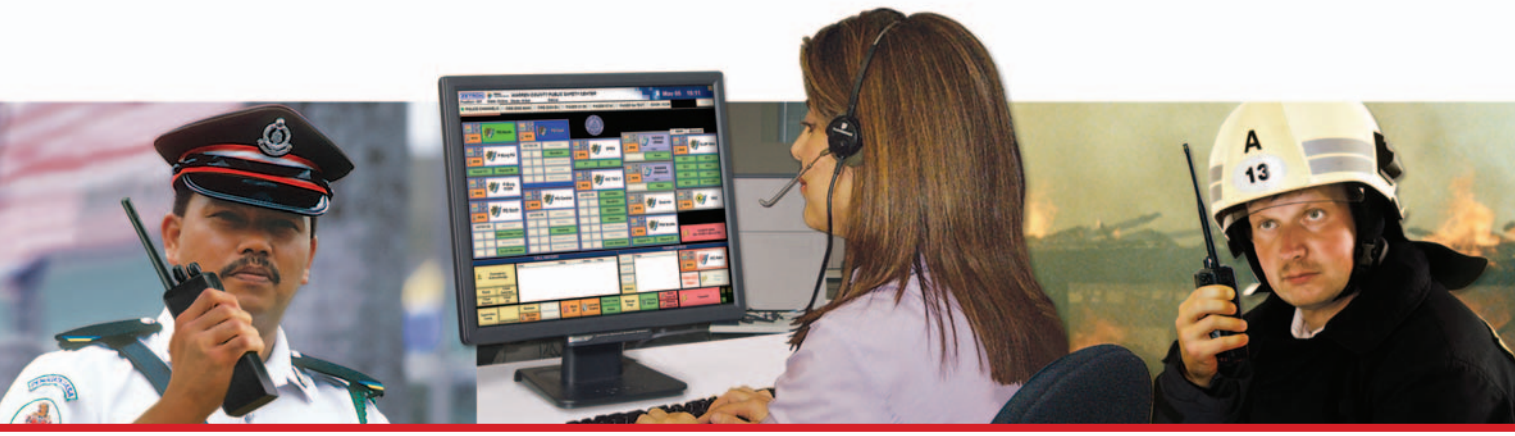
Headline News
Industry news updated daily, plus archives

SuperGUIDE
The industry's most comprehensive online Buyers Guide

MissionCritical UNIVERSITY
White papers, case studies and tutorials

WORLD NEWS
E-newsletter contains breaking news, exclusive content and industry links

3 Ways Zetron Improves Your Interoperability



Zetron Dispatch Systems:

1. **Connect more radio types together**, including analog, digital, and proprietary.
2. Integrate your existing system with **new, digital radios**.
3. Support open standards, such as **P25, including TIA DFSI & CSSI.**

MORE FEATURES:

- Supports small to large centers and multi-site operations and hundreds of operator positions.
- Redundant; no single-point of failure.
- Integrated telephony and radio control.
- Supports IP connectivity between multiple sites.
- Scalable and flexible to support future upgrades.
- Integrates multiple devices, resources, and phone and radio communications.
- Highly configurable UI.

"With our new Zetron system, our interoperability has more than doubled…"

— Derek D., Communication Center Manager

Contact Zetron Today *for more information or visit us at www.zetron.com.*

ZETRON®
MISSION-CRITICAL COMMUNICATION SYSTEMS

United States: 425 820 6363 | United Kingdom: 44 (0) 1256 880663 | Australia: 61 7 3856 4888 | WWW.ZETRON.COM

TETRA's Final Frontier

Putting together the TETRA World Congress issue is one of my annual favorites. This year's issue was especially exciting because I'll be attending the 2010 congress in Singapore in May. I'm looking forward to visiting Singapore; I haven't been to the city-state since 1997 when I attended the International Telecommunication Union (ITU) Asia Telecom conference and exhibition.

Interestingly, I wrote in the Quarter 4 1997 issue of *RadioResource International* about a cooperative agreement between the U.S. Project 25 (P25) steering committee and the TETRA committee within the European Telecommunications Standards Institute (ETSI) to "provide free information exchange between P25 and TETRA. The possibility of the two standards enjoying future compatibility would benefit users worldwide."

Unfortunately, that compatibility promise hasn't come to fruition. In fact, the two digital public-safety communications standards compete head to head worldwide. TETRA technology, which is deployed in nearly every country around the globe, dominates the European market, and P25 is the leading public-safety standard deployed in the United States. While the TETRA Association continues to push for TETRA's deployment in the U.S. market, several roadblocks still stand in the way. However, one TETRA vendor's base station has been type accepted by the Federal Communications Commission (FCC), the U.S. telecom regulatory agency, and Industry Canada, its Canadian counterpart. Industry Canada also recently certified two TETRA portable radios.

Even if U.S. users begin to deploy TETRA systems, they will likely be in non-public-safety sectors. Transportation agencies, utilities and railroads are the main vertical markets being targeted for the standard in the United States. And the likelihood of compatibility between those TETRA networks and the country's P25 public-safety systems is doubtful at best.

However, each standard is moving forward with interoperability initiatives among vendors to ensure one manufacturer's equipment works seamlessly with another vendor's products. Two emerging digital standards — Digital Mobile Radio (DMR) and NXDN — have announced interoperability testing plans as well (see "World News" on Page 16). Ensuring interoperability among vendors is a critical step for all digital mobile radio standards.

We value your opinions! Please e-mail your feedback to me at swendelken@RRMediaGroup.com.

If you're attending this year's TETRA World Congress, please visit us at Stand H601. We would enjoy meeting you in person and getting your feedback on the magazine and our digital products.

Sandra Wendelken

Sandra Wendelken, Editor
swendelken@RRMediaGroup.com

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.

CORRESPONDENCE
Editorial, advertising, and circulation correspondence should be addressed to: ***RadioResource International,*** 7108 S. Alton Way, Bldg. H, Centennial, CO 80112-9977, USA Tel: +1 303 792 2390, Fax: +1 303 792 2391.
Editorial e-mail: edit@RRMediaGroup.com
Advertising e-mail: info@RRMediaGroup.com

RadioResource International (ISSN 1080-3025) is published five times a year in the United States. It is circulated free, by name and title, to personnel responsible for purchasing, recommending, specifying or managing equipment and services for radio communications systems outside the United States and Canada. Canadian Post Publications Mail Agreement No. # 40065056. Canadian Return Address : DP Global Mail, 4960-2 Walker Road, Windsor, ON N9A 6J3.

www.RRImag.com

Pandata

ICOM

IDAS™
ICOM DIGITAL ADVANCED SYSTEM

IDAS™ conventional IP network system expands your communication near and far

In-building two-way radio communication has always been a technical obstacle in analog times. However, with IDAS™, not only are the difficult RF issues solved, but you can expand in-building communications to inter-building communications and beyond! Create your own IP–based IDAS™ radio network for an in-building communications and inter-building or campus wide network and improve efficiency and security while keeping costs in check.

IDAS™: Your choice for digital narrowband professional communications now and in the future.

Icom Inc. 1-1-32, Kamiminami, Hirano-ku, Osaka 547-0003, Japan Phone: +81 (06) 6793 5302 www.icom.co.jp/world

EUROPE

Finland's VIRVE to Begin TEDS Trials in May

State Security Networks, operator of the Finnish VIRVE network, will start testing the TETRA Enhanced Data Service (TEDS) in May with EADS Defence & Security. The work will be conducted on a test network with the same characteristics as the live VIRVE authority network, apart from the TEDS-capable software.

TEDS is the high-speed data evolution of the TETRA digital radio standard. EADS Defence & Security was the first vendor to demonstrate TEDS in June 2007 and has continued to develop the software to run the system on existing EADS TETRA hardware, as well as to develop TEDS-capable TETRA radios. System elements and trial terminals for the VIRVE test network will be delivered during April and May.

"Public authorities need high-speed data capabilities in their radio communications networks to enhance their field operations," said Dirk Borchardt, EADS Defence & Security head of security and communications solutions. "They also need high-speed data to be reliable, secure and available over a wide area. TEDS can meet these strict requirements."

All findings contribute to further design improvements of the EADS TETRA system and TETRA radio terminals, Borchardt said. Company officials can verify the data speeds, determine the actual data capacity increase that TEDS can deliver at short notice, and evaluate TEDS coverage.

"High-speed data is the natural next step," said Kimmo Manni, CEO of State Security Networks. "Our goal is to have a large number of organizations and users testing the new high-speed data functions in action. The testers will have the benefit of using their experience as a basis for developing new operational processes and working methods."

VIRVE public-safety users

COLOGNE, Germany — The Ninth Branch Meeting for Professional Mobile Radio (PMR) and Command Centers 2009 conference and exhibition registered 2,519 square meters of exhibit space and 2,629 visitors 24 – 26 November in Cologne, Germany.

With 169 exhibitors from 14 countries, the numbers from 2008 were exceeded, conference staff said. The size of the exhibit space increased to more than 155.5 percent compared with 2008. The number of visitors increased by 31.45 percent to 2,629 in 2009. The 2010 PMRExpo will be held 23 – 25 November.

ZURICH, Switzerland — Starhome, a provider of roaming services for mobile network operators, is participating in the CELTIC Federated Test bed for Public-Safety Communications (FT-PSC) consortium. The project is focused on public safety and disaster management and includes developing communications among national operators during emergencies. The TETRA Association and other organizations are participating as well.

The FT-PSC project is addressing the lack of existing public-safety communications and information systems interoperability and the effect it has on response times during emergency situations. Establishing direct roaming relations among national operators is problematic, because competitive operators do not have bilateral roaming relations. However, in an emergency, if one network crashes or does not

Wind Farm Deploys TETRA

Alpha Ventus' 12 wind turbines and offshore transformer station make up the first wind farm to be erected at sea under offshore conditions. EWE TEL built the phone and digital communications technology for the entire wind park and selected 3T Communications for the digital radio system.

Sepura secured the contract to supply TETRA radios to Alpha Ventus, located 45 kilometers north of the island of Borkum, Germany, in water about 30 meters deep. The new digital radio solution covers the offshore platform, the 12 wind turbines and the operations center in Norden, Germany. It will enable GPS localization and will also be used for communications with helicopters.

3T Communications supplied two base stations, switch, gateway, dispatcher and Sepura radios. Base stations are installed on the platform and on the ground in Norden.

Sepura will supply hand-portable and mobile radios for use offshore and on land and to maintain communications with the helicopters. Sepura mobile radios will also be installed on ships servicing the wind farm.

"Installation and maintenance of wind farms' equipment requires a powerful and reliable digital radio system," said Holger Witt, project manager from EWE TEL. "The North Sea environment can be extremely tough and demanding, and both infrastructure and terminals must meet the highest standards at all levels, from ease of use to durability and performance."

The Alpha Ventus offshore wind farm

KENWOOD

Listen to the Future

For a Smooth Migration

NEXEDGE™ digital radio systems

Want to take advantage of your current analog assets while upgrading to superior digital performance and reducing costs? Kenwood's NEXEDGE™ digital business radio systems are uniquely positioned to offer just that – because they support both FM analog and digital fleets. While ensuring compatibility with legacy systems, NEXEDGE™ provides all the benefits of advanced digital technology, including inherent secured voice, increased effective coverage area, and low noise for superior clarity. This represents an ideal solution for a wide range of commercial and private applications – from security, supply chains and utilities to hospitality and entertainment. Make NEXEDGE™ your next move.

- **Digital Conventional**
- **Digital Conventional IP Networks**
- **Digital Trunking**
- **Digital Trunked Wide Area IP Networks**
- **FM Conventional & LTR® Trunking**

NEXEDGE™

http://nexedge.kenwood.com

have coverage in an area, other networks should provide backup. The Starhome Roaming Broker solution for new-generation networks will be developed in the project as an alternative to bilateral operator roaming agreements.

CELTIC is a European research and development (R&D) program that initiates and runs privately and publicly funded information and communication technology (ICT)/R&D projects. The FT-PSC project will allow European telecom manufacturers and software providers to test their products, results of R&D projects in international environments with participation of public-safety users. The test bed will use heterogeneous communications networks based on several standards such as GPRS, UMTS, wireless LAN (WLAN), WiMAX, TETRA, Tetrapol and Project 25 (P25) technologies.

MADRID — Spanish Group **Radiotrans** was awarded an international 10 million euro (US$15.1 million) public tender by the European Union (EU) for the supply, installation and maintenance of communications equipment and systems for the Delegations of its External Services Worldwide.

During the four-year contract, services will be delivered to more than 130 embassies of the EU around the world. Radiotrans will supply, install and maintain the EU delegations' radio communications equipment.

The European Commission External Service provides services to European citizens outside the EU for a worldwide diplomatic network.

LONDON — Ford Motor developed a new demonstrator featuring **Microbus** technology to provide a police-specification mobile-data and traffic-enforcement-ready vehicle.

Ford's Mondeo Estate car has a Microbus M-PC2 vehicle computer with a high-brightness touchscreen installed into the dashboard, allowing officers access to a suite of applications. Among the features are Microbus' digital video recording systems that use two Microbus ANPR cameras. The computer also drives a light bar and siren interface, stolen vehicle recovery application, and offers access to PNC and other databases.

The car will be available for demonstration throughout 2010 and will appear at various trade events.

SÃO PAULO, Brazil — CPTM selected **Tait Radio Communications** to supply a 16-site digital Project 25 (P25) conventional network. The network will consist of base stations to provide coverage to CPTM platforms and rail lines, mobiles for

Worldwide Solutions

Security

Transport

professional personal communication

Trunking MPT 1327 • Conventional PMR • CAD • Security • Transport

teltronic

www.teltronic.es

LATIN AMERICA/CARIBBEAN

Groups Scramble to Restore Emergency Communications in Haiti

By Michelle Zilis

Photo courtesy ITU

Workers survey damage in Haiti

Companies and organizations scrambled to re-establish emergency communications following recent devastating earthquakes.

On 12 January, a 7.0 earthquake devastated Haiti. The lack of communications jeopardized all aide efforts as workers struggled to find ways to communicate with each other, as well as other agencies. The quake shut down most radio communications and phone services. Before the quake, the impoverished nation had limited public-safety radio communications and only 108,000 fixed wirelines. The international community has been working to repair the systems, for the short and long terms.

Most nongovernment organizations (NGOs) and relief workers initially relied on satellite services to communicate. Restoration of voice communications, including radio communications, Internet and power supplies, is ongoing, said Cosmas Zavazava, chief of division, emergency telecommunications, International Telecommunication Union (ITU).

ITU deployed broadband satellite terminals with GPS capability for use in search and rescue, coordinating logistics, telemedicine and establishing public calling offices. ITU is also providing support to assess telecommunications network disruption and damage with the aim of rehabilitating those networks, Zavazava said.

"In the aftermath of the disaster, ITU will help Haiti plan and implement information and communication technologies (ICT) projects leading to the establishment of state-of-the-art communications networks," Zavazava said.

Much of the public-safety efforts, including the U.S. Marines and the government search-and-rescue crews, operated on their own communications networks. Ray Vaughan, a communications specialist for the urban search and rescue (US&R) Florida Task Force 1, said the force brought its own old two-way equipment, including repeaters and radios. In an Internet discussion forum, Vaughan said many of the NGOs and organizations coming to help don't have the budgets for their own communications systems and asked for donations.

Several radio communications companies helped with the relief efforts. Kenwood USA donated amateur radios to the ARRL, the national association for amateur radio. Icom America donated more than 150 communications equipment units from the marine, aviation and amateur divisions to be distributed through Mentone Communications Education Association.

Inmarsat and SkyTerra announced a joint initiative to provide relief organizations with enhanced access to mobile voice and broadband data services. Inmarsat works with many NGOs, humanitarian groups and emergency responders operating in Haiti, including TSF, World-Vision and NetHope.

Separately, the ITU deployed 25 satellite terminals to help restore vital communications links in the aftermath of the massive 8.8-magnitude earthquake and tsunami that hit Chile 27 February, killing more than 700 people and cutting communications links in the city of Concepción and towns along the coast.

ITU worked with Iridium Communications to ensure connectivity for satellite handsets, which will be used by local authorities to facilitate humanitarian assistance to disaster victims. ITU's area office in Santiago provided expert on-the-ground support to local authorities, as well as to the local United Nations (UN) operations center, to coordinate the restoration of damaged communications systems and manage spectrum requirements for the wireless systems used by humanitarian agencies.

"Communications networks were disrupted by this massive earthquake, hampering rescue operations and the delivery of essential logistics and services," said Sami Al Basheer Al Morshid, director of the ITU Telecommunication Development Bureau. "Our assistance will contribute toward the bridging of the current communications gap."

installation into CPTM trains and vehicles, and portables for CPTM personnel.

CPTM is responsible for the transportation of nearly 2 million metropolitan São Paulo commuters every day. The state government allocated US$12 billion to improve and extend the metropolitan rail network. The expansion will include the purchase of new trains, the modernization of railway stations, an upgrade of the signaling and telecommunications system, and an extension of railway lines to make the network four times bigger.

The platform's base stations will be configured to directly connect with a Zetron console system via an analog interface. Tait and Grupo MPE will integrate a new signaling and telecommunications system to reduce passenger travel time and the intervals between trains from six minutes to three minutes.

BRISBANE, Australia — Zetron's dispatch system was recently deployed for the Queensland Police Service (QPS) in Queensland, Australia, at the new North Coast Region Police Communication Center in Maroochydore. The 35-position system provides integrated radio dispatch and emergency call-handling for the region's rapidly growing Sunshine Coast.

This system is the fourth Zetron system to be deployed for the QPS in recent months. Others were installed in QPS communication centers at Cairns, Townsville and Rockhampton.

SAN DIEGO — Tachyon Networks announced a new fixed and mobile broadband satellite communications service for Southwest Asia, including Afghanistan. The solution includes high-power capacity, ground-based infrastructure, ultra-small aperture terminal (USAT) equipment and

ASIA

New Delhi Deploys TETRA Network for Commonwealth Games

HCL Infosystems, an Indian systems integration company, in partnership with Motorola, announced a US$21 million project from the Delhi Government to establish the country's first exclusive government radio network. The TETRA network will facilitate communications among various government agencies including the Delhi police, fire services, hospitals, public works department and the Delhi Transport during the 2010 Commonwealth Games in October and beyond.

"The deployment of the government radio network based on TETRA will not only enhance our communications infrastructure but will also place New Delhi among the leading cities of the world," said Savitur Prasad, secretary of information technology for the Delhi Government.

The network will cover the entire metropolitan area of the capital, including transportation networks, such as Delhi Metro Railway tunnels and New Delhi Airport Terminal-II. The network was designed to minimize the public-safety reaction time, ensuring minimal call drops and encrypted communications to maintain the highest levels of security.

The digital interoperable communications platform will operate on secured spectrum and will have 46 base stations. Communications on the GRN is encrypted, and the network is specially designed to ensure failsafe performance even during emergencies. The network will help multiple agencies collaborate over a single platform to ensure well-coordinated optimum response.

American International Radio, Inc.

3601 E. Alongquin Rd., #800 • Rolling Meadows, IL 60008 • USA
Tel: +1 847.818.9999 • Fax: +1 847.818.9190 • Web: www.airadio.com
Email: saftrbo@airadio.com

MOTOROLA distribution partner

Step Into the New Era of Digital Communication

The MOTOTRBO radio series offers a versatile and cost-effective solution to enhancing your calling capacity, voice and data communication clarity and optimizing productivity. Customize your MOTOTRBO radios by adding on the **SafeDispatch** application and enjoy even more flexibility and capability with your system.

> *Increased Calling Capacity*
> *Double the Number of Users Per Licensed Channel*
> *40% Increase in Battery Life Over Analog Radios*
> *Advanced Voice & Data Features with SafeDispatch Application*
> *Operate in Both Analog and Digital Modes*

MOTOTRBO™
Shift into digital.

Advanced Features with SafeDispatch Application :

Available Only Through AIR, Inc and the AIR Dealer Network

GPS LOCATION — **TEXT MESSAGING** — **EMAIL**

VoIP DISPATCH — **REPORTING**

- *Flexible Mapping*
- *Highly Scalable Solution*
- *Multilanguage Interface*
- *Customization Services*

AIR
Communication Solutions When It Matters

AIR delivers critical turnkey solutions around the globe. We are always looking for new partners to help expand our channel business and bring top quality products and solutions to consumers world wide.
To learn more visit us online at www.airadio.com/saftrbo.

managed network services operating in its Ku-band beams, achieving mobile data rates of 512 kilobits per second (kbps) moving to 2.8 Megabits per second (Mbps).

The service is targeted at communications on the move (COTM) in Southwest Asia and is suited to aeronautical broadband applications, such as high-definition full-motion video.

CHENNAI, India — Raytheon was awarded a contract by the Airports Authority of India to automate air traffic control services at the Chennai International Airport.

Raytheon will install its air traffic management system to help reduce delays in aircraft arrival and departure. The new system will also have real-time meteorological information to assist air traffic controllers in adjusting to changing weather conditions.

Raytheon is also upgrading air traffic management systems at the Chhatrapati Shivaji International Airport in Mumbai and at the Indira Gandhi International Airport in New Delhi.

MIDDLE EAST

BERLIN — EADS Defence & Security was awarded a contract by Germany's Federal Office for Information Management and Information Technology of the Bundeswehr (IT-AmtBw) to set up a nationwide Tetrapol radio network in Djibouti. This contract is an extension of the Tetrapol radio network installed by EADS for the police in Djibouti City as part of the German government's equipment support program in 2008.

The new contract will enable the police forces in Djibouti to carry out nationwide operations beginning in late 2010. The communications network comprises a central switching system linked to three base stations distributed across the country and connected via radio relay systems. Depending on topology and the required radio coverage, other locations will be equipped with independent digital repeaters (IDRs) connected via gateways.

The police forces will be equipped with handheld radio devices and vehicle radio devices. The system will be complemented by a separate training facility in Djibouti City, which will train the network's operators and users.

INTERNATIONAL

NEW YORK — Two separate digital radio associations announced interoperability initiatives. The NXDN Forum announced plans for interoperability and conformance testing procedures for NXDN products.

The testing procedures will be completed during mid-2010. Within 30 days after, certification of the test lab candidates will begin. Testing will be done at neutral labs certified by the NXDN Forum's steering committee. Initial product certifications will be awarded to members in the fourth quarter, said Mark Jasin, NXDN Forum chairman. He also announced collaboration with the digital Private Mobile Radio (dPMR) memorandum of understanding (MoU).

Separately, the Digital Mobile Radio (DMR) Association announced the first DMR interoperability test session will take place in Milan, Italy, the week of April 26.

The announcement follows progress defining a list of interoperability tests, suitable test methodology, testing laboratory criteria and a test result verification process for both conventional and trunked modes of operation. The test session will complete phase one of the DMR Association's interoperability program.

Motorola to Form 2 Companies

Motorola's mission-critical communications business will be a separate company by early next year under a plan announced by the company. Motorola is targeting the first quarter of 2011 for a planned separation into two independent, publicly traded companies. One will include the company's mobile devices and home businesses, and the other will include its enterprise mobility solutions and networks businesses, which includes two-way radios and associated equipment.

Greg Brown, co-CEO of Motorola, will be CEO of Motorola's enterprise mobility solutions and networks businesses. This business will offer an end-to-end portfolio of products and solutions, including rugged two-way radios, mobile computers, secure public-safety systems, scanning, radio frequency identification (RFID) and wireless network infrastructure.

Dr. Sanjay Jha, co-CEO, will be CEO of Motorola's mobile devices and home businesses. This business will offer a portfolio of mobile converged devices, home digital entertainment devices, and video, voice and data solutions.

Following the separation, both entities will use the Motorola brand. The mobile devices and home business is expected to own the Motorola brand and license it royalty free to the enterprise mobility solutions and networks business. Additional details regarding brand, capital structure and which entity will be distributed will be provided in the future, a company statement said.

One research group said the separation will further enhance Motorola's mobile radio division. "Last year, sales for the enterprise mobility solutions group represented $7 billion — a key element of this was its mobile radio business," said Jatinder Thandi, research analyst with IMS Research. "Looking ahead, the mobile radio industry is going through a large-scale migration from analog to digital. Motorola is in an excellent position, having a large portfolio of digital technologies that cater to all end users and key intellectual property rights (IPR) that will enable it to continue its dominance of the mobile radio industry."

The Motorola statement said there is no assurance that any separation transaction will ultimately occur and no assurances as to its terms or timing.

UNIMO

"Total Solution from Analog to Digital Trunked Radios"

TETRA

★ World's 1st GSM TETRA Dual Mode
- Data Communication
- High Level Security – Encryption

- AVL System
- SMS Communication
- Voice Communication

TETRA Portable

TETRA Desktop

TETRA AVL Terminal

UNIMO has been recognized as a leader in KOREA's Radio Communication industry since 1971.

Now UNIMO is delivering Digital Convergence Products – TETRA, TETRA Modem, TETRA AVL Terminal, TETRA+GSM Dual mode phone, TETRA+CDMA Dual mode phone.

"IP67 Waterproof"

new

Portable Radio PZ-100 PZ-400

VHF 136~174MHz
UHF 400~512MHz

- GPS / Bluetooth (Options)
- Voice equalizer / Whisper
- Emergency / Scrambler
- Remote Stun & Revive
- Programmable Home Channel
- 512 Channels
- Graphic LCD
- Wireless cloning

VHF (5W/2W) / UHF (4W/2W)
7.5V DC 2200mAh (Li-ion)
53(W) x 102.4(H) x 32.5(D)mm

149g (Without Batt)

new

Portable Radio PX-100NW PX-400NW

VHF 136~174MHz
UHF 400~512MHz

- Home Channel (Dual PTT)
- High Power Loud Speaker
- Emergency function
- Stun & Revive
- Scrambler & Descrambler
- 16 Channels
- DTMF Encoder
- 2-Tone Decoder

VHF (5W/2W) / UHF (4W/2W)
7.5V DC 1800mAh Li-ion
56(W) x 110(H) x 32(D)mm

142g (Without Batt)

Voice Recording Pager VRP-100 / VRP-400

VHF 136~174MHz / 5 Bands
UHF 400~470MHz / 8 Bands

- Pocket Size-Easy to carry
- Light Weight
- High Quality Speaker & Sound
- Rain Proof (IP-54)
- 2-Tone
- Vibrating & Voice Storage Mode

2.4V DC Ni-MH / 3V DC (2xAAA)
54(W) x 83(H) x 24(D)mm

82g (Without Batt)

TETRA Portable MU-1000

350~380MHz
370~400MHz
400~430MHz
450~470MHz
806~870MHz

- GSM / CDMA module (Options)
- True Color Menu driven GUI
- Push To Talk & Trunking(Telephony)
- Group Call & Individual Call
- Short Message Service
- Packet Service
- Roaming & Handover
- GPS based Location Service
- E2E Encryption

1W for 800MHz / 3W for 400MHz
7.5V DC 1800mAh / 1350mAh Li-ion
48.5(W) x 146(H) x 34(D)mm
(With 1800mAh Battery)
280g (With 1800mAh Battery)

RoIP Gateway & Wall Radio

- 4 Communication Channels for different type of radios (with/without internet service)
- Stimulated Communication with TETRA, VHF and UHF
- Stimulated Communication with Skype
- High Quality Voice
- Gateway:
  292(W) x 65(H) x 170(D)mm
- Wall Radio Box:
  360(W) x 60(H) x 240(D)mm

- Visit homepage www.unimo.co.kr/eng for more products.
- All products with ISO 9001 and ISO 14001.
- All products are made in KOREA.
- CE, FCC, IP54 and MIL-STD 810 E/F approved.

"Distributors Wanted"

UNIMO Technology

479-12, BANGBAE-3 DONG, SEOCHO-GU, SEOUL, KOREA
TEL: 82 2 3470 4491~3 FAX: 82 2 581 3107
E-mail: radiosales@unimo.co.kr http: //www.unimo.co.kr/eng

CE FC

* All specifications are subject to change without notice.

Transportation Radio Solutions

Photo courtesy Tait

The best technology choices for planes, trains and buses depend on specific user requirements.

By Lindsay A. Gross

There are a myriad of factors to consider when selecting the most appropriate technology for transportation communications. Mobile radio solutions for transportation use a variety of technologies, including analog and digital, and incorporate a mix of public and private networks. "If ever there were a perfect match between a sector and a technology, then surely it must be transportation and mobile communications," says Mark Thomas, strategic marketing director for Team Simoco. "Increasingly, there is a drive to get more from each asset to ensure that vehicles can be kept out on the road or track for as much time as possible, making it essential for communications to be mobile."

The most fundamental need is to maintain contact with vehicles — buses, trams, metro, rail or airports/airlines — to ensure the most basic level of safety for both drivers and passengers. "However, having established basic mobile communications, application providers have driven the sector forward with a variety of solutions tailored to specific needs, progressing from safety to efficiency and cost reduction, to customer service and now, increasingly, environmental management," Thomas says.

Whatever the sector within the transport industry, mobile communications to support both voice and data are key to safe and efficient operations. "It's often the case in the transport sector that care must be taken with regard to the actual environment into which the radio system will have to be installed," says Duncan Swan, partner with Analysys Mason, a consulting firm. "Be sure to be clear in any procurement just what size, space and power constraints must be considered."

Buses

Different transportation communications types often vary based on user requirements. "For example, in rural areas or small towns, buses will probably only need simple voice communications for status updates, which only requires repeaters and either a quasi-synchronous system or a single trunked system," Thomas says. "However, with urban buses and trams, the requirements are likely to be more complex, calling for status and real-time passenger information (RTPI), voice communications including call features, traffic light control and alarms, which rely

Mission-Critical Mobile VPN for TETRA & Broadband Networks

New mission-critical Mobile VPN software makes it possible for mobile workforces to securely and simultaneously communicate with headquarters over any number of wireless network technologies, utilizing a laptop or a PDA for access from the field. Providing security features like user authentication, device authentication and data encryption, Mobile VPNs improve connectivity so that application sessions are uninterrupted even when network connections temporarily drop due to signal loss.

TETRA Optimization

Radio IP Software's Mobile VPN solutions combine TETRA voice networks with IP data applications. TETRA data performance is optimized and in turn, so is mobile workforce productivity.

82KB / .doc file	6x faster
66KB / .bmp file	27x faster
4.37MB / .txt file	154x faster

Roaming and Policy Management

The software seamlessly roams from one network to another, allowing mobile workforces to combine their PMR or TETRA infrastructure with cellular or Broadband IP networks to take full advantage of emerging bandwidth-hungry applications and to extend coverage where needed. IT Administrators are able to set policies to better manage which network will carry a specific application's data based on priority, application need, time of day or cost of access.

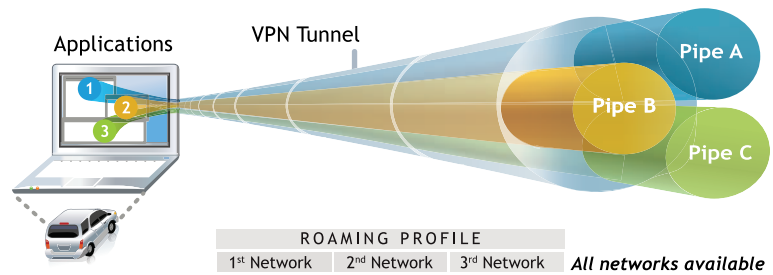
Concurrent VPN – The Future of Mobile VPN Technology

So far, mobile workforces are able to roam from one network to another, but are not able to access both at the same time -- a real problem for emergency responders because mission-critical data applications, such as computer-aided dispatch (CAD), should generally be ensured to transmit over the most reliable wireless network available. Bandwidth intensive applications with less severe security and resilience requirements -- for example, video streaming -- should be able to concurrently transfer data over 3G or broadband networks without impacting or being impacted by applications that are transmitting over mission-critical PMR systems like TETRA at the very same time.

With Concurrent VPN technology, due to be widely available in 2010, users will be able to transmit over multiple networks simultaneously, thus maximizing their infrastructure resources and saving time and money. Concurrent VPN bridges the best features of multiple networks and creates what amounts to a single "network of networks" to achieve a high level of performance, reliability and trusted access.

About Radio IP Software

- Privately-owned corporation founded in 1998
- 500 customers worldwide, primarily in the public safety, utility and mobile government sectors
- Product lines: Mobile data connectivity software including Mobile VPN (mission-critical & business-critical)
- Partners with industry leaders in wireless network infrastructure, cellular networks, global satellite networks as well as mobile device vendors, application vendors, solution integrators and value-added resellers



ROAMING PROFILE	1st Network	2nd Network	3rd Network	*All networks available*
A	PMR	Cellular	Satellite	Application 1 running on PMR
B	Cellular	Broadband		Application 2 running on cellular
C	Cellular			Application 3 running on cellular

For more info, visit radio-ip.com/en/technology/concurrent-vpn.html
Tel: 877-717-2242 | +1 514-890-6070 | Email: info@radio-ip.com
Member of the TETRA Association

Radio IP

Photo courtesy Tait

Photo courtesy Teltronic

MPT 1327 is often used for communications on buses, GSM-R for the rail industry, and TETRA for light rail (metro) and airlines/airports.

on multisite trunked systems."

For many of Tait Radio Communications' public transport customers in Europe, MPT-1327 analog trunked networks have been the preferred communications solution, says Paul Gwynn, the company's global transport sector manager. Analog trunked networks offer both comprehensive voice and data services within the same radio infrastructure and terminals. Digital Mobile Radio (DMR) and MPT 1327 solutions are available across a wide range of PMR frequency bands, which require compliance with the ETS 300-113 standard and can coexist with 12.5-kilohertz users. "Some technologies, on the other hand, are available only in a limited number of frequency bands, and require dedicated spectrum to avoid interference," Gwynn says.

London Bus — responsible for Europe's largest bus fleet — operates an MPT 1327-based system that was implemented as part of the iBus project during the past three years, Swan says. Supplemented by GPRS and local Wi-Fi-based data services, London Bus benefits from a range of voice and data applications including:

■ Location services to enable better control of buses;

■ Historical monitoring of bus performance;

■ Real-time information to passengers; and

■ Integration of traffic enforcement and bus priority.

"With an MPT system, a transport organization can incorporate dedicated data channels to efficiently transport the data required in an automatic vehicle location (AVL) and control system," Gwynn says. "In addition, the bus radio used in conjunction with the onboard computer can provide communications for ticket machines, traffic signal priority, sign clear down, voice announcement and passenger counting data."

According to Peter Clemons, director of telecommunications for Teltronic, AVL is becoming a common feature for managing large fleets of buses and trams in urban mass transit systems. "The increased availability of GPS for onboard radio units opens up a wide range of applications from the control room to passenger information services in the vehicle itself and at bus stops," Clemons says. "However, it is critical for the customer to choose the right technology and sufficient network capacity to be able to handle data refresh times without clogging up the network and putting critical voice communications at risk."

Rail Industry

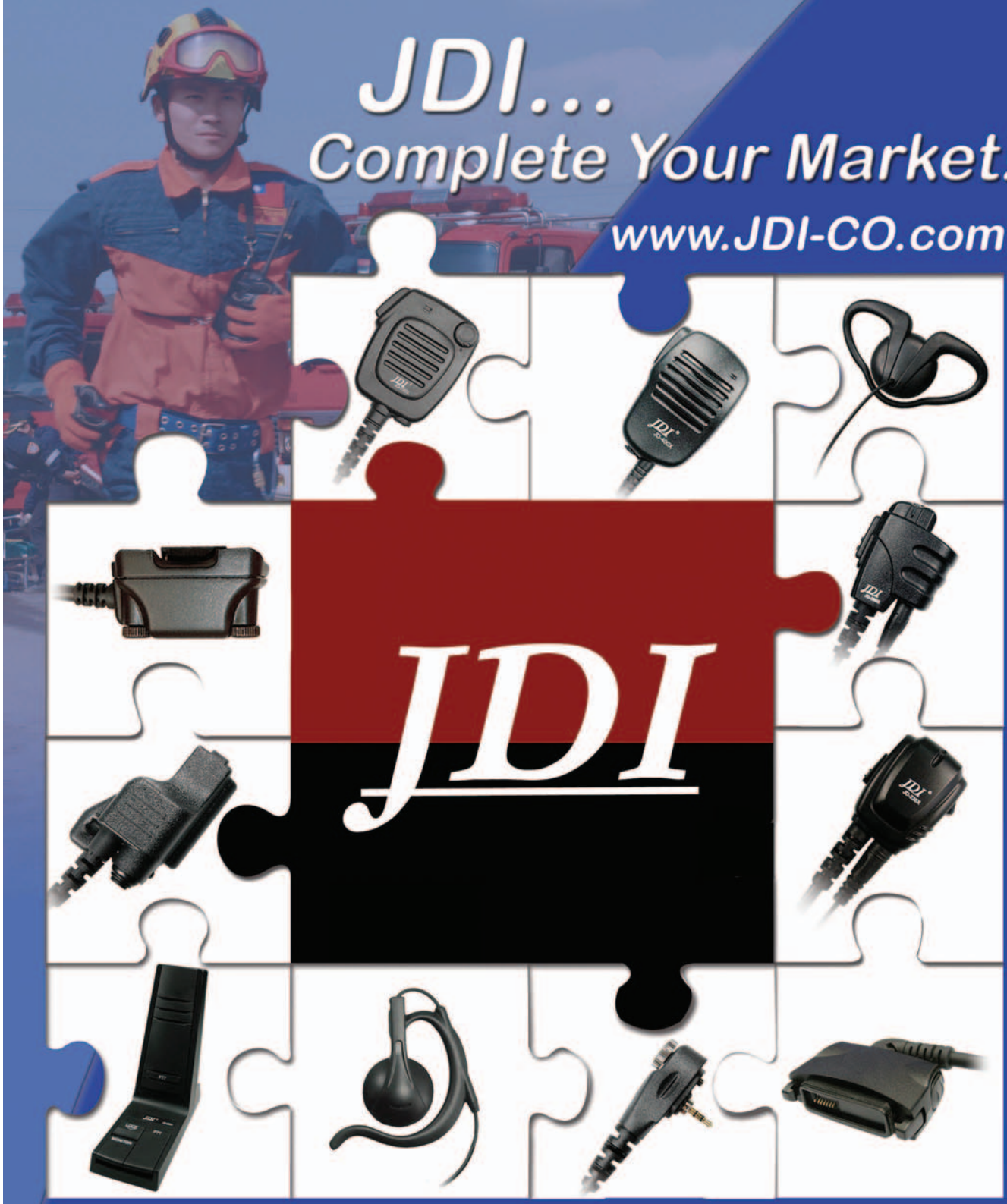
One of the fiercest battles between technologies across the world continues in the rail industry — TETRA versus GSM-R, Swan says. "It would be easy to segment the rail industry such that light rail (metro) equals TETRA and heavy rail equals GSM-R. But that is to underestimate the intense competition that continues between the suppliers of the two technologies," he says.

Metro. Some metro systems are now deploying broadband wireless to communicate data across their system and to meet the needs of voice, alarm and status communications. The London Underground network uses a TETRA-based system delivered as part of the Connect project. In Asia and Latin America, the vast majority, if not all of the metro projects seeking new mobile radio solutions are tending to specifically request TETRA be provided as the bearer of choice. Yet in Australia, especially Sydney and Brisbane, there has been a tendency toward GSM-R, Swan says.

The metro environment is particularly challenging as new metro lines cutting through high-density urban environments often run farther underground, Clemons says. "For

JDI...
Complete Your Market!

www.JDI-CO.com



IWCE 2010
March 10~12, 2010 Booth No.: 2085

Hong Kong Electronics Fair (Spring Edition)
April 13~16, 2010

Tetra World Congress 2010
May 24~27, 2010 Booth No.:F102

JDI JING DENG INDUSTRIAL CO., LTD.
+886 2 29822275 jdi@ms13.hinet.net
TAIPEI. TAIWAN.

CE RoHS

"According to the latest TETRA Association figures, the number of TETRA systems installed in the transport sector overtook the number of public-safety networks during 2009."

— Peter Clemons, Teltronic

example, the Barcelona Metro Line 9 will drop to approximately 70 meters below ground," he says. "A comprehensive TETRA network is being implemented with special and fully redundant communications racks on each train, connected to the train control management system (TCMS) and special vandal-proof radio consoles at each of the wagons."

Railway. GSM-R is the main technology used on railways. The GSM-R pan-European rail network is at the center of coordinating fast and efficient rail travel throughout Europe, establishing a European network that is operational regardless of borders, Thomas says. Sheer distance is one of many factors in selecting the most appropriate technology. In larger countries such as certain African nations and Australia, it may not be as economical to install GSM-R infrastructure in areas with low-traffic density. "A combined solution of GSM-R and PMR systems can be used instead," Thomas says.

TETRA is finding it harder to make progress in the mainline railway sector, Clemons says. In Western Europe in the 1990s, GSM-R, a variation of GSM, was mandated for use by mainline railways, "mainly because of the fact that TETRA hadn't been deployed," Clemons says. Russia's 800-kilometer Moscow to St. Petersburg rail link uses TETRA, along with the Taiwan high-speed rail link and an increasing number of routes across China. Teltronic has also deployed TETRA networks on suburban railways in Mexico and Brazil.

"Considering that TETRA is dominant in metro, tram and light railway solutions across Europe and the world, there should be no reason why it can't provide competition for GSM-R in Europe," Clemons says. Swan agrees. "If TETRA can be proved to support the Electronic Train Control System (ETCS), then perhaps there will be an alternative bearer choice for those railway operators mandated to support train signaling," Swan says.

KIRISUN

Professional Two-way Radio

FC CE • ISO9001:2008 Accredited Designer & Manufacturer

PT568

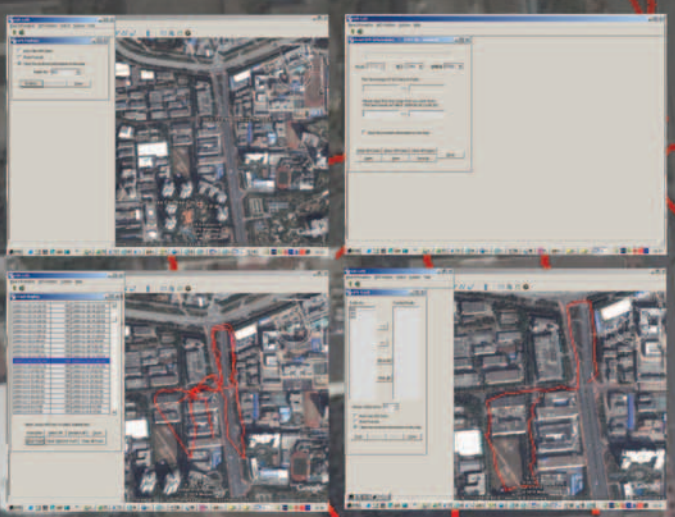
Professional Portable Radio

- 16 Channels
- Computer Alignment & Programming
- Palm Size & Rugged Structure
- Patented Battery Locker
- Auto-power Saving
- Channel Annunciation
- Emergency Alarm

GPS monitoring system

Make Your Connection to the World Easier!

Kirisun GPS monitoring system integrates technology of computer network GPS radio communications, GIS, radio dispatch and other cutting-edge technology, and provides the dispatch management platform with GPS location tracking, real-time monitoring and track log, remote control, and data-base management.



GPS System Features

- Work with Google Earth, free and distinct.
- Work with Microsoft Access, easy to get and use.
- You can locate/track a certain radio or a group of radios.
- You can check and playback tracking data stored anytime.
- You can get the GPS data stored in the radio in wired or wireless mode, and replay the tracks.
- You can monitor one or more GPS radios by a preset patrol list(s) and alarm when out of planning.

Manufactured by KIRISUN Electronics (Shenzhen) Co.,Ltd.

CONTACTS: **Tel: + 86 - 755 8609 6076 Fax: + 86 - 755 8609 6018** E-mail: export @ kirisun.com

"It would be easy to segment the rail industry such that light rail (metro) equals TETRA and heavy rail equals GSM-R. But that is to underestimate the intense competition that continues between the suppliers of the two technologies."

— Duncan Swan, Analysys Mason

Airlines/Airports

In the airline and airport industries, mobile radio communications also plays a big part in ensuring efficient operations. Productivity is particularly important. "At airports such as London's Heathrow, network and software service providers are building application-focused network solutions that enable radio users to access a range of mission-critical applications, putting the information they need to carry out their job into the palm of their hand," Thomas says. "These are highly tuned networking solutions deploying modern TETRA networks and the latest digital compression techniques to maximize application performance over the relatively narrowband world of radio networking."

There have been a number of innovative uses of mobile radio worldwide in air-travel related industries — one of the simplest being the formation of a talk group set up specifically for each flight so that all resources can work and communicate together, Swan says. "The use of short data applications can further enhance efficiency; aircraft dispatching is process driven so tasks are completed, relevant forms can be filled and filed; and at larger airports, the use of location-based services play an important role," Swan says.

TETRA is increasingly becoming the technology of choice for transportation communications such as metros, buses, airports and ports around the world, according to Clemons. "In fact, although many would consider TETRA to be a public-safety solution, according to the latest TETRA Association figures, the number of systems installed in the transport sector overtook the number of public-safety networks during 2009," Clemons says. ■

Lindsay A. Gross is managing editor of *RadioResource International*. E-mail comments to editor@RRMediagroup.com.

Ensuring Safe and Reliable Communication... When You Need It Most!

When you use TETRA radios in critical situations, you need to be able to fully rely on them. The Willtek 2303 Stabilock® TETRA Mobile Station Tester helps you make safety-critical communications as reliable as possible. Its unique architecture and rich feature set make it the first tester specifically designed for TETRA radio service.

- Supports TETRA radio tests relevant for service
- Intuitive and failsafe user interface
- Automated testing capability
- Portable, lightweight and compact

Visit us at the
TETRA World Congress
Booth #F112

For more information visit us at **willtek.com/tetra** or call:
+49 89 99641 132 (Germany)
+44 161 486 3353 (U.K.)
+65 6827 9670 (Singapore)
+1 973-386-9696 (U.S.)

Wireless Telecom Group
Boonton Microlab Noisecom Willtek

Willtek

A TETRA and DMR Comparison

Both standards have advantages for users upgrading to digital technologies.

By Roberto Marengon

Photo courtesy Motorola

People perceive the term digital as more advanced and better than analog, because digital presents a number of attractive advantages to users. Two digital technologies — TETRA and Digital Mobile Radio (DMR) — offer different benefits, but which is the right choice for your system? When a user decides to upgrade a mobile radio system, many factors should be considered. TETRA often presents high infrastructure costs. Are these costs appropriate for the given benefits compared with the emerging DMR solution? Understanding some of the key points that characterize each of the digital technologies will help you make the best decision.

History of the Standards

TETRA standards development started in the European Telecommunications Standards Institute (ETSI) in the mid-1980s by a group of radio manufacturers. The initial requirement was a digital standard to replace the MPT 1327 analog trunked networks and to introduce a number of new features. The primary market segment intended for TETRA was the public access mobile radio (PAMR) market, where operators charge users service fees for trunked radio services. In the 1980s, many European countries had a strong interest in national PAMR systems for private dispatch communications and telephony. The standard specifications were written following the main needs of a PAMR system to maximize traffic capability.

ETSI chose a TDMA access and modulation schema to decrease the cell dimension and to increase traffic density. More traffic equals more business. ETSI spent several years specifying the standard because of the high complexity of the initial requirements — efficient linear modulation, vocoder selection, powerful protocols, field experimental tests and others.

During the same time, GSM networks expanded their coverage outside towns with reasonable and decreasing costs. As a result, an important part of the mobile radio market intended for TETRA was devoured by GSM technology. The huge effort needed to develop TETRA, together with the market contraction, produced economic disasters for many companies involved in TETRA's development. The surviving companies identified a new market segment to help pay for the investments — public-safety services. The manufacturers, with the contribution of some European governments, oriented their efforts to the more profitable security market. TETRA is the most popular solution for public safety in Europe, although the costs and economic crisis have

Hytera™
Respond&Achieve

NEW PRODUCT ALERT!

Hytera Digital Two-way Radio System

TETRA DMR

TOP-NOTCH DIGITAL RADIOS at ANALOG PRICES!

DMR DIGITAL MOBILE RADIO ASSOCIATION

Introducing Hytera DMR Digital Radios

Hytera DMR digital radios enable clear and consistent communication with innovative technologies, versatile features and reliable quality.

- **Large Buttons for Easy Operation**
- **Compact Size & Ergonomic Design**
- **Digital Migration Made Easy with Analog Compatibility**
- **Enhanced Audio & Big HD Color LCD**
- **Reduces Costs by Optimizing Frequency Resources**

Hytera Tetra Series Also Available

As one of the world's leaders in Tetra technology, Hytera provides professionals with customized communication solutions for their organizations. This digital trunking system offers voice and data transmission services for emergency, commercial, industrial and public communication.

For More Information:
1-800-845-1230
marketing@hytamerica.com

Hytera Communications Corporation Ltd. www.hytera.us

TETRA is often the best choice for medium- to high-capacity trunked networks with high traffic volume and low coverage areas, such as large industrial sites, large campuses, airports and similar locations.

slowed implementation in some countries.

DMR's history is shorter and more recent. The DMR standard was published by ETSI in 2006 and optimized at the end of 2007. DMR was developed to substitute analog two-way radio systems with a pin-to-pin digital solution, meaning the digital system should perform the same coverage and application schema — repeater, multisite network, simulcast and trunking — as the previous analog network. Motorola played an essential role in the specification activities and was the first actor in this new segment of the professional mobile radio (PMR) market. Less effort was needed to develop a DMR radio, because DMR is a less complex technology than TETRA. The standard offered a reasonable investment for several radio manufacturers. Motorola, Selex Communications, HYT, Funkwerk and Radio Activity offer commercial DMR products, and Tait, Team Simoco and Vertex Standard plan to offer DMR equipment.

Feature Points

DMR and TETRA are digital standards, and they provide some similar benefits to end users — encryption, which is more robust in TETRA; efficient data communications for GPS positioning, messaging and others; automatic handover and roaming; authentication; direct mode communications; and private and conference calls. The time division full-duplex operation of terminals is available only in TETRA. The DMR standard specifies it, but no terminals yet perform time division full-duplex operation.

Coverage versus Traffic. A customer should determine if it's more important to fulfill high traffic needs or a large coverage area. While TETRA is designed to support high traffic volumes with small cells and a large number of channels, DMR works with large cells similar to analog systems, but DMR isn't optimized to manage many channels. This point is important, because decreasing the cell radius may require more sites to cover the same area. DMR was developed to cover

SmarTrunk Systems, Inc.

This is the authentic controller! Do not accept cheap copies!

New ST-858 SmarTrunk Xpress Base Radio Controller

Backwards compatible with SmarTrunk II

Fly Faster with SmarTrunk Xpress Technology

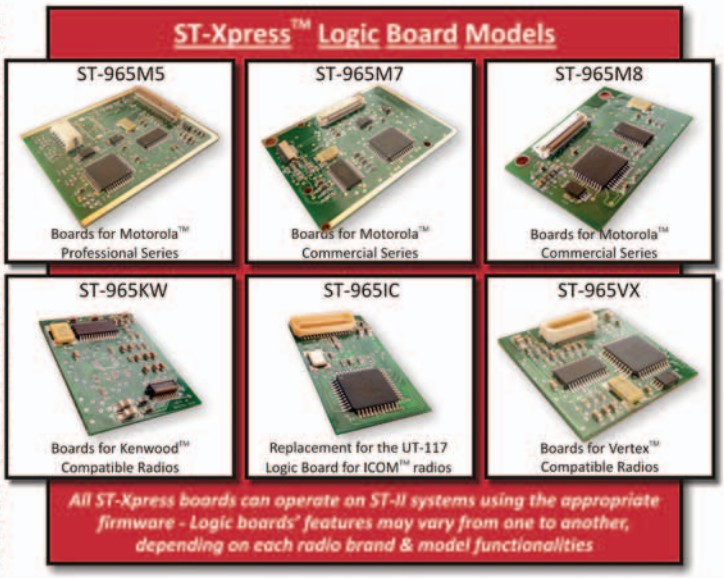
Over 15 years of experience in Radio Trunking equipment had lead us to design and develop a completely innovative controller and logic board series. SmarTrunk Xpress is the latest technology in trunking equipment for LMR

The SmarTrunk Xpress protocol is a result of years of investigation and hard work. The ST-858 has been designed to fix the channel acquisition time **-e.g. 10 channels: 500 ms-** that the obsolete ST-853 was not able to resolve, add functionalities, and enrich both, system administrators and user's experience. The new ST-858 ST-Xpress controller **supports SmarTrunk II protocol**, and it is manufactured in 3 different models, from 1 through 4 controller boards in only one rack unit, in order so save rack space at the installation.

ST-Xpress™ Protocol Key Features

- ✓ More reliable and faster channel acquisition (**500 ms** fixed) independently on the quantity of channels in the system
- ✓ PTT Alphanumeric ID on group calls
- ✓ Detailed calls record - *including individual ID's even in group calls!*
- ✓ Advanced subscribers database
- ✓ Older logic boards can also operate on a ST-Xpress System
- ✓ Dynamic subscribers regrouping using the keypad
- ✓ ST-Xpress boards can operate within old ST-II systems
- ✓ Standalone single site ST-Xpress systems can be easily upgraded to Multi-site adding the ST-310/510LT/510Full Wide Area Roaming Network

ST-Xpress™ Logic Board Models



All ST-Xpress boards can operate on ST-II systems using the appropriate firmware - Logic boards' features may vary from one to another, depending on each radio brand & model functionalities

SmarTrunk Systems, Inc.

867 Bowsprit Road Chula Vista (East Lake), CA 91914. United States of America
Tel.: +1 619 426 3781 - Fax: 619 426 3788

website: www.smartrunk.com
e-mail: salesinfo@smartrunk.com
Support: techsupport@smartrunk.com

wide areas with low density.

The TETRA modulation schema is a linear four TDMA channels in a 25-kilohertz channel. The modulation implies that the maximum RF power available on TETRA portable terminals is lower than for DMR — up to 2 watts compared with 5 watts for DMR. Sensitivity is less in TETRA than DMR because of twice the bandwidth of the receiver. In addition, TETRA works only in the UHF bands, so the propagation effects also reduce the coverage capability. DMR uses a robust fixed envelope modulation schema that provides the same RF power and sensitivity of conventional analog systems. DMR offers similar coverage performance; no more sites are needed to change an existing system from analog to DMR technology. DMR performs with two TDMA channels in 12.5-kilohertz spacing per carrier, so it requires a more expensive branching system to increase the number of desired channels. Some DMR trunked systems are in development, but they are not available yet.

Network Backbone. There are several media, including copper lines, multiplexed audio lines, UHF narrowband channels, IP networks and public switched telephone network (PSTN), used to connect analog base stations. The TETRA interconnection backbone must ensure a bandwidth of several Megabits per second (Mbps) to serve the fast signaling needed for correct operations. It is hard to achieve such bandwidth in most analog connection supports. The DMR bandwidth requirement is low. A few tens of kilobits per second (kbps) are enough to carry both the two channels and all the related signaling. A narrowband UHF link also operating in nondirect visibility or a traditional phone modem can connect two or more DMR base stations. This is another example of DMR pin-to-pin substitution of an existing analog installation.

Network Management. For an emergency organization, it is essential to efficiently manage all the communications resources during disaster events. Many emergency services agencies have internal technical services to guarantee fast and secure operations in extreme cases. In these occurrences, complexity should be avoided, and technical staff must be able to easily modify, repair or reconfigure the system. A crash in a node of the system should not cause a communications blackout. The complexity of TETRA infrastructure elements — base stations and switching nodes — are not easy to understand, manage and reconfigure. TETRA networks outsource maintenance activities. DMR systems are similar to well-known analog networks, and the main operations don't differ significantly. Staff skilled in analog radio can be trained to efficiently operate DMR infrastructure, so mission-critical organizations can have full control of their

mobile communications resources.

Analog-to-Digital Migration. Because of its analog/digital dual-mode feature, DMR offers a natural migration path from analog to digital radio systems. The DMR standard covers all the most used analog solutions such as single site, multisite, simulcast and trunking. A customer can start to implement DMR radio infrastructure over an existing analog network, reusing sites, antennas, power supplies, branching, connection links and frequency licenses. If problems are discovered, they can be solved more easily in analog mode than in digital. The customer can gradually implement the new DMR equipment working in dual mode and interoperating with the analog network.

TETRA migration presents a different scenario: TETRA is a revolution in the radio approach for infrastructure aspects and for end-user operations. TETRA offers few possibilities of interoperability between digital and analog terminals. TETRA is a trunked-only standard and operates in UHF spectrum in Europe. There are also TETRA systems in the Middle East, Africa, Asia, and South and Latin America. Tuning a new digital system could require some time to solve unknown problems in an unfamiliar environment. The migration from an analog system to TETRA produces an abrupt discontinuity and requires a switch to the new radio system at the same time.

Spectrum Efficiency. The spectral efficiency of TETRA must be considered accurately. TETRA gives three (plus one for control) channels in 25-kilohertz channel spacing compared with the 6.25-kilohertz channel of DMR when no control channel is requested. The lower carrier to interference (C/I) protection ratio of the TETRA modulation and the poor adjacent channel selectivity reduce the spectral efficiency. It takes more distance to reuse the same frequency and causes more spectral pollution. TETRA requires a continuous control channel on air, so the power supply requirements of a base station may be several times greater than for DMR base stations. Unlike DMR, it is difficult to use solar cells to supply TETRA infrastructure.

DMR is especially suited to large areas with relatively low traffic applications where simulcast gives the best performance.

The major difference is the modulation scheme. For pi/4-DQPSK modulation, TETRA requires super linear power amplifiers that result in high DC power consumption and poor efficiency because of the combined amplitude and phase modulation. The constant envelope modulation of DMR, 4FSK frequency modulation, has an efficiency advantage over TETRA of a factor of about two to three.

Vendor Environment. TETRA takes advantage of a mature multivendor environment. The major manufacturers have standardized and made interoperable radio platforms, so it is easy for a customer to select the best supplier. Hundreds of successful installations provide confidence about the stability of the TETRA solution. DMR is too young for such an environment. There are some important ETSI unspecified points for DMR such as the vocoder (AMBE II+ will likely be the de facto standard), interoperability tests, encryption coding and most services including positioning. The manufacturers said they need interoperability to take advantage of a true open market, but DMR presents some proprietary features. Some manufacturers are developing trunked solutions for DMR, but based on available information, each vendor protocol looks different and incompatible.

Costs. TETRA was designed to cover the PAMR market with every imaginable feature, so complexity and development costs contribute to the final product cost. The trunking approach requires fast and expensive dedicated switch nodes to run the full protocol. The connections between base stations and the nodes must support several Mbps of bandwidth to avoid excessive signaling delays. The number of sites required to perform the same coverage of an existing analog system may be twice or more. More sites mean not only a higher initial investment, but also fixed costs because of maintenance, site rent, frequency licenses and backbone links. Moreover, a linear modulation requires more expensive hardware and implies higher energy consumption and dissipation.

TETRA offers advantages and disadvantages compared with DMR, and it is often the best choice for medium- to high-capacity trunked networks with high traffic volume and low coverage areas, such as large industrial sites, large campuses, airports and similar locations. DMR offers a true replacement of analog systems with all the benefits of a digital solution. Some care has to be taken when a trunked system is needed due to the proprietary and not-yet-available DMR trunked solutions. DMR is especially suited to large areas with relatively low traffic applications where simulcast gives the best performance. ■

Roberto Marengon is the managing director of Radio Activity, a radio communications engineering firm. He started his career at Alcatel, developing the first Italian 900 MHz cordless telephone. He was the research and development manager of Prod el SpA (formerly Marconi Group and now Selex Communications) for more than 10 years, developing a new generation of simulcast networks. In 1998, he started engineering company SIEL TRE Srl, focused on maritime radio applications, and launched Radio Activity in 2003. E-mail comments to r.marengon@radioactivity-tlc.it.

Photo courtesy Getty Images

Integrated Technology

Secures UAE Grand Prix

By Siva Sivakumar

Abu Dhabi is home to the world's newest and perhaps most technically advanced motor racing facility — the Yas Marina Circuit, site of the United Arab Emirate's (UAE) inaugural Etihad Airways Formula One World Championship Grand Prix 20 October – 1 November 2009. The name Abu Dhabi can be traced to the Arabic Ab zab — meaning father of gazelle — so it's no wonder the emirate has an innate passion for speed. Within two years, the barren sands of Yas Island have given way to a luxurious venue that includes a marina adjacent to a state-of-the-art motor raceway straddled by a five-star hotel and bordered by covered grandstand seating for 50,000 spectators at strategic vistas around the track.

The Formula One Higher Security Committee, comprised of the Abu Dhabi police and a number of government agencies including the emirate's armed forces, contacted UAE-based Atlas Telecom for a video surveillance solution. VDG Security, a video firm from the Netherlands, installed more than 250 cameras throughout the Yas Marina Circuit property. The cameras fed into a video management system and a wall of monitors at a server center. That building was in turn linked by a WAN connection to the command operations center, as well as a redundant center at a remote location.

Mohamed Al Mutawa, head of Atlas' security division, deployed software from Solacom Technologies to integrate several mobile command centers, including a tethered dirigible floating high over the site. The new system integrated radio in a mobile VoIP environment over a wireless network. A month before the race, installation and testing of the LibertyCOMMAND integrated software for strategic command centers began.

"When we started the project, many had questions regarding the ability to provide an integrated video system involving mobile and static environments," Al Mutawa says.

The inaugural Abu Dhabi race witnessed a number of firsts — including the first day into night Formula One Grand Prix. For night operations, the mobile command centers were equipped with high-resolution day/night vision cameras, as well as radars. All cameras and radars fed into encoders, and each center, except for the dirigible, also had an IP phone supplied by Solacom.

The encoded video and the VoIP calls were transported over a wireless mesh network to the server center. The command operations center and remote backup center were each equipped with a workstation with the software and an IP phone.

Operators at the prime and redundant command operations centers selected and viewed the video feeds from any of the mobile command centers. The operators instantly communicated by voice or conference with security agents in the vehicles, or anywhere else, for rapid response to developing threats. Security agents within the mobile command centers communicated by VoIP to other mobile agents, the command operations center or both.

"All were impressed with how we moved video from multiple mobile cameras into one coherent picture with no issues regarding latency or integration," Al Mutawa says. "Without exception, the ability to show anyone a view at any point and at any time as to what was happening, made a great difference in making everyone comfortable with the security arrangements at the event."

In fact, the system was engineered to integrate more than 250 mobile and static cameras into one common operating picture with remote pan tilt zoom (PTZ) control for all cameras. The system also recorded and time stamped all video and imagery, as well as interfaced with database applications for facial, license plate and object movement recognition.

For increased mobility throughout the perimeter, the Yas deployment could have extended actionable situational awareness to portables such as smart phones or personal digital assistants (PDAs), with video, data and voice connectivity to the command operations center. Other features such as text messaging, group calling and networking, hot button customization and direct public announcing access from phone networks could also play a role in event security. Solacom technology has also caught the eye of neighboring Saudi Arabia, where the Royal Saudi Navy is set to deploy multiple LibertyCOMMAND systems this year. ■

Siva Sivakumar is vice president of advanced mission systems for Solacom Technologies. E-mail comments to schandrasekaran@solacom.com.

www.tetra-association.com DISTRIBUTED WORLDWIDE

TETRAnews

Critical communications for all professional users ISSUE 1/2010

CRITICAL COMMUNICATIONS FOR A NEW DECADE

Phil Godfrey, Chairman, TETRA Association

It is sobering to realise that already we are embarking on a new decade. Perhaps even more sobering is to reflect back and see just how far TETRA has come since the year 2000. The technology is now established in 114 countries of the world and without doubt has become the technology of choice for public safety, the transport industry, utilities, petrochemical and others. This surely makes TETRA the most widely accepted digital technology in the Land Mobile Radio business.

Phil Godfrey

But what of the coming decade? Well there is plenty still to do. TEDS technology will bring TETRA's data capability up to a more useable data rate of 150kbit/s and upwards resulting in many more data applications becoming viable. In addition, the Association has been working with ETSI on a project to develop a Broadband capability for the future. This will ensure that TETRA remains a relevant and current technology.

Of course our work is not over in developing new markets, and work with the regulators in the USA and Canada may yet see North American users enjoying the benefits of TETRA technology in the not too distant future.

There is no question that the beginning of the new decade is an exciting time and there is nowhere better than the forthcoming TETRA World Congress to learn and to discuss what is coming next, and to see what our industry partners have in store. Join us in Singapore for what is guaranteed to be a most memorable event.

The global TETRA community will meet for the 12th TETRA World Congress at the Suntec Singapore International Convention and Exhibition Centre – Tuesday 25th to Thursday 27th May. To join us, visit www.tetraworldcongress.com/association

INDUSTRY FIRST

Fire departments need to rely on handsets that are tested to meet the most rigorous of standards to ensure reliability under difficult or extreme conditions.

A handset that meets the European Union's ATEX directive for intrinsically safe radios means users can use them with confidence in areas where dust, explosive gases or flammable materials are present. Motorola's MTP850Ex has been certified at IP65 standards – an industry first for handheld TETRA radio devices used in mission critical services.

The digital bridge

Linking networks across the Øresund bridge

Photo © Miklos Szabo/Øresundbron

Swedish Radio Supply (SRS) and Radiocom Denmark developed an innovative solution in order to facilitate communication between two national TETRA public safety networks during the International Climate Conference in Copenhagen.

The solution harmonised communication between the Rakel network in Sweden and Denmark's Sine network on the 16km Öresund Bridge that links the two countries.

Co-operation between emergency service organisations is important in the Öresund Region, not only during the high-profile conference, but also in the future due to the high volume of cross-border traffic using the bridge.

The communications system consists of Sepura's SRG Gateway radios combined with special cross communication software and hardware. The system handles talk-groups in both the Sine and Rakel networks, using a digital bridge to enable public safety users in Denmark and Sweden to communicate seamlessly with each other. This system also makes it possible to control and monitor network status, speech latency and error signals in both networks

SURGE OF GROWTH IN 2011

Jatinder Thandi, Research Analyst, Mobile Radio, IMS Research

Despite the global recession and a rocky second quarter, the TETRA terminals market showed its resilience in a difficult 2009. IMS Research's latest report on the worldwide LMR market estimated 2009 TETRA shipments increased more than five per cent year-on-year.

Without any new nationwide contract tenders, European shipments were largely driven by three main markets: terminal refreshment cycles by police constabularies in the UK; initial shipments on the German BOS network; and the delivery of terminals for the Portuguese SIRESP network.

Looking longer term, the global TETRA market is forecast to grow with a CAGR of over 15 per cent over the four years. Significantly, as economic conditions improve over the next two years, IMS Research forecast another surge of growth in 2011, driven by a third wave of large contracts currently under consideration.

However, the growth of TETRA is likely to face competition from low cost digital technologies, such as DMR, NXDN, and dPMR. Another IMS Research report, "WW Market for DMR/dPMR", illustrates the rapid uptake of these technologies across a range of markets, over a very short space of time. More importantly, success has not been limited to non-PSS markets. To give an example of the potential impact, many believe TETRA has a strong future in China, yet local LMR companies are committed to developing a Chinese standard for police, which could be in use as early as 2011.

Looking ahead, the TETRA market remains in very good shape. However, continued acceleration of Low Cost Digital radio adoption is likely to drive a new phase of technology competition, especially in emerging markets.

IMS Research analysts Patrick Connolly and Jatinder Thandi will be at the TETRA World Congress in Singapore and available to discuss TETRA market trends.

TETRAtraining

The spring TETRAtraining courses for 2010 will take place during week commencing 15th March in London, UK. These will include the TETRAfirst, TETRAcomplete and TETRAsecurity courses.

All our courses are delivered by highly qualified and experienced TETRA practitioners. Full details can be found on **www.tetra-association.com**

Can't make these dates? Always available is onlineTETRA, the online training course. Just visit www.tetra-association.com for more information. Training in your own work place at your own pace provided exclusively to the Association by a leading TETRA training organisation.

New path for SDS

Funk-Electronic Piciorgros have announced successful demonstration of Optimised Short Data Service (OSDS) over TETRA networks. OSDS uses readily available and proven mechanisms in the TETRA standard, and Piciorgros claims up to twofold throughput in comparison with the standard method to exchange short data messages.

OSDS is enabled by an intelligent infrastructure interface or gateway. This advises the infrastructure on how much data is expected from the terminal when polling for data, so the data transfer capacity is reserved beforehand.

The demonstration was carried out on a Rohill TetraNode system, and Piciorgros is inviting other infrastructure suppliers to perform interoperability tests.

TETRAnews

Comments and contributions welcomed, please send to **editor@tetra-association.com**

Is Public Safety using its spectrum efficiently?

By Risto Toikkanen, TETRA Association Board Member with responsibility for the Spectrum Group within the Association

Risto Toikkanen

The question of spectral efficiency in public safety frequency bands popped up in the discussion about their future spectrum needs. The conclusion in CEPT after the PPDR questionnaire from early 2009 was that public safety will need more spectrum for mobile data capacity. So the question of efficiency is a valid one and should be answered with facts.

But is efficiency measured, against what is it benchmarked, and what would be the conclusion?

We conducted a small study in our Radio Spectrum Group to clarify the situation.

The concept of efficiency itself is not self evident in systems that should always have room for handling major incidents. A public safety radio network cannot be designed like a cellular system to run close to its capacity limits and bring optimal return on the licence investment.

It is easy to point out remote provinces where very few radio channels are occupied at 3am on a winter weekday morning. But would that be proof of bad efficiency? Not likely as the communication capability is needed there in any case.

How to benchmark the efficiency then? There are some ways one can compare the current status with earlier history to see what has changed and how one can compare Europe with some other industrialised region to see possible difference. One can also check whether there are incident reports indicating problems.

Looking at the present and past spectrum usage in Europe reveals a clear difference. The digitalisation of emergency service radio systems introduced much more economic modulations, introduced trunking to share the load optimally and collected all agencies in one radio system and in one frequency band. Now European public safety forces will use only 2 x 5 MHz between 380 and 400 MHz instead of the many and wider VHF and UHF bands used earlier and which are now being vacated. This means an efficiency improvement by something like 50per cent, if not more.

Comparison between Europe and North America could be done in several ways due to differing rules and sharing schemes, but whatever calculation method is used, the 2 x 5 MHz band used in Europe is clearly less than that which North-American public safety and security forces have secured for their use. The possible conclusions are that either Europe is much more efficient or is lacking something important.

We found examples of major cities close to borders suffering channel outage due to international channel sharing, the biggest cities like London facing channel outage just due to the user numbers, and regions like Benelux cross-hatched by national borders that split the band between four nations. These cases demonstrate true and existing lack of channel capacity even when using narrowband radios only. Whether that is a direct indication of efficiency could be debated, but if it is not an indication of efficiency you can take it as an indication of need for more frequencies.

PPDR workshop in March

As reported earlier, CEPT decided to gather together all stakeholders of the public safety spectrum dialogue in a joint PPDR Workshop in Mainz, Germany on March 11th – 12th to debate once more the spectrum need and benefits and disadvantages of different possible solutions.

The programme is now available at **www.ero.com** together with a registration form. The workshop is open for everyone interested and the speakers represent several user organisations, radio administrations, standards working groups, industry etc to get all views spoken.

Start planning your visit to the largest gathering of TETRA Professionals in the world!

TETRA World Congress 2010

25th - 27th MAY 2010 | SINGAPORE

Suntec Singapore International
Convention and Exhibition Centre

The TETRA World Congress is *the* meeting place for the entire TETRA community. This year's event offers each attendee an unrivalled learning and networking opportunity. Join us in Singapore and you will:

- Mix with 2000+ visitors from around the world
- Learn from 120+ speakers during the conference
- Meet all of the leading suppliers at the exhibition of 80+ stands
- Benefit from 15+ streams, masterclasses and seminars covering insights on both public safety and commercial TETRA usage
- Experience 3 days of conference sessions, training, networking and exhibition



To find out more about the Congress and how you can benefit from attending, please download the latest brochure from www.tetraworldcongress.com/association. By visiting the website you will also be able to:

- Register your place
- Start planning your trip - view details of the best available rates at the official TWC partner hotels
- Sign up for e-news updates
- See which sponsors will be supporting the Congress and find out how you can take part in the exhibition
- Access TETRA TV interviews and footage recorded at TWC 2009 in Munich and TWC 2008 in Hong Kong

Researched & produced by:

IIR Telecoms & Technology
www.iir-telecoms.com

In association with:

TETRA Association

Join us at LinkedIn

Linked In group ID: 1881918

TWC Exhibition

The TWC exhibition is the largest exhibition of TETRA equipment in the world. Attending will enable you to meet with all of the leading TETRA suppliers and manufactures to compare their products. Make sure you don't miss out on seeing:

- 80+ stands from leading TETRA suppliers
- Live product demonstrations
- Interactive application displays and solutions
- New product launches and press briefings
- TWC daily news updates

REGISTRATION NOW OPEN

Early confirmed exhibitors at TWC 2010 include:

Addvantech • Aeroflex • Airtech • Airwave • Analysys • APD Communications • Artevea • Asentria • ATIS Systems • Axell Wireless • Creowave • CyberTech • Damm • Dantherm • EADS • Etherstack • Harris Corporation • Invisio • JDI Jing Deng Industrial • Kabelwerk Eupen • Kathrein Werke • Kolibri Systems • LS Telcom • MAC Multiple Access Communications • Mason • Motorola • Net Technologies • NICE CTI Systems • OTTO • P3 Communications • Panorama Antennas • Piciorgros • Portalify • Pöyry • Radio IP • Rohde & Schwarz • Rohill • Sapura • SAVOX Communications • Schnoor • SEE Telecom • SELEX • Sepura • Shenzhen HYT Science & Technology • Sinclair • Skymasts • Spescom • Spinner • Stop Noise • Team Simoco • Teltronic • TETRAsim • Thales • Unimo • Wave Korea • Willtek Communications • WRAP international • Zetron

For full details of the sponsorship and exhibition opportunities available please contact **Stephan Groves** on **+44 (0) 20 7017 7098** or **sgroves@iir-conferences.com**

Visit **www.tetraworldcongress.com/association** to find out more!

Argentina ***SELEX Communications secures Buenos Aires Police*** SELEX Communications is to supply a TETRA system for the new police forces of Buenos Aires, Argentina. The system will be operational from March 2010, and will cover the entire metropolitan area of the city with additional indoor coverage in the city centre.

The contract is to supply a complete solution including 10 new-generation base stations (BS Plus) and over 2000 terminals in the first phase.

The City of Buenos Aires has benefited from special status as federal district since 1994, with its own constitution and its own government. The last government of the Autonomous City of Buenos Aires deliberated for the formation of a new police corp to face the increasing need of security in an area that today is the second largest metropolitan area of South America.

China ***The largest TETRA system in China*** EADS and iASPEC Software have signed a contract to jointly provide a TETRA system for the Shenzhen Public Security Bureau. This will be the largest digital trunked network for the police in China providing secure radio communications for more than 25,000 users in Shenzhen. It will also offer secure communication services for the 26th World University Games scheduled for August, 2011.

EADS and CETC-7 Ltd. (China Electronic Science and Technology Group Corporation No.7 Research Institute) have been awarded a contract to jointly provide a TETRA radio system for the Guangzhou municipal government. The system will provide secure radio communications for more than 60,000 users over an area of more than 7,000 sq. km. in the city of Guangzhou. It will also offer secure communication services for the 16th Asian Games scheduled for November this year.

Denmark ***Motorola delivers tough terminals*** Motorola has supplied the Fire Departments of Lolland and Guldborgssund in the Danish region of Zealand with ATEX (Atmosphere Explosive) TETRA portable terminals for its firemen. The handsets are engineered specifically for the tough conditions firemen can encounter, and include a simplified keyboard with a large button surface which can be used with protective gloves weighted enough to ensure that the user can feel that the product is there. The terminal includes a familiar user interface with large scalable display fonts and icons to facilitate operation in difficult environments with limited visibility, plus an integrated GPS receiver that can locate personnel, improving user safety and resource management. An internal "Man Down" alert triggers an emergency procedure when the user of the radio remains motionless for a period of time.

France ***Sepura in new deal with Nancy*** The cluster of municipalities within the Nancy region in France - Communauté Urbaine du Grand Nancy (CUGN) – has chosen Sepura TETRA radios for its public service organisations. The radios will operate

Stanislas Square, Nancy

on a digital infrastructure deployed by SYSOCO, Sepura's distributor in France. The radios will be supplied to Grand Nancy's municipal police, public transport, water utilities and the city's technical management departments. Teams in charge of maintenance and surveillance of the municipalities' parks and gardens will also be among the first users to join the new digital network.

The forthcoming migration to TETRA of Grand Nancy's transport services will bring major enhancements to the passenger support and information system. The new system will improve

driver safety in the city's bus and minibus routes and will ensure real-time data transfer of bus route and passenger information displayed on digital message boards.

The French city of Clermont-Ferrand (above) has chosen Sepura TETRA radios to enhance communications between the departments and services operating within its municipality. This contract was secured by SYSOCO, Sepura's partner in France.

Germany ***North Rhine-Westphalia selects Selectric*** Selectric GmbH has won the tender for

From left, Hendrik Pieper, Selectric - Jürgen Mathies, LZPD - Jürgen Heußner, Selectric

the supply of Sepura TETRA radios to the German federal state of North Rhine-Westphalia (NRW). The digital terminals will be delivered to the North Rhine-Westphalian Police. The contract is for 25,000 Sepura radios and accessories.

The first radios were handed over to the regional authorities' leader for the central police services of North Rhine-Westphalia (LZPD), Mr. Jürgen Mathies, by Selectric's General Managers, Jürgen Heußner and Hendrik Pieper.

The tender's estimated total value amounts to €30 million. It was originally awarded in April 2009, and ratified in December 2009.

Largest terminals order in Germany The federal state of Saxony has selected Sepura TETRA radios for its public safety users. The contract, for a total of 30,000 radios, was secured by Selectric. The terminals will be supplied to police, fire brigades and rescue services in the state. This is the largest contract awarded to date for TETRA radios in Germany.

All the German states to have selected Sepura TETRA radios will adopt the BOS-Safety SIM card from the very first day of deployment, providing end-to-end encryption. Sepura radios are the first to support this type of encryption in Germany and the first to achieve certification by the BSI - the German authority responsible for ITC security.

Minister receives first radio for Hamburg
Christoph Ahlhaus, left, Minister of the Interior of the

German City State of Hamburg receives the first digital TETRA radios for the city's public safety organisation from Hendrik Pieper from Selectric.

The contract for the delivery of 10,000 Sepura radios – to be supplied over the next three years – was awarded to Selectric following a European-wide tender. The radios will be provided to the police, fire brigades and ambulance services in Hamburg.

India ***Government Radio Network for New Delhi*** Following the terrorist attack on Mumbai in November 2008, the Indian government has established a Government Radio Network (GRN) for the capital city of New Delhi. The city, hosting the 2010 Commonwealth Games, will be the first in the country to have a GRN for its government departments to collaborate over a single, digital, secure and private communication network to counter public safety emergency situations. New Delhi joins a number of major cities in Asia looking at this approach to public safety and disaster mitigation.

The TETRA GRN chosen by Delhi Government is built and maintained by Motorola and HCL Infosystems under a seven year contract.

A GRN goes beyond being a strategic public safety mechanism during one-off international events. It is a new paradigmatic approach. A GRN can deliver efficiencies and cost benefits and empower first responders with real-time information to help them take rapid life-saving decisions with unprecedented pre-emptive and combative capabilities.

The Delhi GRN will serve as a critical communications backbone in facilitating inter-agency communications and collaboration amongst the Delhi police, fire services, hospitals, public works department and the Delhi Transport Corporation over a single network. Security is ensured through the use of advanced encryption; and the network provides full visibility to individual subscribers at any given time at the command and control centre.

Motorola will also be rolling-out a GRN in Western China. As more and more countries realise the serious threat that terrorism and natural disasters pose to public safety and national stability, governments are beginning to look at the immense value and capabilities offered by next-generation Government Radio Networks.

Italy ***DAMM's TetraFlex® chosen for Lodi's Public Safety*** The Emergency Service (118) in Lodi in the province of Lombardy region has chosen DAMM's TetraFlex® multi site TETRA solution for its critical communications throughout the entire province. The system was commissioned through GEG Telecomunicazioni, a System Partner of DAMM. The system integrates with several other systems at the Centre of Operation. This connects the entire emergency service organization, including offices at all decentralized locations. The DAMM system supports 20 dispatcher stations and integrated recording of all data and voice communication.

Malaysia ***Launch of 1Network*** At the Langkawi International Maritime and Aerospace Exhibition, the Prime Minister of Malaysia, Datuk Seri Mohd Najib Tun Razak launched the new digital infrastructure 1Network using a Sepura SRH TETRA hand-held radio. 1Network was developed by Sapura, Sepura's strategic partner in Malaysia.

1Network can integrate communications, information, resources and assets of various organisations into one unified platform, enabling faster communication links and improving operations. A major critical component of 1Network is the Government Integrated Radio Network (GIRN) - also developed by Sapura - which is the secure nationwide TETRA network currently used by more than ten Malaysian government agencies.

The Netherlands ***Marine contractor makes TETRA choice*** Heerema Zwijndrecht BV, a leading marine contractor in the offshore oil and gas industry,

has chosen Damm's TetraFlex® infrastructure for its communications system. The project was delivered by DAMM's partner Flash Services in The Netherlands.

At Heerema, the TETRA communication plays an important role in coordinating transport of equipment, plant and manufacturing facilities, security operations, and communications involving crane operators as well as Emergency Assistance Crew members. New groups of employees (dispatched by clients or external fitters) that temporarily join the team can also be rapidly included in the communication system.

Oman ***Middle East and Germany partner to support BP*** T.E.S.S. FZCO in Dubai and Oman-based Suhail Bahwan Group have been awarded the contract to deliver TETRA infrastructure and services for a new Oil & Gas installation in the Sultanate of Oman. The TETRA system will be delivered to British Petroleum in Oman, who have been awarded the right to appraise and develop gas from the Khazzan and Makarem contract area in central Oman which extends to approximately 2800 sq km.

The TETRA-over-IP system consists of system equipment and special software applications from. UTOD GmbH. T.E.S.S. FZCO is the technical service provider and operates as an integration partner on site.

Spain ***Ibiza Airport takes Telvent TETRA*** Telvent is implementing a project for Aena – Aeropuertos Españoles y Navegación Aérea, the Spanish airport manager – aiming at expanding the TETRA system deployed by Telvent in 2006. The continuous increase in the number of operations in Ibiza Airport has led to the need to grow the TETRA service through a portable system.

The extension will enable a backup system in case of any incidental critical failure in the current TETRA system and provide the capability for delivering TETRA coverage to areas out of reach of the usual operation area in case of emergency.

A new recording system will register all the voice and data communications processed in the network, turning into a basic tool to analyse airport activity.

New comms system for Burgos City Council Telvent, together with its consortium partner Keyland, has signed a contract with the Burgos City Council to update its mobile radio communication network with a TETRA digital system. Telvent technology will replace the current analogue radio communication network and will serve the police, the fire brigades and the civil defence, providing them with secure and encrypted voice and data mobile communications.

The new emergency control room will become the core component of the operational management of the city of Burgos, which will be provided with a centralised service centre.

Integrated network management solution IAPsolutions has launched Version 2.7 of its IAPTeNMS solution, designed for integrated TETRA network management. This new version offers a management platform for multi-vendor networks focused on a complete alarm and monitoring platform, full network inventory, fleet management and reporting portal.

IAPTeNMS v2.7 aims to unify all technologies that are performing in the network: TETRA radio network, transport networks (PDH, transmission networks), IP/MPLS services networks, office equipments, network servers (DNS, DHCP), power electronics (UPS, generators, rectifiers), and other equipment within the network base station. To provide a complete end-to-end service management, the system also manages end-user terminal networks.

UK ***Oldham council enters the digital age*** The DAMM TetraFlex® multi site solution has been chosen by Oldham Council to launch a Public Private Partnership scheme to deliver a digital radio network for both the authority and local businesses. The solution will be implemented by DAMM's System Partner, Arqiva.

The five-year deal is the first of its kind for a UK local authority and will benefit the business community with capacity for approximately 1,000 radio users across the borough including businesses such as couriers, taxi companies and private security firms.

New strategic alliance for emergency vehicle solutions Microbus has joined forces with Carnation Designs to offer the public safety market a one-stop source for in-vehicle mobile computing and auxiliary electronics control. Microbus' rugged vehicle-based PC technology and Carnation Designs' genisys electronic management system form a package to meet the advanced electronics requirements of the latest emergency service vehicles.

Panorama launches Ultra Wideband Ceiling Mount Antenna Designed to support a multi-service, multi-operator wireless environment, the Panorama CMWB-038-6 operates on the full wireless spectrum, from 380MHz through to 6GHz in a single antenna. Businesses and facilities can support multi-service / multi-operator wireless coverage. Any number or combination of services are supported – including TETRA UHF, GSM 400, AWS 700MHz, Quadband GSM, 3G UMTS, 2.4GHz WLAN, LTE & WiMAX etc., providing in-building service providers and DAS installers with a 'one size fits all' solution. The antenna delivers wireless coverage in multi-building campus sites, high-rise offices or large complexes such as airports.

TETRA Events 2010

Event	Date	Location	Organiser	Website
TETRA Workshop	10 March	Las Vegas, USA	IWCE/TETRA Association	See **www.iwceexpo.com** Nicola.morrison@tetra-association.com
TETRA for Turkey	28 April	Hilton Hotel, Ankara, Turkey	TETRA Association	See **www.tetra-association.com**
ASTRID User Days	20-21 May	Tour & Taxis, Brussels, Belgium	ASTRID	See **www.astriddays.be**
TETRA World Congress	25-27 May	Suntec Singapore International Convention and Exhibition Centre	IIR and TETRA Association	See **www.tetraworldcongress.com** enquiries@tetraworldcongress.com
TETRA moving forward in Poland	8 July	Warsaw, Poland	TETRA Association	Please contact **Nicola.morrison@tetra-association.com**
TETRA moving forward in Argentina	September	Buenos Aires, Argentina	TETRA Association	Please contact **Nicola.morrison@tetra-association.com**
TETRA moving forward in Brazil	September	Rio de Janeiro, Brazil	TETRA Association	Please contact **Nicola.morrison@tetra-association.com**
TETRA roadshow	October	China	China Trunking Forum/ TETRA Association	Please contact **Nicola.morrison@tetra-association.com**
TETRA moving forward in India	November	Mumbai, India	TETRA Association	Please contact **Nicola.morrison@tetra-association.com**
TETRA moving forward in India	November	Bangalore, India	TETRA Association	Please contact **Nicola.morrison@tetra-association.com**
TETRA moving forward in MENA (Middle East/North Africa)	December	To be confirmed	TETRA Association	Please contact **Nicola.morrison@tetra-association.com**

Please see **www.tetra-association.com** for updates.
If you have any queries concerning the Events schedule, please contact **nicola.morrison@tetra-association.com**

Kidner's Corner

Each year the TETRA Association, in partnership with IIR, holds its flagship event, TETRA World Congress (TWC). This year, from the 25th to 27th May, it will be in Singapore. Up to a hundred exhibitors and over 2000 delegates participate.

Not everyone can get to TWC so we organise other events in various regions of the world. These are either our own events or events in partnership with other organisations. In addition we sometimes organise workshops to address particular topics or issues. All the latest information on all the events is always on our website.

Phil Kidner, CEO, TETRA Association

The "next events" are promoted to the front page for your convenience.

This year the theme of our events is "TETRA moving forward". These one-day events consist of a conference targeted at a particular country or region and an exhibition, showcasing most of the leading TETRA manufacturers and suppliers. As well as seeing their latest equipment and being able to ask questions on a one-to-one basis, there are many networking opportunities throughout the day.

Everyone is welcome to participate in these events, as an exhibitor, as a sponsor, as a speaker or as a delegate. Bring your colleagues, customers, users and other contacts. The events are free to all delegates that register in advance. Typically registration is open two months in advance. Find the event on the website, and you will find the registration.

You will be able to find the event nearest to you on the website but remember that we add further events throughout the year – so keep checking!

I look forward to seeing you there!

Showing in Las Vegas

Teltronic, the Spanish based manufacturer of TETRA infrastructure and terminals, has a reputation for innovation and the integration of TETRA with other digital technologies. The company's TETRA/WiMax development reported in previous issues is a case in point. Now Teltronic is making efforts to make TETRA technology available in North America.

The company is known as PowerTrunk in the US, and will be exhibiting at IWCE In Las Vegas. Having received type approval for its equipment from FCC and Industry Canada, Teltronic is committed to opening up the North American market to TETRA, as well as developing a P25 line of products – using the same hardware platform as its proven TETRA solution – to offer the public safety community in USA and Canada.

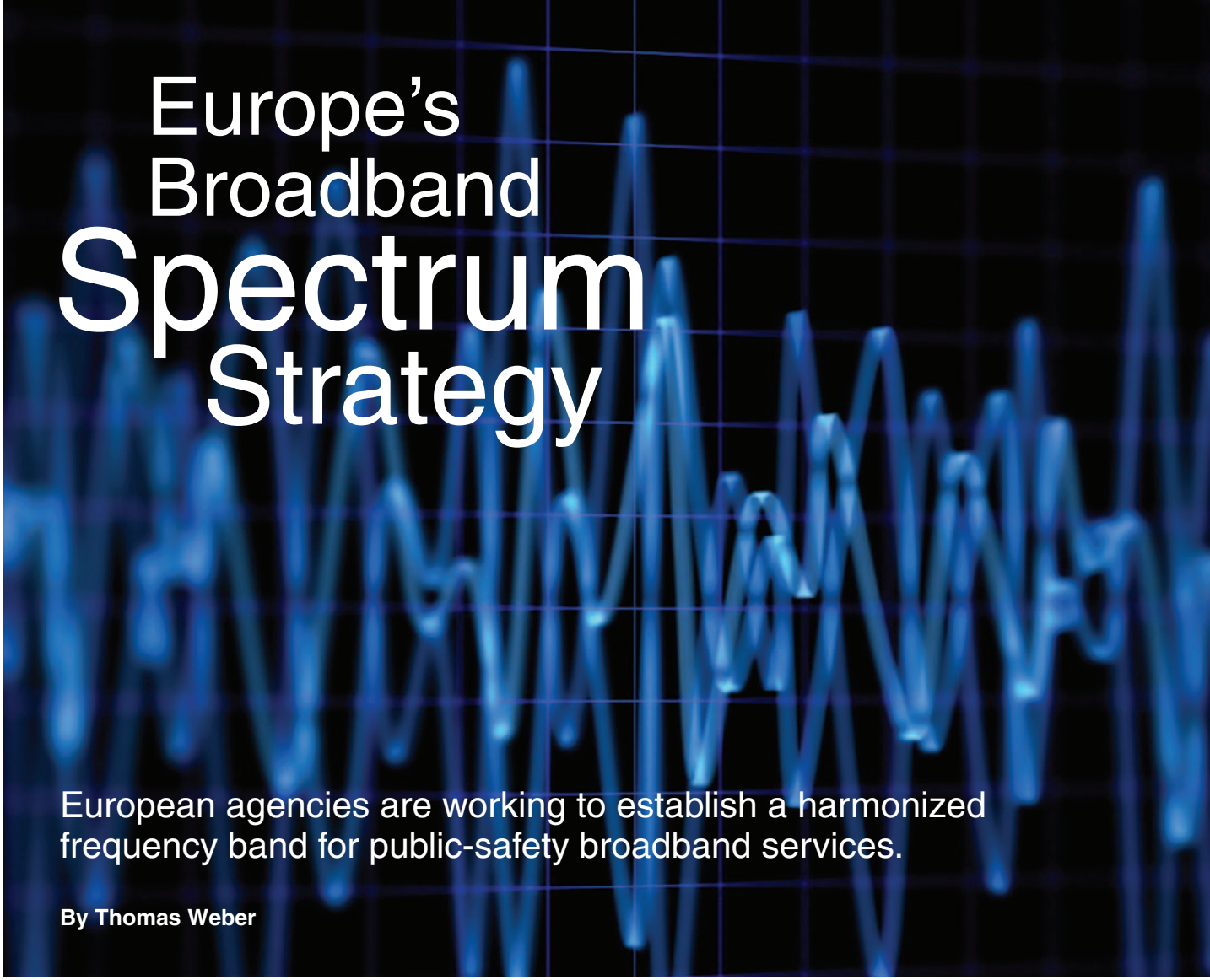
More information on products and companies in this edition can be found at **www.tetra-association.com**

Subscribe at **www.tetra-association.com**

TETRA News: Comments and contributions welcomed – please send to: **editor@tetra-association.com**

For any other information please contact the TETRA Association's administration office by email: administration@tetra-association.com or visit the Association's website at **www.tetra-association.com**

Published by: The TETRA Association, 14 Blandford Square, Newcastle upon Tyne, NE1 4HZ UK in February 2010. Reproduction is permitted if referring to the source.



Europe's Broadband Spectrum Strategy

European agencies are working to establish a harmonized frequency band for public-safety broadband services.

By Thomas Weber

The European Telecommunications Standards Institute (ETSI) started the process of identifying additional spectrum in Europe for future public safety and security (PSS) wireless communication systems in the UHF frequency range. TETRA is well established and in daily operation in many European countries as the public protection (PP) wireless communications system with hundreds of mission-critical and business-critical organizations in Europe. The popular application of TETRA is mission-critical group calls. In addition, TETRA has an extensive list of special functions for professional users, which together with the special voice handling in the networks, are unique.

One thing TETRA could do better is more data. TETRA Enhanced Data Service (TEDS) is just around the corner and will deliver 10-fold more data throughput than TETRA's release 1. However, more data throughput requires more radio spectrum. Spectrum regulation for TEDS is completed in European Conference of Postal and Telecommunications Administrations (CEPT) countries, and users can apply for spectrum from their national regulators in Europe.

Securing spectrum takes the longest lead time of any issue for a new technology. For that reason, a number of user organizations initiated work to access additional spectrum for even higher speed data services allocated for PSS. Consequently, ETSI began creation of an ETSI system reference document, ETSI TR 102 628, a spectrum request addressed to the CEPT. This is the official tool under the memorandum of understanding (MoU) between ETSI and CEPT Electronic Communications Committee (ECC) to convey new spectrum requests to the spectrum regulators in Europe.

The effort is led by ETSI's Technical Committee TETRA. The proposal is aimed at establishing a dedicated, harmonized European spectrum designation for public protection and disaster relief (PPDR) mission-critical public-safety and emergency communications. The proposed resource would be harmonized spectrum across Europe, allowing interoperable and permanent PPDR networks to be established somewhere in the 300 – 790 MHz band including the Digital Dividend band — preferably in the lower parts

Study Outlines Europe's PPDR High-Speed Data Spectrum Needs

A report from Analysys Mason released in March addresses the need for public-safety dedicated spectrum for high-speed data applications in Europe.

TETRA and Tetrapol networks in the 380 – 400 MHz band offer a range of low-rate data services, but the speed and capacity available within those networks limits the more widespread use of higher speed data applications, the consultancy said in a statement. "In line with increasing demand for access to information on the move, public-safety operations are becoming more information driven, requiring access to a broader range of wideband and broadband applications," Analysys Mason researchers said. "These include high-quality imaging, uploading and downloading large data files and real-time video."

Researchers said a new generation of solutions will be required across Europe in the next five to 10 years. Such solutions, if delivered using new, dedicated mobile broadband networks designed to deliver public protection and disaster relief (PPDR) applications, will require additional spectrum to deliver the services required.

Analysys Mason defined four possible evolution paths for the future demand of mobile broadband applications within the public-safety sector as part of the study. Consideration of these different evolution paths demonstrated that the capabilities of current narrowband and wideband dedicated mobile networks used by the public-safety sector will not be sufficient to meet future requirements under three or four evolution paths defined. The only evolution path that could be accommodated by existing networks is the "steady growth" path. However, this isn't sustainable in the longer term, because there is growing evidence of trends and changes in working methods that suggest that it will not meet future demands.

A summary of the four alternative evolution paths and their impact on network requirements is provided on the TETRA Association Web site. The association commissioned Analysys Mason to gather the information based on existing documents and reports recently published in Europe.

The options for delivering this new generation of services include making use of upgraded commercial networks using HSPA+/Long Term Evolution (LTE) technology with network deployment modified to meet the specific operational requirements of the public-safety sector, or developing a new generation of dedicated mobile broadband networks for exclusive public-safety use.

The study found that, in line with trends already identified, a diverse range of data, imaging and multimedia applications are in demand within the public-safety sector. The types of applications required are not generally available in commercial mobile networks. Sharing of data types between agencies and between field and central command staff is being used to establish and maintain a common operational understanding throughout the sector.

The evolution paths modeled illustrate the public-safety sector's need for a next generation of mobile broadband network to deliver the range of applications that are envisaged for the future, the report said. As there is a limit to the range and volume of data and multimedia applications that existing dedicated narrowband and wideband networks, and existing commercial networks, can provide, if a new generation of mobile broadband network is not made available, some new applications cannot be delivered. Ultimately, this will affect how emerging working practices might evolve within the public-safety sector and, in the longer term, constrain the further development of the sector.

of the band. European Union (EU) member states are switching from analog to digital television. The switch will free spectrum primarily in the UHF band, called the Digital Dividend. It is proposed that a PPDR network would cater to all narrowband, wideband and broadband public-safety applications requiring wide-area coverage.

The emphasis of this new proposal is on spectrum within the tuning range of technology used for wideband and broadband applications. The following factors are important:

1. The high-speed data emergency communications services assume a high priority in European spectrum designation;

2. The requested band is a Europeanwide asset for PPDR networks

SMART TETRA COVERAGE SOLUTIONS FOR EXTREMES

- We know TETRA coverage -

Meet us at:

TETRA World Congress 2010

25th - 27th May 2010 Singapore
Suntec Singapore International
Convent & Exhibition Centre
Visit our stand D401

SOLUTIONS

- Indoor coverage
- Outdoor coverage
- Hazardous environment coverage (ATEX)

SERVICES

- Consultation
- Coverage planning
- Training

CREOWAVE
SOLUTIONS FOR EXTREMES

www.creowave.com

Creowave Oy Lentokatu 2 FI-90460 Oulunsalo, Finland | **Phone** +358 10 83 26 300 | **Fax** +358 40 88 29 465 | **E-mail** sales@creowave.com

Typical and Future Spectrum Requirements for Public-Safety Systems

Channel Type	Number of Channels	Total Spectrum (MHz Paired Bands)
Narrowband	120 network wide; 10 per site	2 x 5 (existing allocation)
New Narrowband	120 network wide; 6 per site	2 x 3
New Wideband	20 network wide; 2 per site	2 x 3
New Broadband	1 network wide and per site	2 x 10
Total New Requirement		2 x 16

Source: Draft ETSI TR 102 628

ETSI suggests that the CEPT ECC make its new decisions on future PPDR spectrum before the end of 2011 to allow manufacturers time to have equipment in the market by 2013.

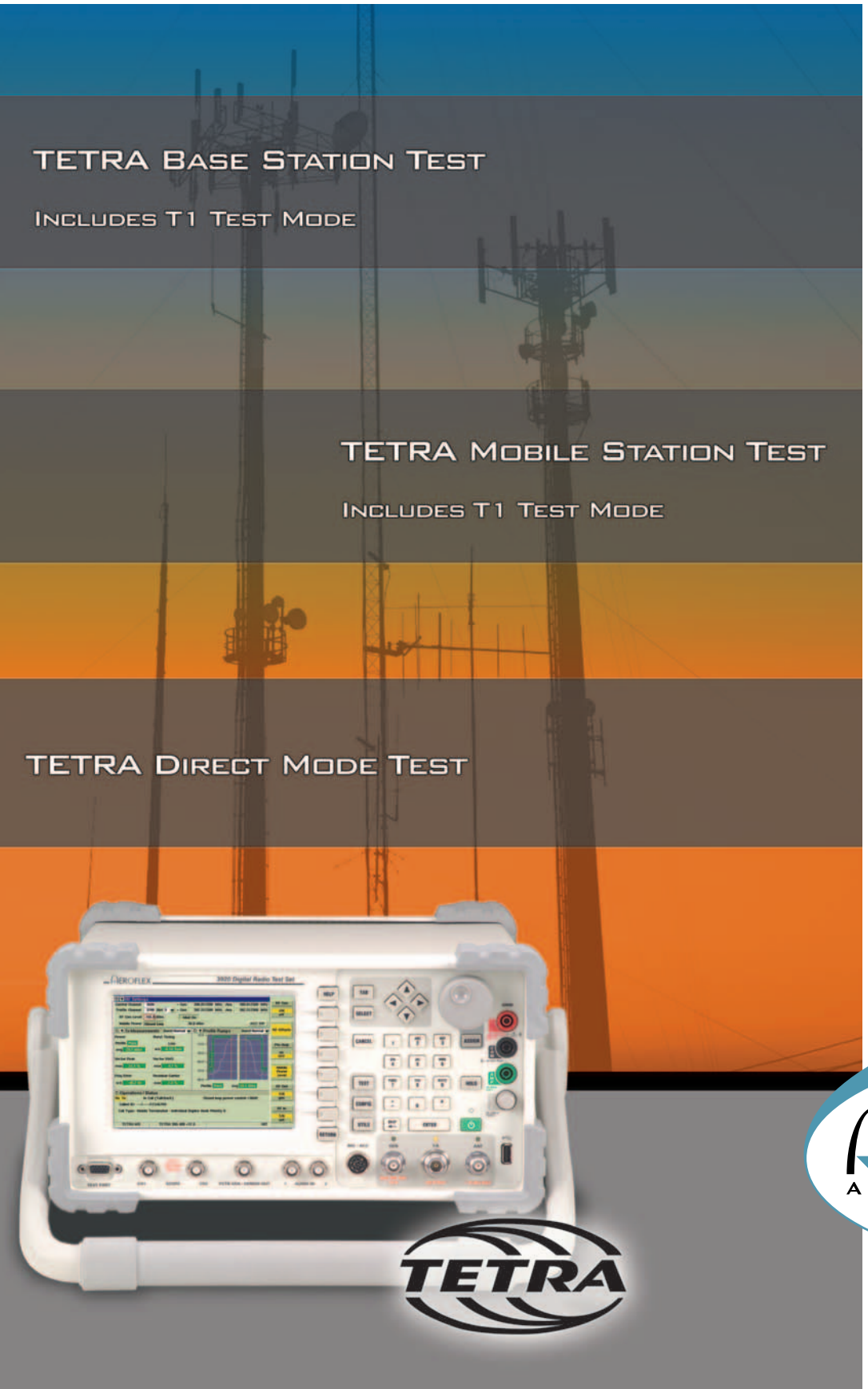
and isn't subject to criteria used in spectrum designation for commercial consumer networks and services like auctions;

3. This band is to be designated on a dedicated (and protected) basis;

4. This band is for harmonized use (interoperable) across Europe.

The CEPT ECC is requested to consider harmonized availability and use of the radio spectrum for PSS as detailed in the ETSI document. A first ECC action was to send a questionnaire about the radio spectrum demand for public-safety systems. The ECC working group on frequency management developed the questionnaire, which was sent to spectrum regulators, as well as PPDR authorities, PPDR operators and industry officials. Based on the

Aeroflex – For Complete, Reliable TETRA Test



Looking for a complete TETRA test system? Need to test to Industry Standards?

Aeroflex's next generation 3920 Radio Test Set provides complete TETRA test for Base Station Installation and Conformance Testing, Portable and Mobile Radio Test and Direct Mode operation. Measurements are made in accordance with ETSI EN 300 394-1 for transmitter and receiver parameters. Signaling functions support TIP (Tetra Interoperability Profile) compliant TETRA radios, thus ensuring optimum compatibility with TETRA equipment from various suppliers.

No other TETRA test system provides such a complete solution.

The future of professional radio is changing and Aeroflex is the next generation.
Contact Aeroflex today to receive a data sheet on this industry leading test instrument, request a quote or arrange a product demo.
www.aeroflex.com/testtetra

AEROFLEX
A passion for performance.

www.aeroflex.com

This proposal is aimed at establishing a dedicated, harmonized European spectrum designation for mission-critical public-safety and emergency communications.

responses received, the working group on frequency management in CEPT ECC identified the following conclusions:

■ The use of existing and new data applications (high-speed data) by PPDR users will increase rapidly;

■ Increased data use, especially for mission-critical communications, will have a significant effect on the frequency need and justifies requirements for additional spectrum;

■ There are many requirements and conditions for the use of PPDR, which lead to the need to use dedicated PPDR networks. However, in addition to the dedicated networks, commercial/public networks are and will also be used for non-mission-critical data applications.

To progress with PPDR issues, an ECC workshop was organized in March in Mainz at Germany's Federal Network Agency. CEPT ECC assumes that ETSI will take the results of the workshop into account when producing the final version of the ETSI system reference document by mid-2010. ETSI suggests that the CEPT ECC will make its new decisions on future PPDR spectrum before the end of 2011 to allow manufacturers sufficient time to have equipment in the market by 2013.

In addition, the EU has been active on the subject and recently approved the Justice and Home Affairs Council Recommendation 10141/09 on improving radio communications between operational units in border areas. This new recommendation concludes that law-enforcement and public-safety radio communications systems will need to support and to exchange high-speed mobile data information beyond the capabilities of current networks, and a common technology standard operating in a harmonized frequency band created by ETSI will make this possible.

Consequently, the recommendation suggests that the ECC be tasked to study the possibility of obtaining sufficient additional frequency allocations below 1 GHz for the development of future law-enforcement and public-safety networks. ■

Thomas Weber is executive officer at the Federal Network Agency in Germany. E-mail comments to thomas_j.weber@bnetza.de.

WE HAVE AN UNCANNY MEMORY FOR VOICES.

EVENTIDE VR725

With each new generation of digital loggers, Eventide keeps expanding memory and flexibility while enhancing reliability. Because we never forget what you're looking for in a logger.

The new VR725 Advanced Technology Logging and Archiving System is a case in point: it's the latest of our Linux-based loggers, offering dual DVD drives and scalability from 8 to 96 channels.

For memory, there are dual 250 GB hard drives that deliver continuous recording that can be measured in years rather than hours. There's also an optional 1 TB Hot Swap RAID-5 array that can yield over 14 channel years of continuous recording.

For flexibility, both analog and digital channels can be accommodated. Each analog channel is independently selectable for on/off-hook, VOX or continuous record. With ID and password protection, any PC in your network has access to its relational database, or use the optional Active Matrix TFT 7" touch screen interface. The VR725 can either be rack mounted or placed on a desktop.

For reliability, there are dual redundant power supplies. Plus, the VR725 is resistant to hard drive failure because of an advanced RAID system. Above all, there is Linux, which is inherently fast, reliable and secure. With Linux and our self-installing Call Browser, you get performance without licensing fees.

The Eventide VR725 is an outstanding value for voice and every other logging application. As it performs for you, day after day and year after year, it will be a constant reminder of everything a logger should be.

For more info call 201 641-1200 x264, email loggers@eventide.com or visit www.eventide.com

Eventide®

3 Critical Steps to Frequency Planning

Three steps can help economically design RF hardware with minimum interference and risk at frequencies below 700 MHz.

By Bryan Corley

Images courtesy Motorola

Engineering RF hardware and choosing the frequency plan at 700 and 800 MHz involve basic decisions that are relatively risk free. The situation below 700 MHz is completely different. Frequency planning below 700 MHz involves using frequency plans that can have little or no guard bands and can involve hostile spectrum. Both of these issues create a design situation that must be evaluated carefully and site-by-site. In the past, RF system design for the lower frequency bands involved determining the frequencies available and then forcing them into the hardware, like fitting a shoe two sizes too small. When it succeeded, the price tag wasn't only an expensive RF design, but also compromised the valuable real estate of the equipment room.

A better approach involves understanding the complexity of lower frequency bands and designing the frequency plans around the actual spectrum, hardware available and possible interference. There are three steps to successfully and economically design RF hardware with minimum interference and risk at the lower frequency bands.

1. Understand the Spectrum Site-by-Site

Carefully understanding the spectrum environment of every site allows an engineer to choose compromises carefully and minimize risk during the design phase. Mission-critical design requires minimizing risk and delivering reliable communications when needed.

To minimize risk, the spectrum must be empirically measured to fully understand the spectrum environment at the site. Every site presents different influences and spectrum considerations. Theoretical design provides significant risk to high-level carrier interference, as well as environmental noise that is prevalent at lower frequencies. To fully understand the risk, both of these influences must be measured at every site.

High-level carriers. Carriers above a certain threshold can create interference to the dynamic range of the receiver and reduce coverage. These carriers must be reduced with proper filtering; however, before they can be reduced, they must be

MobilitySound

Your Best Partner in Two Way Radio

GPSMic

GPSBox
With embedded automatic/
manual location reporting
features for real-time tracking

Made in Taiwan

GPSBox and GPSMic for professionals, easily integrated with exiting two way radio and GIS systems.

ODM/OEM

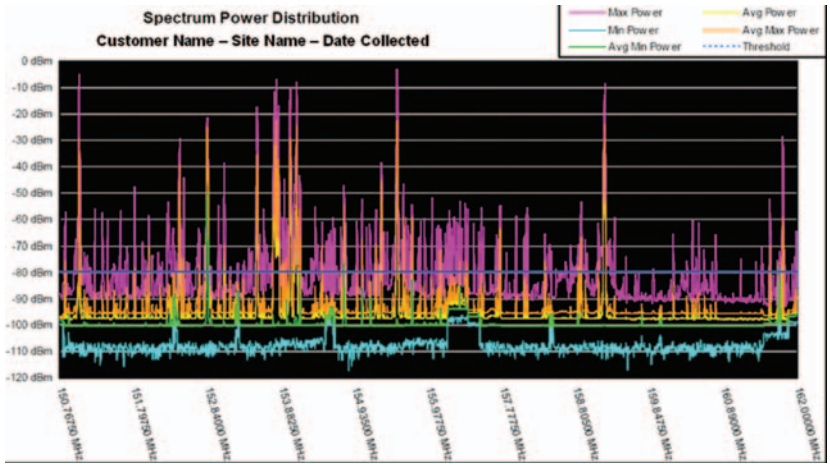
Radio Accessory

Wireless PTT

BT Dongle

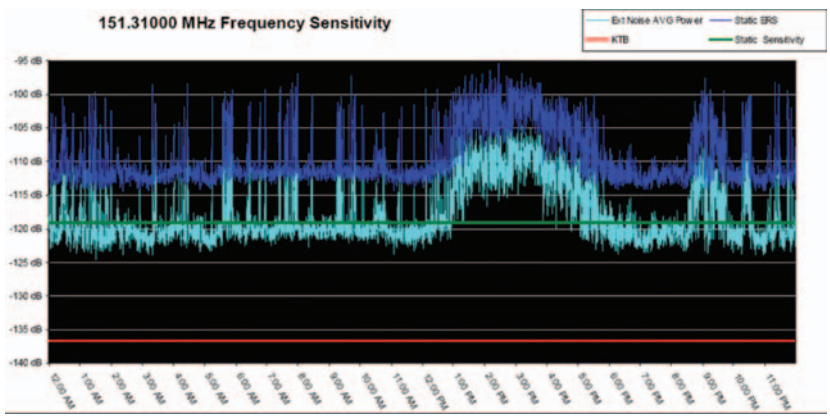
MobilitySound Technology
4F,No.287,Sec 4,ChengDe RD,
Taipei, 111,Taiwan
Tel:+886-2-2882 9178
Fax:+886-2-2881 8012
www.mobilitysound.com.tw
ccc@mobilitysound.com.tw

Spectrum Finger Printing Output



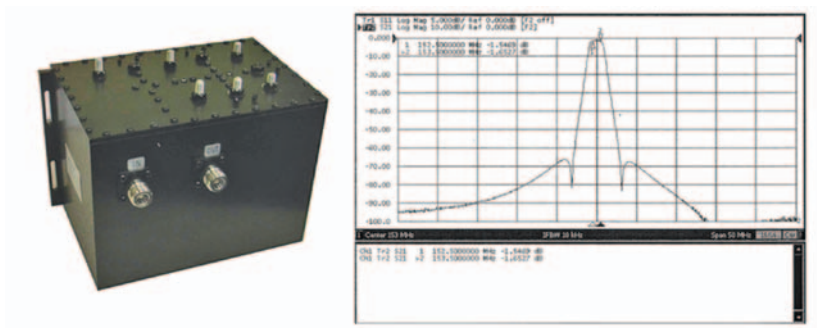
With typical spectrum finger printing, every carrier can easily be analyzed and high-level carriers identified.

Noise Floor Monitoring



A typical output of noise floor monitoring where the noise increases over time, and the exact characteristic is easily understood.

New Filter and Sample Curve



This figure demonstrates the selectivity that can be obtained from one new filter design.

identified and the risk established. Unless they are properly classified, unnecessary filtering or inadequate filtering may be applied. High-level carriers are related to transmitters collocated on site or nearby and must be understood with measurement. Some engineers have attempted to substitute licensing searches for this step, but have failed. The most reliable way to fully understand the carriers present is to measure them. Reliable measurement requires measurement over long periods of time and accurate measurement of the level and duty cycle.

Complete understanding of interference risk is related to evaluating three components: RF level, duty cycle and duration of the interference. If an interferer is below the receive noise floor, of very short duration or occurs infrequently, it won't present a risk. One process that performs this service is spectrum finger printing. Spectrum finger printing uses fast computer control of RF monitoring equipment to examine every possible channel within a certain span of frequencies, allowing thousands of frequencies or channels to be monitored in one session. The carrier levels are collected and reported in reference to the channel bandwidth of a receiver so the engineer understands the levels as the receiver sees them.

Noise level within the channel. Noise that falls on the channel frequency can be interference, environmental or external carrier related. The common component is degradation in sensitivity or coverage deterioration. As the noise or interference increases, the amount of signal required for reliable communications must increase. It's imperative that the level of external noise or interference be fully understood. Each decibel of noise above receiver noise will cause degradation to coverage. This degradation can't be prevented or corrected within the infrastructure with filtering or amplification. There is only one resolution to external interference — elimination at the source.

Trunked systems require all channels to perform identically. A subscriber must see the same sensitivity on all channels. To ensure a frequency is compatible with trunking, the noise floor must be measured. There is no substitute to measuring the noise floor. Only after measuring all

frequencies can the system be evaluated for noise and interference balance. While theoretical noise numbers have been released, they only establish a baseline for theoretical coverage. Every site, frequency and design will have different noise characteristics. At lower frequencies, the risk of external noise increases. To have reliable communications, the actual noise or interference levels must be understood and considered in the coverage design.

The biggest risk of interference comes from inside the transmit combiner and transmit network, where the highest signal levels reside.

Mission-critical systems require empirically derived noise and interference to be integrated into every site design to fully understand the reliability. One collection process, noise floor monitoring, uses a computer-controlled collection system that emulates a receiver and allows for direct collection of noise power levels down to -126 dBm. This noise collection depth is required to fully understand the impact of external interference to actual infrastructure sensitivity. Using an actual receiver to measure the noise floor is effective only for that frequency and during the short period of time measured, and it requires a subjective evaluation. Noise floor monitoring can collect up to 100 frequencies rapidly and provide analysis of each frequency during 24 hours. It's important to note that noise isn't consistent over time. To fully understand the noise, it should be measured for a long duration. Testing has shown that measurements over a 24-hour period provide a reliable understanding of operational reliability.

2. Develop the Frequency Plan to the Hardware

Design the frequency plan to the hardware available, not the hardware to the frequency plan. Default designs and simple guidelines will allow the frequency plans to adapt to the hardware. This will simplify the hardware requirements, as well as reduce the risk of interference. Developing

Complete understanding of interference risk is related to evaluating RF level, duty cycle and duration of the interference.

hardware designs aimed at predetermined guard bands and bandwidths allows efficient filter designs to be used and reduces the cost of RF filtering without reducing selectivity.

New filter designs allow for high selectivity with little insertion loss. Using a new filter design as the preselector and then supplementing it with another after the amplifier provides the foundation for selectivity of more than 65 dB with as little as 1 megahertz of guard band. The best part of this filter design is its ability to be moved up or down the band, while maintaining the performance of the design. This approach provides better selectivity, smaller footprint and lower cost compared with conventional filter designs. The major drawback to this design is that the selectivity and band-pass width are fixed and can't be adjusted. This requires the engineer to ensure the frequency plan fits the hardware design. In the past, the engineer and frequency planner would choose their frequencies and then design the hardware to conform, which was expensive, and in most cases, required large rack footprints to accommodate.

3. Establish and Maintain Basic Rules of Interference Compatibility

Designing the hardware and frequency plans to the interference standards significantly reduces the risk of interference. The biggest risk of interference comes from inside the transmit combiner and transmit network. This is where the highest signal levels reside, and interference produced in the transmit network can be of sufficient level to radiate into collocated receivers. Risk is also associated with transmit networks that have multiple carriers present. To prevent creating interference, the engineer must establish and follow basic rules of prevention. Some sample rules are:

- No third-order products allowed on site;
- Always use high passive intermodulation (PIM)-rated RF components after the combiner;
- Always use 7-16 DIN connectors on RF components;
- Properly torque all associated connectors; and
- Maintain a wider guard band than bandwidth in the frequency plan.

Design below 700 MHz is difficult and shouldn't be performed without a specific plan and data. It's important to spend more time and effort upfront because the cost of resolution, re-tuning and re-design is more expensive than prevention and understanding in the beginning.

Frequency planners who bypass some of the recommendations often suffer severe problems and deterioration. The goal of these recommendations is to allow a system to be installed and be fully operational with few changes. It's important to note that the lower frequency bands aren't stable. They can and will change over time, causing the noise floor and spectrum environment to change. To ensure stability in a mission-critical system, it's strongly recommended that a regular program of spectrum monitoring on all frequencies at major sites be established. This will allow problems to be recognized before they affect operation. ■

Definitions of RF Terms

Guard band. The frequency separation between the closest transmit and receive frequencies. This is the area where selectivity is developed for isolation.

Bandwidth. The frequency separation between the lowest receive frequency and the highest receive frequency in the same group. This is normally the bandwidth used in a band-pass filter.

Duty Cycle. Relationship between the amount of time a carrier is active verses inactive. The higher the duty cycle of a transmitter, the longer it is transmitting. A continuously keyed transmitter would have a 100 percent duty cycle.

Noise Floor. The noise floor is classified as the highest noise possible that must be overcome with signal for operation. This noise can be a function of environmental noise, interference or co-channel carriers. A specific amount of signal relative to the noise floor is required for reliable communications and is referenced as C/I+N where C is the amount of carrier and I+N is the uncorrelated signal level of interference and noise present.

Receiver Dynamic Range. The dynamic range of the receiver is the difference between the lowest signal (sensitivity) and the highest off-frequency signal that produces noticeable degradation. The Institute of Electrical and Electronics Engineers (IEEE) defines this as the point where the noise floor of the receiver rises by 3 dB when a strong off-frequency signal is applied.

Passive Intermodulation (PIM). Intermodulation created in passive components such as connectors and antennas. These components contain small impurities, which can produce intermodulation. The lower the intermodulation products, the higher the PIM rating. High-quality components are generally rated at greater than 150 dBc.

Bryan Corley has been involved in interference mitigation, RF design, system integration and other special RF projects for more than 30 years with Motorola. He partners with most major manufacturers to influence the industry, as well as advance the hardware available. E-mail comments to b.corley@motorola.com.

Breaking news, exclusive content, and vital industry links **wherever, whenever** you need it

Headlines and News Briefs
Breaking news updated daily

SuperGUIDE
The most complete online industry resource with more than 1,500 listings

ONLY Online
Exclusive online content

MissionCritical UNIVERSITY
White papers, case studies and tutorials

TRANSMISSION
MissionCritical's e-newsletter

WORLD NEWS
RadioResource International's e-newsletter

JOBsource
An industry-specific online employment resource

AdLink
Links readers to advertisers' websites real fast

Digital Issues
Interactive, electronic editions of our publications

Issue Highlights
A summary of content for our print and e-magazines

Association Links
Links to industry associations and organizations

Regulatory Links
Links to regulatory bodies and government agencies

Events
A comprehensive list of industry events with links

Advertising/Marketing
Current media kit, advertising data, and mDispatch marketing newsletter

Subscription Services
Subscription services for new subscriptions, renewals, and special requests

www.RRImag.com

Product Expo

Aeroflex

The Aeroflex 3500A is a 1 GHz handheld radio test set. Less than 3.6 kilograms

and packaged in a cast magnesium alloy case, the rugged portable radio test set offers up to 7 hours of battery life. The test set can be used anywhere and is ideal for testing AM and FM radio transceivers, whether on a bench, in a vehicle or in a remote location, Aeroflex executives said. The test set also can test the cables and antennas of an installed radio system.
www.aeroflex.com

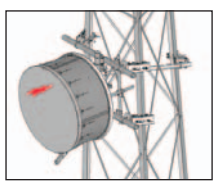
Alltec

TerraStat Charge Dissipation Terminals use the point discharge principle to reduce the accumulation and concentration of electrical charge that causes

upward streamers to propagate. The terminals delay the formation of upward streamers critical to the completion of a lightning strike, Alltec executives said. The high-grade stainless steel constructed terminals are lightweight and easy to install, corrosion resistant and offer low-wind loading. The products feature a large selection of mounting hardware and are UL listed.
www.allteccorp.com

Andrew Solutions

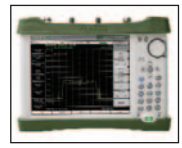
Andrew's Tower Face mount kits offer universal face mounting and are an ideal mounting solution for installing



microwave antennas on the face of straight or tapered lattice towers, Andrew executives said. Each kit contains universal saddle mounts for mounting to straight or tapered round legs or 60- and 90-degree angle legs. Each mount contains specially designed sliding channels to accommodate taper adjustments for a true vertical mounting solution. The kit is shipped complete with saddle mounts, taper adjustment channels, horizontal pipes, antenna mounting pipe and all necessary hardware. All components are hot-dip galvanized for maximum corrosion protection.
www.commscope.com/andrew

Anritsu

The E Platform for Anritsu's line of handheld analyzers features integrated functionality in a robust, lightweight, field-proven design that provides field personnel with all the tools necessary to deploy, maintain and troubleshoot demanding wireless equipment and networks, company officials said.



The platform is designed into Anritsu's Site Master, Spectrum Master and Cell Master analyzers. All of the analyzers are lightweight and have the functionality of multiple instruments, and feature an intuitive user interface and high-quality construction, officials said.
www.us.anritsu.com

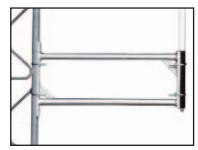
Bird Technologies Group

Site Analyzer series is a user-friendly test solution for installing, maintaining and troubleshooting antenna and cable systems. The SA-6000EX provides users

with a diagnostic range from 25 MHz to 6 GHz. The broad bandwidth capability increases the number of diagnostic applications that can be supported by a single field unit. The line provides up to 500 traces, a VSWR range of 1 to 99.99, operating temperature range from -10 to +50 degrees Celsius and immunity to on-channel interference (+13 dBm).
www.bird-technologies.com

Comtelco Antennas

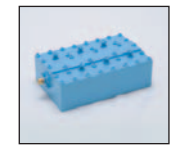
Comtelco's Tower Side Mount Kit was designed for use with Comtelco XL series base stations. The heavy-duty side



mounts feature a galvanized finish. Each kit is supplied with 4.45-centimeter stainless U-bolts for easy installation on a Rohn 45-type tower. For a larger tower leg, stainless steel strapping (not supplied) can be used.
www.comtelcoantennas.com

Creowave

Creowave's radio testing business offers a variety of filtering solutions that include



products for spurious emissions, multiband testing and passive intermodulation measurements (PIM). The filter collection consists of diplexers, duplexers, band pass filters, band stop filters and high pass filters. The filters may reduce the number of test runs and cable changes in the final tester environment, as well as prevent and remove unwanted signals, thus enabling the wanted signals to enter the test systems.
www.creowave.com

Davicom

Davicom MAC systems remotely monitor and control transmitter sites to reduce operating costs and downtime. Real-time

site information, like transmitter status, RF power, antenna VSWR, audio/video levels, main power presence and temperature status can be accessed easily. The units provide automation with decision-making features and commands that go beyond conventional telemetry systems, Davicom executives said.
www.davicom.com

Elma Electronic

Elma Electronic offers the E37 dual concentric encoder, which features a dual concentric inner shaft and outer pole,

allowing the product to act as two encoders. The encoder can save the space and cost of a second separate switch, Elma officials said. The encoder comes with or without an integrated push button and features a rugged metal housing and shaft. The series offers optional IP68 front-panel sealing and an operating temperature range of

-40 to +85 degrees Celsius. The series comes with 16 or 32 detents in standard resolution.
www.elma.com

Fiplex Communications

The Fiplex low-band duplexer DHV0544 is the smallest high-power duplexer in the market for the 25 – 55 MHz band, company officials said. Capable of handling 150 watts continuous wave (CW), the duplexer provides more than 90 dB rejection with low insertion loss and a minimum transmission (TX) to receive (RX) separation of 1 Megahertz. The duplexer fits in standard 19-inch racks with only two rack units (RU). Temperature compensation technology enables the duplexer to work at extreme conditions without performance degradation.

www.fiplex.com

General Dynamics Satcom Technologies

Now featuring comprehensive, digital Project 25 (P25), NXDN and Digital Mobile Radio (MOTOTRBO) test capability, the General Dynamics R8000 analyzer is a portable, full-featured radio test set. The analyzer weighs 6.35 kilograms and features a spectrum analyzer that is comparable to expensive stand-alone instruments, company executives said. The analyzer offers a noise floor of less than -120 dBm.

www.gdsatcom.com/cte.php

Lightning Eliminators & Consultants (LEC)

Towers can be protected from lightning by using the Dissipation Array System (DAS), Spline Ball Ionizers (SBIs) or a combination of the two. LEC Chem-Rods can also be used for tower grounding. The DAS is a multipoint ionizer system that will prevent lightning strikes to the tower by interrupting the formation of streamers. The SBI is a

multipoint air terminal that uses the same prevention principles as the DAS. The Chem-Rod is a chemically activated grounding electrode that produces a low impedance earth connection.
www.lecglobal.com

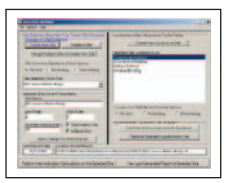
Locus Location Systems

DiagnostX is an over-the-air testing system that offers early detection of potential mobile and portable radio transmission problems, narrowband performance verification and diagnostics in trunked and conventional radio networks. The system can be installed in any location where a receive antenna can be mounted, or it can coexist at any established radio site. The system identifies poorly operating radios by performing calculations related to radio performance and stores the historical records in the system database. The over-the-air-technician assists the radio service shop by constantly monitoring the radios from a hardware perspective and ensuring operational readiness, company officials said.

www.locususa.com

Midian Electronics

InterMod Calculator software predicts the possible occurrence of intermodulation products that may cause receiver interference at a repeater site. The software tests for odd and/or even order products caused by the mixing of multiple transmitters at a given site in a nonlinear device. A non-modulated signal may not produce a direct hit. Therefore, a deviation window is provided to take into account modulated signals that are multiplied/mixed, and sweep across the channel. The InterMod can be used with a PC to solve intermodulation interference problems at radio repeater and cellular sites.



www.midians.com

Optoelectronics

The VS5800 video sweeper detects wireless cameras in the 1.2, 2.4 and 5.8 GHz frequency bands, while scanning all available video frequencies in about 30 seconds. If audio is present on the targeted camera, the sweeper will demodulate the audio through the speaker output. The product has three A/V outputs and an earphone output. The sweeper works with NTSC or phase alternating line/SECAM systems and has both an automatic and manual scan mode.

www.optoelectronics.com

PageTek

PageTek added networking capability to its ProTek+ line of alarm and monitoring units. Networking allows the user to telnet into the unit to check on status or program the unit. It also provides alerting capability to other network devices by transmission control protocol (TCP), to pagers via simple network paging protocol (SNPP) or to e-mail via simple mail transfer protocol (SMTP). The product line consists of the ProTek-Tor+, a compact unit providing eight monitoring points; the ProTek jr+ that monitors 12 points; and the ProTek 24+ that monitors up to 104 points. All modules network with the firm's central collection and control system.

www.pagetek.net

Powerwave Technologies

Optimized to support forthcoming European Digital Dividend frequencies, Powerwave's new Twin 700 tower-mounted amplifiers provide wireless operators with a compact solution for improving base station receive sensitivity by helping reduce dropped call rates and improving uplink data rates for an improved user experience, company executives said. In addition to high power in a small package, the amplifier reduces installation costs and complexity by minimizing tower loading, providing customers with a low total cost of ownership over the life of the product, executives said.

www.powerwave.com

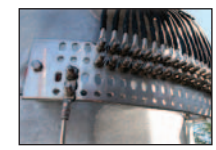
RF Industries

RF Neulink, a division of RF Industries, introduced the NL5500 data transceiver series for licensed conventional radios in the VHF and UHF frequency ranges. The transceiver offers the capability for transparent and direct asynchronous communications. The transceiver is fully compatible with the company's NL6000 and is field configurable as a master or remote.

www.rfindustries.com

Sabre Site Solutions

Sabre Site Solutions' Wireless Components and Site Accessories catalog offers wireless components and pre-engineered towers. New products include Click and Go cable trays, ULTRA boom and a newly designed, expandable low-profile platform. The catalog features a full line of coax and grounding accessories, along with pre-engineered lightweight towers. Sabre Site Solutions offers phone, fax or online ordering.



www.sabresitesolutions.com

Sinclair Technologies

Sinclair's TCC series compact hybrid ferrite combiners combine solutions for systems requiring close frequency separation and space-efficient racking. The combiner is assembled on a 1U high tray. Each unit allows two or four 60-watt transmitters to be combined with one antenna. The UHF and 700/800/900 MHz band TCC line features broad bandwidth that can combine a wide range of transmitter frequencies. The frequencies can be changed without having to retune the combiners. The VHF band line offers a bandwidth of 3 Megahertz that can be adjusted within 5 Megahertz of the factory-tuned frequency.

www.sinctech.com

Researched & produced by:

IIR Telecoms & Technology
www.iir-telecoms.com

In association with:

TETRA Association

TETRA World Congress 2010

25th – 27th MAY 2010 | **SINGAPORE**

Suntec Singapore International
Convention and Exhibition Centre

Registration now open!

Please quote **I08LHMC**
when registering to attend

www.tetraworldcongress.com/mission

Site and Test Equipment

SoftWright

SoftWright announced an RF modeling tool that integrates the Terrain Analysis Package (TAP) software with Google Earth to show radio links and coverage in 3D. Using the software, an engineer can fly down a path and see areas causing signal deterioration. Coverage maps can

be viewed with all the capability of Google Earth. The package can be used on Windows XP/Vista to evaluate radio transmitter sites; predict radio coverage, administer intermodulation studies and radio transmitter sites; and design multichannel multiprint distribution service (MMDS), PCS, supervisory control and data acquisition (SCADA), wireless local loop (WLL), Wi-Fi, WiMAX, microwave, paging, air-to-ground, ship-to-shore and conventional two-way radio systems.
www.softwright.com

Spectracom

The Pendulum Path Align-R is a complete system designed for microwave path alignment. Fast, accurate and easy to use, the system provides alignment results in less than 20 minutes without radio or power on site. The system documents all calculations with proof of date, time, location and actual path loss. Align-R can align at distances up to 160 kilometers and now features a cold pack battery, Dragonwave adapters and 15 GHz band.

www.spectracomcorp.com

Spinner

Spinner's new product range includes SPINNERFlex feeder cables, FlexGround earthing sets and three types of FlexFix cable brackets. In close cooperation with the world's leading cable manufacturer, Zhuhai Hansen Technology, Spinner offers a broad range of SPINNERFlex corrugated copper cables. The FlexTool assembly tools and FlexSeal sealing elements complete the product range.

www.spinner-group.com

Survey Technologies Inc. (STI)

STI Field Test 6 software is equipped with the Project 25 (P25) bit error rate (BER) test mobile. About once every second, the P25 test mobile sends RF signal strength and the BER calculation of the P25 signal tested and logs this data with GPS location. Invaluable information about the coverage and quality of P25 signal propagation can be gathered, and critical communications coverage can be verified, STI officials said. Mobile radios with P25 BER capability are available for VHF, UHF, 700 and 800 MHz P25 frequencies.

www.surveytech.com

TC Communications

Connecting emergency dispatch centers and remote radio transmitters and receivers is a critical site tower application. TC Communications offers TDM and Ethernet solutions for linking or extending 2/4 wire analog, audio and intercom devices: the TC8000 28-channel fiber multiplexer and the TC3846 analog and dry contact Ethernet gateway. Benefits include improving voice quality, increasing system reliability in harsh environments, replacing unreliable leased phone circuits and stabilizing voice level settings for 600 ohms audio channels. Both products support voice bandwidths from 300 hertz to 3.4 kilohertz, feature hot-swappable interface cards, offer fiber optic and power redundancy, and are available in extreme temperature versions.

www.tccomm.com

Telewave

Telewave's compact UHF duplexers enable a transmitter and receiver to operate simultaneously with a single antenna. The duplexers provide at least 90 dB of isolation between transmission (TX) and receive (RX), providing maximum receiver protection. Insertion loss is typically 1 dB, with standard frequency separation of 5 Megahertz, and minimum separation of 2.6 Megahertz over 380 – 512 MHz. The duplexers are constructed with an Invar rod, silver-plated tuners and a quarter-inch welded top plate for high performance and reliability.

www.telewave.com

Willtek Communications

Following the success of the TETRA mobile radio test application, Willtek's 2303 Stabilock is available with a BS test option now. Network operators use the instrument to frequently ensure that the base station's transmitter and receiver maintain the required performance over time and variations of temperature and humidity. The tester is lightweight with a high-contrast display and can be operated from a battery.

www.willtek.com/tetra

Xcel Control

The CPS series is a versatile tower lighting controller that can handle all tower sizes, even towers requiring as many as eight beacons. A controller provides alarm outputs through standard Form-C dry contact relays. In addition to the controller's standard features, the line provides circuit breaker inspection and reset from the face of the panel. The models are load balance upgradable and can be built for outdoor environments. Features include individual beacon control, and field switchable for incandescent or LED style fixtures. Outdoor models are available, and power boosted, three-phase power, foreign power compatible, dual red/white compatible and load balancing are all optional.

www.xcel.com

DMR Radios and Repeater

Hytera launched a line of Digital Mobile Radio (DMR) products compliant with the DMR standard. The PD782 digital portable radio features a high-definition display, full keypad, and supports both analog and digital modes.

The radio is compliant with Mil-Std-810 C/D/E/F and IP57 waterproof standards. The MD782 digital mobile radio offers functions such as message, GPS, data transmission and Connection Alert, and a reserved port allows for additional functions. The RD982 digital repeater operates in analog or digital modes and supports 100 percent duty cycle at 50 watts.

www.hytamerica.com

Software-Controlled Digital Radio

The MDS SD2 from **GE Digital Energy** is a software-controlled digital radio that provides long distance communications over licensed radio bands and allows users to

deploy IP/Ethernet and serial communications using the 200 MHz band. The system is ideal for data acquisition and supervisory control and data acquisition (SCADA) applications and supports flexible, reliable, secure and efficient data transmission. The radio operates in channel sizes of 5, 6.25, 12.5, 25 and 50 kilohertz. Multiple applications can operate on a single network simultaneously, including remote device configuration and data polling.

www.gedigitalenergy.com

Mobiles and NEXEDGE Repeaters

Kenwood Communications introduced TK-7302/8302 VHF/UHF mobiles that feature 16 channels, a two-digit LED display and refinements in the chassis design. The mobiles offer a variety of signaling protocols, built-in programmable voice inversion scrambler, multiple scan functions, built-in voice announce, wideband coverage and full compliance with Mil-Std-810 and IP54.

Kenwood also introduced two NEXEDGE digital repeaters, the VHF NXR-710 (25/50 watts) and UHF NXR-810 (25/40 watts). Designed for small- to medium-sized systems, the repeaters operate

multimode in digital NXDN 6.25 kilohertz or analog 12.5 kilohertz. The repeaters are suited for applications requiring local-area coverage and migration to digital.

www.kenwoodusa.com

TETRA Terminal

Motorola announced that its MTP850Ex portable TETRA terminal, part of the company's ATEX TETRA terminal line, achieved IP65 certification for operating in environments containing dust or pressurized water.

The terminal, designed to be intuitive and easy to use in hazardous environments, features an integrated GPS receiver and internal man down alert, Motorola executives said. The terminals also offer an emergency button, dust and waterproof connector, and a simplified keyboard with large button surface for easy use with protective gloves.
www.motorola.com/tetra

Dual Head Radio Configuration

Tait Radio Communications released the TM9155 mobile radio from its Project 25 (P25) radio line. The radio is available with a dual head configuration option that enables the operation of two independent, standard control heads attached to a single radio body. The user interface features, such as

display content, internal speaker audio and LEDs, are duplicated on both control heads. The radio body can be located separately from the radio and only requires the installation of the standard graphical head at the user location.

Tait also introduced the TP9100 vehicle charger for portables that was designed for fixed installation in vehicles to provide reliable and fast charging to either battery alone or battery with the radio. The charger is compatible with Li-ion or NiMH batteries and features a single action to latch and release the radio from charger.
www.taitworld.com

Digital Console System

The DCS-5020 digital console system from **Zetron** now offers support for Motorola's MTM800 enhanced TETRA radio, in addition to already supporting Sepura SRM3500; EADS/Nokia TMR880/880i TETRA radios; and high frequency (HF),

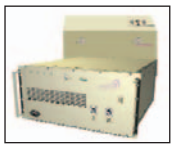
UHF, conventional, tone remote control and 5/6 Tone Selcal radio protocols. Zetron's TETRA PEI Intelligent Radio Interface Module (iRIM) provides the connection between the console system and the TETRA radios it supports. The interface is wireless, which makes it possible to deploy TETRA and analog radio and telephony systems in mobile control rooms.
www.zetron.com

Repeaters

Axell Wireless developed a digital multi-band repeater (D-MBR) that provides coverage for 900 MHz, 1.8 GHz, 2.1 GHz and LTE operating at 2.6 GHz. The repeater allows mobile operators to serve subscribers on all major network types and frequencies in the same building without having to deploy a number of devices. The repeater features 240 megahertz bandwidth capacity and multiple sub-band filtering.

Following the European Union's decision to standardize cross-border communications through the pan-European connection of GSM-R networks, Axell developed a digital

onboard repeater, D-OBR, for in-train cellular and GSM-R coverage. The repeater allows the train operator's system to automatically retune services at border crossings to support local network operators. The system also enables the operator to turn off the service when entering a territory where it has no agreement in place.



www.axellwireless.com

Repeater Interoperability Controller

Midian Electronic's RIC-2 is a tone remote adapter that allows repeaters connected by phone line or microwave to key one another. When Repeater A receives a signal from a field radio, it will give a carrier-operated relay (COR) signal to the adapter. The adapter generates 2.175 megahertz high-level guard tone, function tone and low-level guard tone to key Repeater B and re-transmit the audio coming from Repeater A.

www.midians.com

Base Station and Dispatcher System

Xfin Base and Dispatcher, an analog IP base station and dispatch system from **Team Simoco**, combines the benefits of analog radio with the operational advantages of an IP network, company officials said. The product's VoIP capability means radio traffic can be integrated onto IP networks using IP connectivity options. The software-based PC product allows multiple base stations to be managed from one or more dispatch consoles connected at any location on the IP network.

www.teamsimoco.com

Satellite Data Transceiver

Iridium Communications unveiled its next-generation Iridium 9602 satellite data transceiver. The full-duplex short-burst data (SBD) transceiver was designed for embedded applications for remote asset tracking and monitoring. The modem is smaller, lighter and less expensive than the company's first-generation SBD modem, Iridium executives said. Built-in GPS input/output ports allow users to interface with an external GPS receiver using a single dual-mode L-band antenna. The duplex data links permit two-way communications to and from remote devices, allowing users to reprogram the unit, adjust reporting intervals and send on-demand queries.

www.iridium.com

Data Transceiver

Circuit Design released data transceiver

LMD-400-R, designed for use under the European Land Mobile Service specification EN 300-113. The synthesized transceiver features 10 megawatts RF power, 4.8 Megabits per second (Mbps) data rate and GFSK modulation. The compact, low-power transceiver fulfills requirements for frequency stability in a 12.5-kilohertz channel spacing system. Three frequency versions, 438 – 442, 458 – 462 and 458 – 462.5 MHz, are available. Typical applications include industrial radio remote control and industrial telemetry.

www.circuitdesign.jp

Scanning Receiver

The CatchAll receiver from **Multiple Access Communications (MAC)** is a measurement tool for the verification and optimization of wireless networks such as TETRA, Tetrapol, GSM and UMTS. The receiver uses a wideband receiver and analog-to-digital converter (ADC) to capture an instantaneous bandwidth of up to 20 megahertz. Depending on the mode of operation, the band can be scanned up to 200 times per second, and the scanning rate can accommodate an effective scan list size of 200 TETRA or 400 Tetrapol carriers. The receiver also includes positioning information from the integrated GPS receiver and wheel-pulse inputs.

www.macltd.com

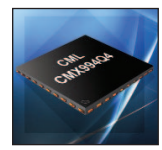
Portable Logging and Surveillance System

The **WiNRADIO** PFSL-G3 portable field strength logging and surveillance system is a portable, fully integrated system designed for mobile signal coverage measurements. The system is ideal for field strength mapping and mobile surveillance. The system offers an optional TETRA control protocol decoder and includes a wideband HF/VHF/UHF calibrated measuring receiver to measure and log signal strength. The system features an integrated GPS, and includes the control computer, receiver, rechargeable batteries and associated subsystems. Signal levels and field strength can be measured and displayed in a variety of formats along with user-definable intervals.

www.winradio.com

RF Integrated Circuits

The CMX994 from **CML Microcircuits** is a direct conversion receiver IC (DCRx) that targets the next-generation of multimode software-defined radios (SDR) for wireless and two-way radio applications. The DCRx mixes the wanted RF signal down to 0 hertz in a single quadrature mixing process using a local oscillator tuned to the wanted RF channel frequency. Selectivity filtering and gain can now take place at baseband with practical, low power, analog and digital circuits, company officials said. Features include on-chip voltage-controlled oscillator (VCO) for VHF applications, an operating range of 100 MHz to 1 GHz and precision baseband filtering with selectable bandwidths. The receiver operates at 3 – 3.6 volts and comes in a Q4 40 very thin quad flat non-leaded (VQFN) package.



www.cmlmicro.com

Rechargeable Battery

Codan released its 17-ampere hour (Ah) Lithium Iron Phosphate (LiFePO4) rechargeable battery that provides 65 hours of operation from a single charge for the company's 25-watt high frequency (HF) 2110M manpack transceiver. The battery weighs 2.9 kilograms. With the transceiver's smart battery interface, users can view critical data including battery life expectancy based on the normal field operational scenario of 1:9 transmission:receive (TX:RX).

www.codan.com.au

Microphones

Astra Radio Communications (ARC) introduced several microphones. The B45 is an anti-noise earbone microphone that transmits voice and audio by integrating voice pick up and voice transmission. The two-wire microphone is ideal for hands-free operation in loud environments. The S14 waterproof speaker microphone is medium duty and can withstand wet environments. The light duty S10NC and two-wire T23NC noise canceling microphones block surrounding noise. All microphones are made with polycarbonate plastic, Kevlar reinforced cabling and can be used with most two-way radio brands, ARC executives said.

www.arcmics.com

In-Ear Radio Headset

Phonak Communications launched primero DPC, an in-ear radio headset with built-in intelligent hearing protection for communications in loud environments. The boomless radio headset enables conversations in noise of up to 115 dB, while providing hearing protection should louder impulse noises such as shots and crashes occur. The headset uses a tiny microphone situated within the ear Jack and a signal-processing algorithm to pick up the user's voice from inside the ear canal. The headset is compatible with all helmets and masks and connects to all professional portable radios. The headset is available in wired and wireless push-to-talk (PTT) units.

www.phonak-communications.com

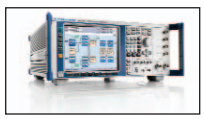
Half Loop Antenna

The Micom NVIS Half Loop Antenna System from **Royal Communications International** provides rapid automatic voice and data high frequency (HF) radio communications suitable for mobile land and marine applications in short, medium and long range. Complying with military standards, the system can withstand severe shock and vibration and was designed to operate with all Micom HF-SSB radios. The system provides advanced tuning options to replace existing large vertical and bent whip antennas.

www.royal-communications.com

TETRA 2 Enhancement

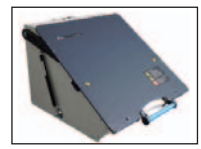
Rohde & Schwarz Professional Mobile Radios upgraded its portfolio of test and measurement equipment to provide test capabilities for the data service enhancements included in TETRA Release 2. Receivers in TETRA base stations and handsets can be comprehensively tested



using the SMU200A, SMJ100A and SMATE200A vector signal generators. The new option (-K68) runs directly on the generator. And when equipped with the FS-K110 option for TETRA Release 2, the analyzers measure parameters required for development and production applications.
www.rohde-schwarz.com

RF Shield

Willtek Communications introduced the 4933 RF Shield that supports radiation and quality measurements at large radio transceivers. The shield combines a high shielding factor with easy access to the unit under test. The shield attenuates signals from outside or inside, in conjunction with the RF



connector, which enables radio frequency and quality engineers to measure the radiation of the device under test in an electromagnetic compatibility (EMC) prequalification test. Other applications include transceiver tests in a controlled environment.
www.willtek.com

Network Security

EADS Defence & Security (DS) launched the Security Cockpit for the supervision of information system security. The system was designed for implementing network security responses in complex environments, which depend on multiple data sources and human input. The system relies partly on the Erudine Behavior Engine's (EBE) proprietary behavior capture and evolution technology. The technology centralizes information, alerting people involved and allowing them to react to complex attacks through a central console, company officials said. The system can constantly evolve as required by the user.
www.eads.com

Remote Site Link

The **MiMOMax Wireless** Power OnDemand Link (M-PoD) for supporting remote sites was designed for the low latency and spectrally efficient Network Digital Link (NDL). The link reduces power consumption by automatically and rapidly turning the remote end of a link's transmitter on and off, depending on the demand for over-the-air traffic. Both IP and NIM data at either end will prompt the link to activate, and when the link isn't in use, the link power consumption is reduced to less than 10 watts.

www.mimomax.com

Classifieds

Contact Debra at +1 303 792 2390, x 13 • Fax: +1 303 792 2391
dsabin@RRMediaGroup.com

Equipment For Sale

The Biggest inventory of Two Way Radios and Accessories in the U.S.A.

ICOM

- ✓ Full Featured
- ✓ Higher quality
- ✓ Immediate delivery
- ✓ Lower prices than used radios !
- ✓ Wholesale - (only for Dealers)

We stock thousands of portable, repeaters and mobile radios!

Two way radios & accessories, base antennas, mobile antennas, portable & GPS antennas, coax cable & connectors, rechargeable batteries, RF amplifiers, repeater & interfaces, encoders & decoders, lightning protectors, duplexers, tower sections, power supplies, programmers, solar modules, DC - AC inverters, DC - DC converters, RF test equipment.

EPCOM *Ask for your free Catalog !*

1630 E PAISANO DR. **EL PASO, TX.** 79901 U.S.A. Ph (915) 533-5119 FAX 542-4701

www.epcom.net **E-mail: sales@epcom.net**

Engineering Consultants

Communications Technology Services:

Public Safety Two-Way Radio
Conventional, Trunked, P25
Multi-Jurisdictional Interoperability
System Life-cycle Planning
Next Generation 9-1-1 Systems
Broadband / Mobile Data Networks
Communication and Operation Centers

434.239.9200
Walter.Karvetski@aecom.com
www.aecom.com/communicationstechnology

USED 2-WAY COMMUNICATIONS EQUIPMENT

Scott Communications *"Worldwide Specialists in 800/900 Infrastructure"*

Motorola and LTR Trunked Systems • IDEN Infrastructure
Type I II SmartZone Controllers
Quantar, Quantar (Intella) MTR-2000 - MSF-5000-Viking VX
mobiles • portables • base stations • repeaters
Turnkey systems and installation available (worldwide)

Ken Scott +1.406.745.3218 (voice and fax)
e-mail: kenscott@scottcomm.net www.getaradio.com

Welcome To All!

TETRA/BAPCO Attendees

Please tell our Advertisers you saw their ad in → RadioResource INTERNATIONAL

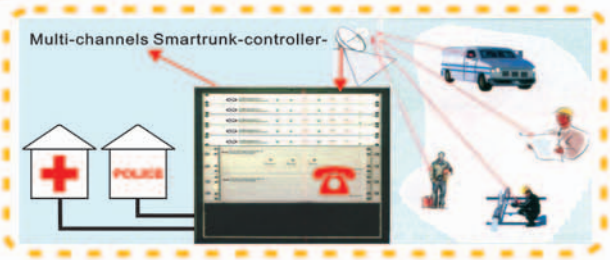
Equipment For Sale

Digital Radio Trunking System & Vibration-Acoustic Headsets Specialist

With over 20 years experience in Land Mobile Radio, The Regal Group is the manufacturer of new Trunking Option Boards. These Option Boards are 100% compatible with the Smartrunk™ II digital trunking protocol. These Option Boards use the Same proven and reliable technology that has been Used in these trunking systems worldwide for more than 15 years.

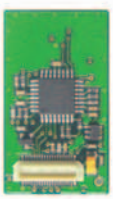
SmarTrunk™ Trunking Base Controller
Trunking systems available for Vertex, Icom, Kenwood, Motorola & Updated designs
New features include:

- **Text-messaging**
- **AVL-GPS**
- **Group-Scan**
- **Mandown & top-emergency-call**
- **Auto-serching Non-busy-channels -**
- **Conventional-scan**
- **Emergency-call**
- **Busy-channel locked-out**

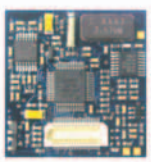


Smartrunk™ Radio Trunking System
For radio dispatching and better-controlling

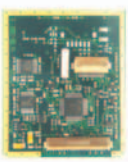
Trunking-Option-Boards



RG-117-/ RG-117-R For Icom™ radios)

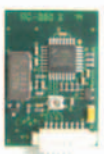


VT-80 (for Vertex™ Radios)



RG-380 Trunking board for motorola Professional Series Radios

RG-180 Trunking board for Motorola Commercial Series Radios

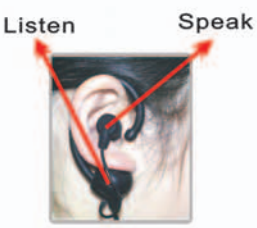


RG-860 (For Kenwood)

Smartrunk™ Compalible Trunking Transceivers UHF, VHF

Armada-OTH-Flex-boom

BTH-41-Rubber-coated



Water-proof Bone-Vibration-kit

RSM-kit

Emergency-key

Boomless-Duck bone-vibration-headset

("Smartrunk" is a trademark of Smartrunk Systems, Inc.-)

REGAL GROUP

Rm. 8, 9/F., Block B, Wah-Lueng Ind. Ctr., 15--21, Wong-Chuk-Yeung ST., Fotan, Shatin, Hongkong
Tel: (852) 2745- 8033
email: szrg2001@china.com // szrg2005@szrg2005.com
www.globalsources.com/regalgroup.co // www.szrg2003.com

Events

For more events, visit RRImag.com

6 – 9 April: IEEE Symposium on New Frontiers in Dynamic Spectrum Access Networks (DySPAN), Singapore. IEEE Communications Society: h.sweeney@comsoc.org, www.ieee-dyspan.org/2010

8 – 9 April: **Asia Pacific Radio Spectrum Conference (APRSC)**, Hong Kong. Institution of Engineering and Technology: + 852-2734-3317, aprsc2010@theiet.org.hk, www.theiet.org.hk/APRSC2010

13 – 15 April: ENTELEC, Houston. ENTELEC: 888-503-8700, www.entelec.org/conference-and-expo

18 – 21 April: IEEE Wireless Communications & Networking Conference (WCNC), Sydney. IEEE Communications Society: h.sweeney@comsoc.org, www.ieee-wcnc.org/2010

20 – 22 April: BAPCO, London. Brintex Events and BAPCO Organization: admin.enquiries@bapco.org.uk, www.bapco.co.uk

2 – 4 May: International Conference for Police and Law Enforcement Executives, Richmond Hill, Ontario. Canadian Professional Management Services: www.internationalpoliceconference.com

3 – 4 May: Transportation Security Forum, Abu Dhabi, United Arab Emirates. Wise Media: +39 02 8903 412, info@transportation-security-forum.com, www.transportation-security-forum.com

4 May: Public Safety 411, Burlington, Ontario, Canada. Public Safety 411: admin@publicsafety411.ca, www.publicsafety411.ca

5 – 6 May: RadComms2010, Melbourne, Australia. Australian Communications and Media Authority (ACMA): Donald Robertson, +02 9334 7980, www.acma.gov.au/

16 – 19 May: VTC Spring, Taipei, Taiwan. IEEE Vehicular Technology Conference (VTC): vtc@ictsgroup.com, www.ieeevtc.org/vtc2010spring/index.php

23 – 27 May: IEEE International Conference on Communications (ICC), Cape Town, South Africa. IEEE Communications Society: h.sweeney@comsoc.org, www.ieee-icc.org/2010

25 – 27 May: TETRA World Congress 2010, Singapore. TETRA World Congress: +44 20 7017 7878, enquiries@tetraworldcongress.com, www.tetraworldcongress.com

2 – 3 June: Train Conference Systems 2010, London. BWCS: www.traincomms2010.com

7 – 8 June: International Software Radio, London. SMi Group: Teri Arri, +44 20 7827 6162, tarri@smi-online.co.uk, www.smi-online.co.uk/2010softwareradio20.asp

15 – 18 June: CommunicAsia 2010, Singapore. Singapore Exhibition Services: +65 6233 6638, www.communicasia.com

23 – 25 June: European Reconfigurable Radio Technologies Workshop and Expo, Mainz, Germany. SDR Forum: sdrforum.org/2010EuropeWorkshop

1 – 4 August: APCO 76th Annual Conference and Trade Show, Houston. Association of Public-Safety Communications Officials (APCO) International: 888-272-6911, www.apco2010.org

4 – 7 October: Wireless Infrastructure Show, Hollywood, Florida, USA. PCIA: 703-535-7411, events@pcia.com, www.wirelessinfrastructureshow.com

23 – 27 October: IACP Annual Conference, Orlando, Florida, USA. International Association of Chiefs of Police (IACP): 703-836-6767, www.theiacp.org/Conferences/tabid/69/Default.aspx

15 – 18 November: APCO Canada, Vancouver. APCO Canada: Niesa Silzer, 403-277-7377, nsilzer@detailsinc.ca, www.apcocanadaconference.ca

23 – 25 November: PMRExpo, Cologne, Germany. +49 34 743/62 092, www.pmrexpo.com

ADVERTISER INDEX

Link to advertisers at RRImag.com ONLINE with AdLink

ADVERTISER	PAGE
3T Communications AG www.3t-ag.com	28
Aeroflex Wichita, Inc. www.aeroflex.com/testtetra	45
American International Radio www.airadio.com	15
ConnecTel www.connectel-cz.com	10
Creowave www.creowave.com	43
Daniels Electronics www.danelec.com	55
EADS Defence & Security www.eads.com/pmr	12-13
Eventide www.eventide.com	47
Fiplex www.fiplex.com	44
Genesis Group www.GenesisWorld.com	22
HAL Communications www.halcomm.com	30
Hytera www.hytera.us	27
ICOM Inc. www.icom.co.jp/world/	7
JDI www.jdi-co.com	21
Kathrein www.kathrein.de	61
Kenwood nexedge.kenwood.com	9
Kirisun www.kirisun.com	23
Kolibri Systems www.kolibri-systems.com	46
Midian www.midians.com	14
Mobility Sound www.mobilitysound.com.tw	49
OTTO www.ottoexcellence.com	59
Procom A/S www.procom.dk	24
Radio & Trunking Distributors International www.radioandtrunking.com	60
Radio IP Software Inc. www.radio-ip.com	19
RadioResource International www.RRImag.com	28, 53
Radiotrans Comunicaciones www.radiotrans.com	63
Selex Communications www.selex-comms.com	2
SkySweep Technologies www.skysweep.com	51
SmarTrunk Systems www.smartrunk.com	29
SoftWright www.softwright.com	55
Spectra Engineering www.spectraeng.co.au	3
SuperGUIDE www.RRImag.com	63
Team Simoco www.teamsimoco.com	71
Telewave www.telewave.com	72
Teltronic www.teltronic.es	11
Tetra World 2010 www.tetraworldcongress.com/mission	57
Unimo www.unimo.co.kr/eng	17
Willtek www.willtek.com/tetra	25
Zetron www.zetron.com	5

Is This Your Copy of *RadioResource International*? Start Your Own FREE Subscription TODAY!

RadioResource INTERNATIONAL

FREE SUBSCRIPTION

AND ADDRESS CHANGE CARD

This card is for: ❑ New Subscription ❑ Address Change

Subscribe online: www.RRImag.com

or fax this form to: +1 818 760 4490

COMPLETE ALL ITEMS ON CARD

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE/PROVINCE _____

COUNTRY _____ POSTAL CODE _____

FAX _____

E-MAIL _____

❑ *Do not share this e-mail address with a third party.*

1a. ❑ **YES, I want a FREE subscription to *RadioResource International*** ❑ No
Subscription includes magazine and WORLD NEWS monthly e-newsletter.

1b. How would you like to receive your magazine?
❑ D. **DIGITAL Edition: Clickable, Searchable, Saveable & Ecological** (Available Worldwide)
❑ P. Print Edition (Available Outside US and Canada)

SIGNATURE: _____

DATE: month _____ day _____ year _____

2. Which of the following best describes your organization?
❑ A Mobile Communications Dealer/Reseller
❑ 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 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 radio communications equipment or services?
❑ A Yes ❑ B No

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

6. In what area of the world do you do most of your business? (mark only one)
❑ 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
❑ Z Other _____

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 _____

Q210

Philippines Gains Updated Typhoon Communications System

By Matt Heggli

Depending where you live in the world, tropical cyclones are known as typhoons or hurricanes. On average the Philippines experiences more than 20 typhoons a year. That compares with the United States, which experiences about two hurricanes a year, and on occasion, exceptionally dangerous hurricanes with great loss of life and property, such as Hurricane Katrina in 2005. The landmass of the Philippines makes this comparison all the more exceptional. Annually, these weather-related devastations can cost a country such as the Philippines millions of dollars and result in hundreds of lost lives.

The Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) is at the forefront of the disaster mitigation activities as the government-mandated agency responsible for warning the public of typhoons, floods and other weather-related hazards in the Philippines. PAGASA's legacy telecommunications employed the 800 MHz frequency range. Once mobile phones became popular, the legacy telecommunications system crumbled from increasing interference from the country's mobile-phone networks.

PAGASA then experimented with a migration to GSM/GPRS technology, but this largely failed because the commercial communications networks did not meet the standards required for the devastation brought by typhoons and for operation during emergencies. The public and others use commercial networks, and they can get bogged down or crash when there is high volume of use, such as during an emergency. When the network is heavily used, data transmissions are not received by end users, in this case, the government responsible for alerting the public. Not receiving transmissions was a recurring issue in the Philippines. During most days, the transmissions were received 100 percent of the time, but during times of severe weather, the GSM/GPRS communications would drop out or be unavailable for long periods of time. The absence of reliability results in inadequate emergency response.

PAGASA has most recently sought assistance from the United States in developing a frequency migration plan, adding coverage throughout the 7,000 islands that make up the Philippines, and developing a backup telecommunications concept. Innovative Hydrology was assigned to manage the project, which includes the evaluation of the country's entire meteorological network and building a design for a highly sustainable telecommunications network to serve the needs of the Philippines in preventing loss of life and property.

Innovative Hydrology has worked on a global scale with consulting expertise in meteorological and hydrological applications, weaving in the use of state-of-the-art telecommunications. With this particular project, Innovative Hydrology faced some new challenges such as the complex geography of the Philippines. The terrain and land area — a nation that is covered in tropical rolling hills, spanning more than 7,000 islands — is unlike anything the company's staff had experienced on previous projects.

Innovative Hydrology assessed the system, which led to a recommendation that a microwave backbone system be used with backup over satellite. The civil works will include the rehabilitation of 25 existing mountaintop stations with the addition of new mountaintop stations that will easily double the total number of nodes. The design includes a rather simple ring topology to improve reliability and will use TCP/IP protocol. Communications reliability will be fortified with satellite data relay through MTSAT, which is a meteorological satellite equipped with a data relay transponder.

The implementation, which will eventually be contracted, will be budgeted at about US$40 million. The United States Trade and Development Agency granted financing for this study to improve the living conditions in the Philippines and promote trade from suppliers in the United States. It is expected that through the use of reliable and sustainable telecommunications, the people of the Philippines will have vastly improved infrastructure that will lead to the protection of life and property, and much improved quality of life. ■

The civil works will include the rehabilitation of 25 existing mountaintop stations with the addition of new mountaintop stations that will easily double the total number of nodes.

Matt Heggli is an analyst for Innovative Hydrology. He focuses on the meteorology and hydrology aspects of telecommunications projects for Innovative Hydrology. He has also worked on projects in India. Visit the company Web site at www.innovativehydrology.com or e-mail comments to matt.heggli@innovativehydrology.com.

TeamSimoco

Call +44 (0)1332 375500
for Launch Offers

next GENERATION

Portable Range

Conventional Trunked & P25

with upgrade options

simoco
Smart Thinking Technology

Rugged

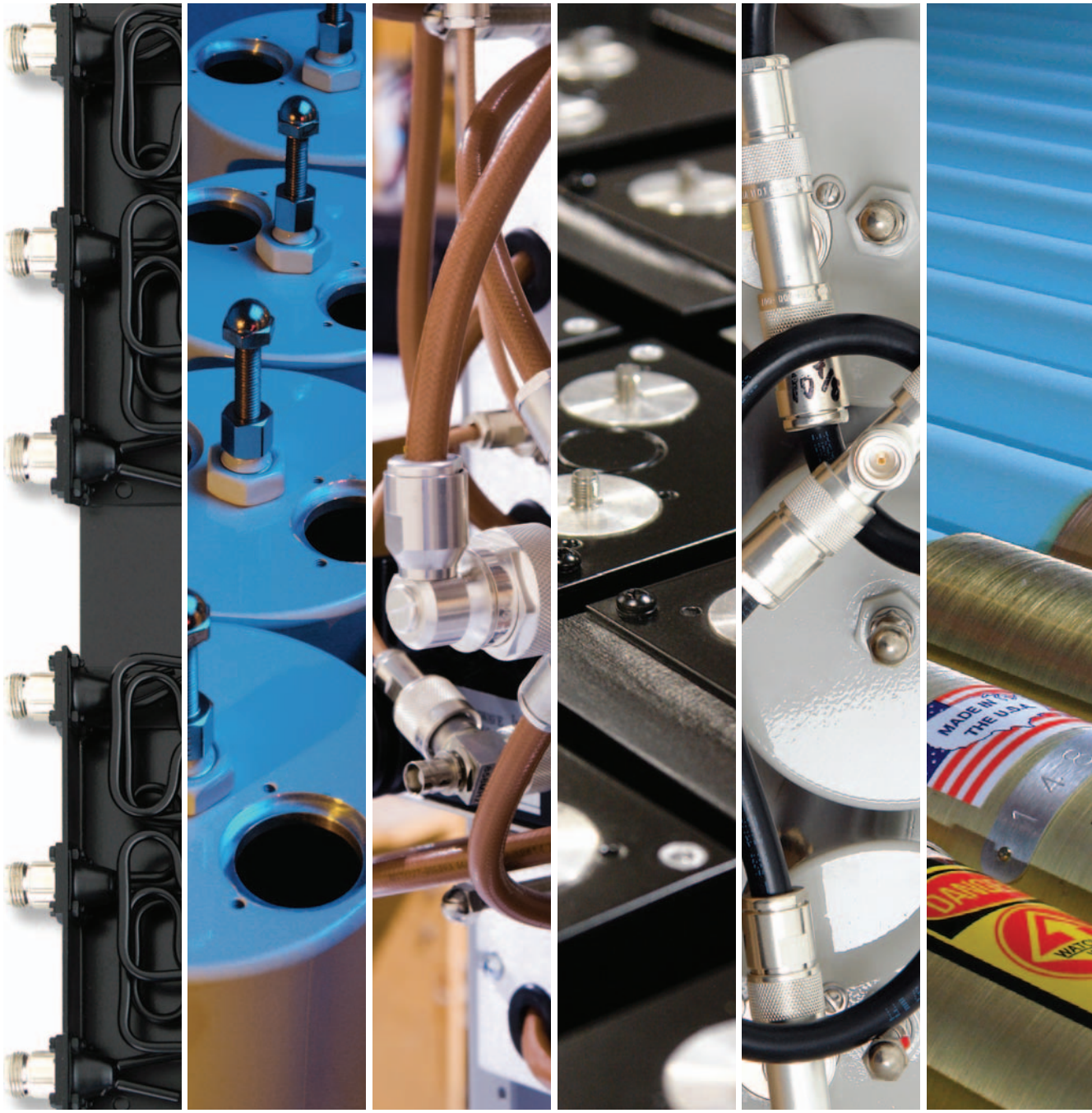
Compact

IP67

Xmode TERMINALS

Team Simoco Ltd, Field House, Uttoxeter Old Road, Derby DE1 1NH
Tel: +44 (0)1332 375500 · Fax: +44 (0) 1332 375666
Email: marketing@teamsimoco.com · Web: www.teamsimoco.com

P25 DIGITAL · DIGITAL WIRELESS · SAMS · UNLAMBRICO



Tested. Proven. Trusted.

Telewave has supported Public Safety, local and state government, and the military for over 38 years. Our full line of standard radio system products is available for shipping within 10 days or less, and our system engineering team is ready to assist with your most demanding projects.

From 700/800 MHz dual-band combiners to receiver multicouplers, duplexers and multi-channel, multi-band antenna systems, Telewave has the tools and the technology to help you meet your mission requirements. All Telewave system solutions are P25 and narrowband compatible.

TELEWAVE, INC.®

San Jose, CA • +1 408-929-4400 • www.telewave.com