# CRITICAL COMMUNICATIONS TODAY

The global information resource for mission-critical communications

CRITICAL COMMUNICATIONS TODAY
Headline partner
Hytera

# State of the nation: critical comms in the USA


**p10**
**Forward progress**
Lead mobile network operator appointed to provide Australian public safety broadband proof of concept

**p16**
**At the crossroads**
Exploring the impact of major disasters on international public transportation communications strategy

**p38**
**Just getting started**
Following its recent 100th meeting, TCCA Technical Forum talks about the future direction of the TETRA standard



**May 2021**
*www.criticalcomms.com*
*@CritCommsToday*

SUPPORTED BY TCCA


PUBLIC SAFETY ◉ TRANSPORT ◉ INDUSTRY

# CRITICAL COMMUNICATIONS TODAY

The global information resource for mission-critical communications

***Critical Communications Today*** *is the only publication serving all aspects of the mission-critical wireless comms community.*

*Our reach is massive, with over*

**20,000**

*digital and printed copies.*

*Engage with industry professionals in more than*

**105**

*different countries.*

CRITICAL COMMUNICATIONS TODAY
Headline partner
Hytera

*Contact Frankie at* ***frankie.butler@markallengroup.com*** *if you want to take advantage of the exposure that we provide.*

REGISTER FOR YOUR ***FREE*** COPY TODAY

**www.criticalcomms.com**

MAY 2021

## 4 Editor's letter
Philip Mason gives an overview of the latest issue of *Critical Communications Today*

## 6 Who, what, where
Bahrain Grand Prix relies on TETRA; Teltronic rolls out to Sydney suburbs; Danish utilities' broadband upgrade; manufacturer proves ESN functionality; Leonardo kits out Alpine ski championship; Nokia provides industrial 5G to Japanese prefecture; Hytera expands its Latin American operation

## 10 News
ETSI tests NG 911/112 cross-border interoperability; Australian emergency services broadband; TCCA launches 2021 ICCAs

## 14 The big interview
FirstNet chief executive officer Ed Parkinson discusses additions made to the US mission-critical broadband network over the past 12 months, as well as the benefits of a 'competition'-based model for roll-out

## 16 At the crossroads
Transport for London and Brussels-based STIB talk about how two recent major public safety situations have influenced their critical communications strategies

## 22 What's past is prologue
With the Emergency Services Network in the middle of a crucial year, ETSI's Brian Murgatroyd talks about parallels between the roll-outs of Airwave and ESN

## 26 Back in the USA
Philip Mason gives an update on the United States TETRA market, finding contrasting opinions about the anticipated popularity of the standard going forward

## 32 Conference report
BAPCO: The Online Event in March provided visitors with three days of high-level conference content, including several ESN-related sessions, as well as presentations focusing on artificial intelligence

## 36 CCBitesize preview
The first Critical Communications Bitesize event – taking place online in June – will focus on the use of critical narrowband

## 38 Just getting started
Following the 100th meeting of TCCA's Technical Forum earlier this year, group chair Harald Ludwig and association vice-president Tero Pesonen discuss the history of the group, and the future of the TETRA standard



CRITICAL COMMUNICATIONS TODAY

**Editor:** Philip Mason
philip.mason@markallengroup.com

**Sales manager:** Frankie Butler
Tel: +44 (0)7967169083
frankie.butler@markallengroup.com

**Graphic designer:** Jamie Hodgskin
jamie.hodgskin@markallengroup.com

**Circulation manager:** Paul Creber

**Sub-editor:** Chris Young

**Production director:** Richard Hamshere

**Managing director:** Tim Willoughby

**Chief executive officer:** Ben Allen

Reader enquiry and subscription services:
Tel +44 1722 716997
(in the UK, 0800 137201)



Views expressed in this magazine do not necessarily represent those of the editor or publisher. The publisher can accept no liability for any consequential loss or damage, howsoever caused, arising from any information printed.



MA Exhibitions
Part of
Mark Allen
www.markallengroup.com

**Critical Communications Today** is published by:
MA Exhibitions Ltd, St Jude's Church, Dulwich Road, London, SE24 0PB, United Kingdom
Tel. +44 0207 738 5454

**Online edition:**
**www.criticalcomms.com**

**Twitter:** @CritCommsToday



©2021 MA Exhibitions Ltd. All rights reserved. Whether in whole or in part, in any form or by any means, this publication may not be reproduced, stored in a retrieval system or transmitted without the written permission of the publishing director.

Please read our privacy policy, by visiting http://privacypolicy.markallengroup.com. This will explain how we process, use & safeguard your data



**(Print) ISSN 2517-2719**
**(Online) ISSN 2045-8673**

**UK Personal subscription rates**

| | |
|---|---|
| Quarterly Direct Debit | £13.50 |
| Annual Direct Debit | £55 |
| Annual Credit Card | £58 |
| 2yr Annual Credit Card | £99 |
| 3yr Annual Credit Card | £139.50 |

Subscribe online:
www.magsubscriptions.com
Subscribe by phone: +44 (0) 1722 716997
Printed by: Pensord Press Ltd

The paper used within this publication has been sourced from Chain-of-Custody certified manufacturers, operating within international environmental standards, to ensure sustainable sourcing of the raw materials, sustainable production and to minimise our carbon footprint.

recycle
When you have finished with this magazine please recycle it.

Cover credit: Adobe Stock/Beboy

MAY 2021

# Affairs of states

*Critical Communications Today* editor Philip Mason gives a rundown of the latest issue, which focuses in particular on the deployment of TETRA and mission critical broadband in the USA

**MISSION STATEMENT**

*Critical Communications Today provides the global mission-critical community with insight into the latest technology and best practice required to ensure that its members always have access to the instant, one-to-many wireless communications that can make all the difference in moments of crisis.*

*We are dedicated to providing our readers with the knowledge they need when determining their critical communications strategies and procurements, though delivering up-to-the-minute accurate information on industry trends, developments, and deployments, as well as the latest new products and services. Our journalists are committed to easing out the little details from your peers that will allow you to draw on the industry's collective experience of deploying and implementing new projects and systems.*

*We work to stimulate and focus debates on the topics that matter most and provide our readers with a means to raise their concerns and speak frankly about their work and the lessons they've learned while delivering the devices and networks that the world's blue light organisations depend on.*

Welcome to the latest issue of *CCT*, the leading resource for professionals operating within the critical communications sector.

As you may have noticed, we have somewhat of an American theme running through this issue, first via an interview with Ed Parkinson giving an update on FirstNet, after which we examine the state of the TETRA market across the country.

Both are fascinating topics for any number of reasons, not least that they offer profound insight into what might be termed the 'competition' model of critical communications roll-out.

As well as these pieces bringing news from the USA, we also have several articles discussing some of the most interesting work being carried out across specific 'mission critical' verticals in different parts of the world. For instance, turn to page 16 to read about how public transport operators in Belgium and the UK have evolved their communications strategy in the light of major public safety crises.

> **"As you may have noticed, the latest issue has somewhat of an American theme"**

Coming back to the subject of emergency services comms, meanwhile, starting on page 22, Brian Murgatroyd looks back at the initial roll-out of Airwave in the United Kingdom, comparing it to the current deployment of the Emergency Services Network.

As current chair of ETSI's technical committee for TETRA and critical communication, Brian's opinion is clearly invaluable.

What some may not know, however, is that he previously occupied the role of head of security at the Police Information Technology Organisation, giving him the inside track on UK public safety TETRA right from the beginning of its roll-out all those years ago.

Finally, turn to the back of the issue for several TCCA-related interviews. The first of these (located on page 36) is with CEO Tony Gray, discussing the new CCBitesize events, the first of which focuses on critical narrowband, specifically from the user perspective. A few pages later, we mark the recent 100th meeting of the organisation's Technical Forum with an interview with Harald Ludwig and Tero Pesonen.

Stay safe and enjoy the issue.

**Philip Mason, editor**

Hytera

# HYTERA'S ADVANCED MULTI-MODE SERIES

**ROAM ANYWHERE | MULTI-TASK ANYTHING | SEE EVERYTHING**

*Gives you Voice, Video and other Multimedia all in one device*

*Supports a variety of Apps via an Android platform*

*Supports DMR and TETRA Technology*

*The ROIP function allows the device to select the best network*

For more information please email **info@hytera-europe.com** or visit **hytera-europe.com**

# Who, what, where

## EUROPE

Adobe Stock/Dirk

### Danish utilities' broadband upgrade

Nokia has reached an agreement with Danish operator Cibicom to provide a new country-wide, mission-critical 450MHz LTE network for essential services suppliers.

According to Nokia, the project will ensure that "key mission-critical services throughout Denmark will have access to highly reliable and secure connectivity, as well as building preparedness for mass-volume IoT adoption".

Speaking of the project, a spokesperson said it "will ensure that Cibicom is in a strong position to adapt to changing customer requirements and offer new opportunities and application support around 5G 3.5GHz.

"Smart grids and remote managed petrol stations are just some of the areas where these systems will be needed, as well as emergency services."

### AT&T announces global WAN project with ERIKS

The American provider is supplying a series of wide-area networks (WANs) to Netherlands-based industrial tech specialist ERIKS.

According to a statement from AT&T, the networks will be deployed across 17 countries, with the company "migrating ERIKS' US transport network, [as well as] all of its 250 sites in Europe and Asia Pacific".

The communications company will also provide "dedicated service management resources, supporting 350 locations in Europe, North America and Asia Pacific".

Sites will include the company's headquarters, branch offices, data centres and more.

Discussing the rationale for the project, a spokesperson for AT&T said: "ERIKS wanted to consolidate their global network through the use of a single provider."

### Motorola provides Norway health control room

Motorola Solutions is supplying its CommandCentral control room solution to the Norwegian Health Emergency Service. The contract was issued by health-authority-owned technology organisation Nødnett HF (HDO HF).

According to Motorola, the solution will be used across all Norwegian medical and external outpatient treatment facilities. A spokesperson said: "HDO HF can host the solution within their private data centres, helping to simplify IT management. This will increase data capacity to meet rising demands and reduce costs by automating essential tasks."

Nødnett HF's CEO, Lars Erik Tandsæther, said: "The new control room solution allows for significant improvements to efficiency and scalability, providing much-needed flexibility."

## Manufacturer proves vital ESN functionality

Frequentis has successfully demonstrated additional voice and data feature sets for the Emergency Services Network, including functionality such as group call, private call and ambient listening.

Discussing the project, a spokesperson for the company said: "We are working directly with the Home Office on the development of a gateway, which will connect Frequentis's multimedia communications platform 3020 LifeX to ESN.

"The gateway will provide an Airwave-comparable feature set. It will be installed and tested within the Ambulance Radio Program, which is a Frequentis reference customer. Testing included group call, private call – in/out – ambient listening, status message, emergency calls, text messages and broadcast."

## Leonardo kits out major Italian sporting event

Leonardo partnered with the Cortina 2021 Foundation to provide comms for this year's Alpine Ski World Championships.

During the project, the company installed a dedicated Rete Ibrida Multi-Vettore radio network across 12 sites. According to Leonardo, the system offered both narrowband and broadband, and was "interoperable and fully integrated thanks to the Leonardo Core Network".

The organisation also rolled out a bespoke data collection solution, consisting of advanced video surveillance and real-time analysis, based on AI. The solution also included sensor-based field data collection, as well as information classification.

The Alpine Ski World Championships took place in Cortina d'Ampezzo, Italy.

## Tranvia de Murcia receives TETRA update

The Spanish city of Murcia is updating its public transport communications with a TETRA network provided by Airbus.

The city's tram network – known as the Tranvia de Murcia – uses a system based on Airbus TETRA Claricor technology. Installation of the updated solution will be carried out in collaboration with industrial engineering company COMSA.

A spokesperson for Airbus said: "The Tranvia de Murcia network provides secure voice and data communications. It also allows communication between the central control post and on-board equipment through SDS messaging."

The latter will also facilitate tram servicing information, timetable information and "possible in-vehicle alarm triggering".

EUROPE

## English ambulances to receive comms upgrade

Telent has been awarded the contract to upgrade mobile communications across all 11 NHS Trusts in England.

According to a statement, the company will deliver the NHS Ambulance Radio Programme's mobile data vehicle solution initiative. This will involve the installation and support of "specially programmed and ruggedised Windows tablets", as well as smart vehicle routers.

Discussing the roll-out, a spokesperson for the company said: "[The deployment] will enable the in-vehicle communication capability needed for the National Mobilisation Application, which will provide a standard platform for control rooms to communicate with ambulances." Installation will take place across approximately 5,000 ambulances.

MIDDLE EAST

## Bahrain Grand Prix organisers rely on TETRA

Operators of the Bahrain International Circuit – site of the recent Formula 1 Bahrain Grand Prix – used Airbus TETRA technology to secure the event.

According to Airbus, the Bahrain International Circuit Organisation leveraged the country's pre-existing TETRA network infrastructure, with the company providing additional capacity. Devices supplied included the company's THR880i and TMR880i radios.

Airbus Secure Land Communications' vice-president, Selim Bouri, said: "Large events, such as the Formula 1 races, massively draw people's attention to the Arabian peninsula. It is always an honour to serve the organising committee of this Grand Prix with our technology."

AUSTRALASIA

Adobe Stock/Phillip

## Teltronic's radio roll-out to Sydney suburbs

Teltronic is deploying TETRA to the Parramatta Light Rail project in the outskirts of Greater Sydney.

According to the company, it will be supplying its NEBULA network infrastructure, consisting of a switching control node and outdoor base stations.

It will also provide on-board radio from its RTP series.

Speaking of the initiative, a spokesperson for Teltronic said: "This is one of the last major projects that the government of New South Wales is developing to provide new services to Sydney."

The new transportation line will connect the suburbs of Westmead and Carlingford, in the west of the city. It is expected to be operational by 2023.

ASIA

LATIN AMERICA

Adobe Stock/Alaksei

## TETRA technology continues to fly high in Nepal

Gautam Buddha International Airport in Nepal's Siddharthanagar municipality is rolling out a suite of Sepura SC20 handheld radios. It is the second airport in the country to deploy TETRA, following on from Tribhuvan International in Kathmandu.

Speaking of the roll-out, a spokesperson for Sepura said: "Built on Teltronic's TETRA infrastructure, [the deployment] is part of the airport's wider infrastructure upgrade.

"It will allow the airport to respond to the pressure of moving passengers, luggage and cargo on-site, improving both efficiency and safety.

"The technology will also enable co-ordination between the airport's security and operational teams for everyday operations and, where necessary, emergency response."

## Japanese region gets Nokia 'industrial grade' 5G

Nokia is providing standalone 5G throughout the Aichi Prefecture in Japan.

According to the company, it will be working on behalf of Japanese CATV operator the KATCH Network, which plans to offer "autonomous industrial-grade private wireless networks for businesses in the region". Nokia describes the Aichi Prefecture as the "nerve centre" of automotive and hi-tech manufacturing in Japan.

Speaking of the project, KATCH Network executive vice-president Tatsuya Yamada said: "There is a huge concentration of industrial companies in Aichi Prefecture.

"Given Nokia's 5G expertise, we can now help Aichi-based manufacturers benefit from reliable and secure, high-bandwidth networking."

## Industry giant expands regional reach

Hytera Mobilfunk has announced plans to strengthen its Latin American operations.

According to the company, teams based in Lima (Hytera Mobilfunk Surcusal del Perú) and Santiago (Hytera PMR Chile SpA) will also support customers in Argentina, Bolivia, Uruguay, Paraguay and Ecuador. The Peruvian branch of the business will become what the company refers to as a "competence centre" in the region.

Speaking of the move, a spokesperson for the business said: "The newly structured Hytera sales territory is combined into the 'LATAM south' region, and is headed by Luis Perez as regional director. He – together with his team – has established himself as an expert in mission-critical communications solutions, especially in Peru and Chile."

# ETSI tests NG 911/112 cross-border interoperability

ETSI has announced the completion of an "international emergency communications interoperability testing event", focusing on next-generation call-taking technology.

According to the organisation, the event – which took place remotely – was a collaborative effort involving ETSI, the European Emergency Number Association (EENA) and NENA in the United States. Two hundred and eighty-five test pairings were run, showing an interoperability rate of 87 per cent.

Testing was carried out in conjunction with NENA's ICE 9 event which, according to that organisation, was the first test of emergency call routing across international borders "using voice, video and text to simulate international roaming scenarios". Elements tested included location/location-based call routing, audio, video, real-time text, policy-based routing and core.

Speaking of the initiative, EENA technical director Cristina Lumbreras said: "ETSI and EENA are delighted to have collaborated on this milestone intercontinental testing event. Crossing borders and oceans, the event helped to ensure efficient, interoperable emergency communications for all citizens.

"We believe that the testing will make a significant contribution to public safety in Europe and the USA, driving forward the implementation of lifesaving next-generation communications in our continents."

According to a statement issued by NENA ahead of the event, it was intended to cover a variety of scenarios including voice interoperability between NG911 and NG112 core services, as well as "Internet of Things and automatic/non-interactive emergency calls". Another scenario identified by NENA was "initial conformance testing of global implementations compared to normative standards, including the NENA i3 family of standards, the ETSI EMTEL specification".

Discussing the event, former president Monica Million said: "This collaboration is key to improving emergency-calling services worldwide. By working together with our global partners, we can take next-generation emergency-calling services to the next level.

"Through international events like this, our commercial partners can realise a global economy of scale. Meanwhile, our public-safety members can leverage increased vendor competition and a greater diversity of technical solutions when designing and deploying life-saving next-generation 911 and 112 systems."

Adobe Stock/Milovan Zmic

Stakeholders involved in the testing included NGCS vendors, user agents, mobile operators and call-handling vendors. The event took place from the end of February to the beginning of March.

In other interoperability news, ETSI has announced its Future Railway Mobile Communication System (FRMCS) Plugtests, taking place in the middle of June. According to the organisation, the virtual event will aim to "validate equipment interoperability using test scenarios based on the 3GPP mission-critical work. Focus will be on rail-specific features and capabilities, such as functional aliases, multi-talker and MCData IP connectivity."

The tests – which will be based on the 3GPP, ETSI and IETF standards – will be designed for a range of equipment, including MCX application servers, MCX clients, consoles/control rooms, and UEs and cab radios.

A spokesperson said: "The purpose and scope of the FRMCS Plugtests are to test independently and jointly all components of the mobile communication system for railways. Railway-related test cases are available in ETSI TS 103 564. Interop demonstrations for observers will also take place, where different vendors will showcase interoperability by executing the Plugtests test cases."

According to ETSI, more than 20 vendors and 80 participants will be involved in the summer event.

## Verizon wins major UK 5G contract

American carrier Verizon Communications has won its first European industrial 5G contract, signing an agreement with Associated British Ports to supply a private network at one of the UK's new freeports.

According to a statement, Verizon will build and run the system in Southampton, which is one of several post-Brexit, low-tariff business zones created during the UK government's recent Budget. The network will leverage Nokia's Digital Automation Cloud solution.

Speaking on a video call announcing the decision, chief executive officer of ABP, Henrik Pedersen, said: "We chose Verizon simply due to [its] track record of setting up private 5G networks. 5G is not regional or local, it's global. There will be a lot of need for data transfer in the freeport zone, especially when you start to move goods in and out of the customs zones. [Our] 5G network will enable new systems including drones that can transmit high-definition video for maintenance checks and send live shipping data."

The Solent Freeport private network is expected to be operational by July of this year, with the rest of ABP's 21 UK ports also likely to tender for 5G networks.

Tami Erwin, CEO of Verizon Business, said: "Along with Nokia, we have been able to equip ABP to take advantage of the immediate benefits offered by private 5G, and most importantly, prepare the [Solent] port to take full advantage of new technology applications and real-time analytics which will digitally transform its services in the future."

# Australian emergency services broadband nears trial stage

TPG Telecom has been appointed as the lead MNO on an Australian public safety broadband trial. It will deliver the network proof of concept in collaboration with Nokia.

According to a statement by TPG, the trial programme "will provide a mobile broadband platform for emergency services organisations, aimed at improving access to information, providing real-time, automated situational awareness and enabling emerging technologies to be integrated into operational practices".

The project is being led by the government of New South Wales "on behalf of all states, territories and the Commonwealth".

Speaking of the initiative, TPG Telecom's CEO, Iñaki Berroeta, said: "The trial will allow for the exhaustive testing of the multi-operator service delivery model to ensure it can provide the critical communications support needed for frontline staff during emergencies and natural disasters.

"Last year's bushfires, and the recent floods in New South Wales and South East Queensland, demonstrate the importance of emergency services personnel having access to real-time information to enable them to make critical decisions in dangerous, fast-moving situations."

Adobe Stock/ingusk

Head of Oceania for Nokia, Anna Wills, said: "Nokia is proud of our innovation and expertise in delivering high-quality, secure public safety solutions for emergency services. Communications across services are essential to enabling fast, reliable co-operation between our emergency personnel in times of crisis."

The Australian federal government began exploring options around mission-critical broadband in 2017, following the issue of a request for information. This was followed a year later by a 'request for proposal', which invited the telecommunications industry to undertake a proof of concept.

Speaking of the RFP at the time, managing director of NSW Telco Authority Kate Foy said: "NSW has been working in close collaboration with representatives from the Commonwealth and all the other Australian states and territories in developing the next steps towards a national PSMB [public safety mobile broadband] capability. By participating in the proof of concept, industry can provide solutions for innovative and cutting-edge equipment that can be integrated by public safety agencies into their mission-critical communications portfolios.

"The RFP also provides an opportunity for carriers and equipment suppliers to have a direct influence on the roadmap for a national PSMB capability in Australia."

## TCCA news

TCCA has launched the 2021 iteration of the International Critical Communications Awards. The event will take place at the Casino de Madrid on 3 November, after the first day of this year's Critical Communications World, also taking place in the city.

Speaking of the awards, TCCA chief executive Tony Gray said: "The ICCAs highlight the excellent work carried out by the critical communications sector across the world. As difficult as the past 12 months have been, critical communications have proven once again to be at the cutting edge of innovation and customer service.

"Alongside the awards themselves, we also expect the occasion to be particularly special for those in attendance. After a year spent away from people, the ICCAs represent the perfect opportunity to socialise with friends and valued colleagues from across the globe."

The organisers of the event have described it as a 'celebration of excellence in the sector, recognising products, organisations and individuals which have pushed boundaries and capabilities within the field'.

Award categories include 'Best use of critical communications in public safety', 'Best hybrid device of the year' and 'Best narrowband device'. The event follows on from the 2020 ICCAs, which took place online as part of Critical Communications Week last year.

In other TCCA news, antenna and test and measurement specialist PCTEL has joined the organisation. Speaking of the move, the company's chief operating officer, Rishi Bharadwaj, said: "PCTEL is at the forefront of several important trends in critical communications, including 5G, public safety broadband, and reliable radio coverage in buildings.

"Together with TCCA, we can help to enable reliable critical communications connectivity worldwide, both indoors and out."

TCCA's Gray said: "PCTEL's expertise across the range of wireless technologies will enable the company to bring much knowledge to TCCA, particularly relating to the US market.

"With FirstNet leading the field in public safety broadband implementation – and with TETRA steadily increasing its footprint in North America – PCTEL's experience will be a highly valuable resource. We look forward to their participation in our work."

PCTEL is an American company, which has its headquarters in the town of Bloomingdale, Illinois.

*Turn to page 38 to read an interview with Harald Ludwig and Tero Pesonen, discussing the recent 100th meeting of TCCA's Technical Forum.*

# 5G: the technology behind the future of public safety

Broadband wireless services based on 4G/LTE have already had a big impact on public safety services with the deployment of next-generation services in the US (Firstnet), the UK (ESN) and Dubai (Nedaa) and other countries. But public safety authorities are also scrutinizing the arrival of the next generation of private wireless: 5G. What will its high-performance broadband, low latency and other features do to enhance command and control, situational awareness and general communications support for first responders?

One of the principal drivers for broadband wireless services is the ability to share high amounts of data, including video. First responders often have to feel their way without much situational awareness, especially when the scale and rapid shifts on the ground make it difficult for them to keep up with the larger picture. This is where video communications and augmented reality can be invaluable for keeping everyone involved connected and aware of the evolving situation.

It is possible for a very big event to have feeds from tens, if not hundreds, of first responder body cameras, truck-mounted cameras, site-based CCTV cameras and drone cameras, including infrared. The large number of high-quality video feeds requires an enormous amount of bandwidth. For drones and robots, a very low latency connection is a must so that the pilots are able to precisely maneuver them remotely.

Much less bandwidth-intensive, but still demanding for the network, are IoT communications, namely with the many kinds of sensors that now exist: Air quality, heat, chemical, structural sensors and bio-vital monitors, to name a few. Also, modern telemedicine capabilities can deliver top medical expertise, including remote surgery, to the event by connecting paramedics with medical specialists operating from a distance.

Many of these use cases are being tested and, in some cases, already used on a regular basis using 4G/LTE. However, in the longer term, in cases where a high density and variety of applications will be needed in the same area, there can be some limitations to what 4G/LTE can deliver regarding scaling up to the performance needed.

## The technology behind the 5G magic

To support this increased need for high bandwidth, 5G New Radio is designed to work across a much broader range of radio spectrum. Many of the bandwidth gains relate to 5G's ability to use higher frequencies, such as millimeter wave (above 20GHz). These very high frequencies provide limited coverage, making them better suited for hot spots in dense urban areas. To efficiently provide large area coverage for rural areas, 5G will also be able to use lower frequencies, but capacity will be reduced compared to higher bands. Between these extremes there are different spectrums that work better. Typically, urban and suburban areas will benefit from the latest radio technology, such as MIMO and beam forming, to deliver enhanced throughput versus 4G, while offering similar coverage. Using these different bands will be important to fully benefit from 5G promises.

There are other ways in which 5G shows its flexibility, such as its ability to geographically distribute core network functions to the edge, thus shortening the distance between essential core functions and end devices. This is what enables 5G to dramatically decrease latency, which is the measure of how long it takes for communications between two devices to take place. This is a key feature for machine-to-machine communications, such as drones and robots using haptic and tactile feedback and is especially useful in applications such as augmented reality or tele-surgery, where the feedback to the user has to be nearly instantaneous.

Last, for operations in remote areas or where the network coverage is bad or even down, public safety authorities will

still have the ability to equip themselves with deployable 5G systems, to benefit from the full performance and capacity of this technology. The massive bandwidth of 5G even enables self-backhauling, where part of the capacity is used to relay communications in between the field and a central mobile command and control center. This self-backhauling is known as integrated access and backhaul (IAB).

## A slice of security

More than ever, first responders will be able to rely on public 5G networks and their nation-wide deployment because of a feature called slicing. It allows multiple virtual networks, with agreed quality of service (QoS) criteria, to be created on top of a common, shared physical infrastructure when a service must be used. In the case of 5G, network slices can be put up and taken down almost instantaneously, in this way being implemented only where and when needed and optimizing overall network resources usage.

5G is based on a cloud-based, virtual network architecture, which means that it is possible to duplicate many network functions. Thanks to end-to-end orchestration of all network elements, it is possible to automatically create a virtual network configured precisely to fulfill the needs of the application. A mission-critical application used during an event might, for instance, be a push-to-video application. The virtual 5G network creates the network functions required to support the video transmission, which means a very high quality of service with no delays and top priority level. These virtual network resources are then reserved for this application. This is what we mean by a slice.

In other words, slicing means that the many consumers who also depend on the public mobile network will still have access to it, but their activity won't affect the operation of the public safety mission-critical slice that is passing over the same network infrastructure. Especially important for security is that the traffic on one slice cannot pass to another. This makes a dedicated public safety slice or slices very secure.

## When will we have 5G?

We are still in the first phase of 5G deployment. Most of the features we have discussed above will not be available for a few years, as the standards are still being firmed up. Even when the final standards for features like slicing and massive IoT support are finalized, the end device ecosystem will take a while to mature.

This means that for most public safety authorities, if they want to reap the benefits of broadband wireless, they are better off today starting with 4G/LTE. In fact, the majority of new innovations in this area of public safety are occurring today on 4G/LTE networks. Fortunately, 4G/LTE was designed to smoothly evolve to 5G and the two will in many cases co-exist for years. But make no mistake, 5G is coming, and it will be the future of public safety.

For more information about Nokia mobile broadband networking solutions for public safety, visit our web site: **nokia.ly/publicsafety**

# The American evolution

**Philip Mason** talks to FirstNet chief executive officer **Ed Parkinson** about the additions made to the network over the past 12 months, as well as the benefits of a 'competition'-based model

**Could you give an update regarding what's happened with FirstNet over the past 12 months? It's been an extremely unusual year…**

As you say, it's been an unusual and dramatic time – the world is a very different place now than it was at the beginning of 2020. From our perspective, the last 12 months have also seen a dramatic shift in terms of first-responders' relationship to public safety broadband, and FirstNet in particular. It has become a crucial part of what they do.

**What in particular has prompted that shift in attitude? How has it manifested itself?**

COVID-19 has obviously had a dramatic impact on everything, including public safety. While people have been dealing with that, we've also had wildfires, hurricanes, civil unrest, and so on.

A really good example of FirstNet deployment took place earlier this year when hurricanes hit the Louisiana coast. There's one parish called Cameron which was totally devastated, with barely a building left standing. We were able to provide service for the emergency management effort, via the extended coverage enabled by the FirstNet One blimp.

**Have public safety agencies made specific use of FirstNet in relation to the response to COVID-19?**

Regarding Coronavirus in particular, we're now seeing emergency services broadband being used in relation to mass testing centres and massive vaccination distribution facilities. FirstNet has been there every step of the way, providing coverage at these various sites.

Some of the larger vaccination centres are often quite a long way outside of the major metropolitan areas, where commercial services aren't as strong. So, again, we've been able to mobilise our deployable assets, such as trucks and drones.

**How is the service being used by first-responders, as part of 'business as usual' operations? Is it simply a matter of increasing situational awareness through the use of data, or has the use-case evolved?**

Situational awareness is still a huge part of the use-case for FirstNet. If you look at something like the Super Bowl, or the annual Houston Rodeo, which is the world's largest livestock event, it's now so much easier to disseminate information relating to these huge crowds.

For instance, in the past, if a child had gone missing at one of these events, you'd have to describe them over the police radio. Now, officers can disseminate a photo of the child provided by the parent.

Parallel with this, there's also been a dramatic change in how public safety is thinking about the technology in a systematic way, as well as how they might want it to evolve.

One example of that is the use of the network by the Green Bay Police Department, which has enabled them to maintain cellular coverage on Sundays when the Green Bay Packers are playing. Green Bay is a really small town, except on game day when the population swells.

Obviously, we're also on the doorstep of FirstNet MCPTT, as well as things like 'Z-Axis', which is a three-dimensional mapping application.

**What impact do you think FirstNet's burgeoning MCPTT functionality will have? Do you see a time when first-responder organisations abandon their LMR handsets altogether?**

Ultimately, everything's going to be down to public safety itself to decide what it wants to do, and the direction in which it wants to go. As we've discussed, in the near term we're seeing organisations use the FirstNet functionality primarily to increase situational awareness, thereby augmenting what they're already able to do with their radios. We're not encouraging people to switch off their land mobile radios – quite the opposite, as a matter of fact.

Having said that, AT&T recently announced that FirstNet PTT now supports interoperability between LTE and LMR, built to 3GPP standards. Again, it will be down to the organisations themselves to decide when our MCPTT is good enough to meet operational needs.

One thing we are currently seeing is FirstNet interoperability helping to expand LMR functionality, but without encroaching on the organisation in question's radio footprint. I was recently talking to a police chief in Anchorage, Alaska, and he was telling me how he's now able to listen in on all his LMR traffic, via the use of the FirstNet PTT application.

*FirstNet chief executive officer Ed Parkinson*

There are thousands of independent LMR systems currently being used by local public safety all across the United States. The transition from that to FirstNet PTT will only begin when the first-responder actively chooses a smart device over LMR. I'm sure one day that will happen.

### In what other ways is the network evolving, other than PTT and the extended coverage piece?

We've recently launched MegaRange, which is high-powered user equipment, specifically requiring Band 14 spectrum in order to operate. The MegaRange tools can significantly improve connectivity, particularly at the edge of coverage, for instance in rural or maritime locations. These [AT&T] towers are remarkable, but they only go so far.

The tools should be useful for urban and suburban responders as well, for instance in connecting to harder-to-reach places like elevators, parking garages and basements.

### What has been the main benefit of FirstNet having its own spectrum?

Having our own spectrum is a complete differentiator when it comes to other services and commercial networks. It also enables us to hold AT&T accountable, which in turn allows for much greater oversight to ensure they deliver what they said they would do for public safety.

From a technical point of view, Band 14 has enabled AT&T to deploy its network faster, for instance in relation to 5G. Having the spectrum has enabled them to run up the tower just once in order to hang their radios, rather than going up multiple times.

Just to clarify, as a government agency, we retain the licence for Band 14, which AT&T then leases from us for excess network capacity.

### The American public safety broadband model is very much 'competition'-based. Going back to a previous question, do you feel like you're in competition with organisations' legacy technology?

Not at all. As I said, we're here to augment the LMR systems which are out there and being used right now. The great thing about the FirstNet business model is that there's no mandate to use it, which means the needs of users are dictating the market.

A good example of that is prior to the creation of FirstNet, public safety went to all the major carriers and asked them for priority and pre-emption, and they all said no. After FirstNet came along, other carriers started to market their own versions of public safety broadband, taking into account those requirements.

Another knock-on effect is that since the network was rolled out, we're seeing a dramatic decrease in money being spent by public safety on monthly subscription plans. So, competition is a good thing.

### How has the market changed since the likes of Verizon got involved? What has been the implication of that kind of competition from FirstNet's point of view?

Again, I think it's great that users now have a choice in what network they choose. Nothing breeds good customer service like competition, and having specific, public-safety-tailored products can only be a good thing.

As I said, there's no mandate to use the service, but you're still seeing public safety organisations gravitating towards it. That illustrates a confidence in the market which didn't necessarily exist before, particularly when you introduce Band 14 into the equation.

We place our entire focus on engaging with public safety, and any decision we make comes from their input. We're trying to implement a larger holistic vision, and public safety organisations are really responding to that. Do we get everything right? Of course not, but the heart of what we're trying to do is put public safety first.

### How do you see the network evolving from here? Where does 5G fit in?

This has to be a phased approach – you can't just flick a switch and have 5G. The initial upgrade in terms of infrastructure was approved last year, and will give FirstNet users with the appropriate devices access to AT&T's 5G spectrum.

The evolution of 5G is a multi-stage approach across the board, so 4G isn't going anywhere, and for a long time the two of them will co-exist. Our strategy is to take advantage of that process of evolution.

Adobe Stock/Sergii Figurnyi

# At the crossroads

**Philip Mason** talks to Transport for London and Brussels STIB about how recent, major, public safety/health incidents have informed their critical communications strategies

As regular readers of *CCT* will remember, in the last issue we published a feature focusing on Motorola Solutions' work with Polish energy distributor Energa-Operator.

That article was prompted, at least in part, by the project winning the award for best utilities roll-out at the most recent ICCAs, taking place online at last year's inaugural Critical Communications Week. The more we dug into the Energa TETRA roll-out, the more fascinated we became by it, not least due to the sheer size of the project, as well as the level of co-ordination involved in its successful completion.

With that in mind, we are following up in this issue by focusing on another 2020 ICCA award winner, this time situated in the transport space. The project in question is also eye-catching in its scale, covering as it does the whole of London. It is the speed of roll-out which is truly impressive, however, with Transport for London (TfL) having to rapidly expand its comms capability at the height of the Coronavirus pandemic.

## Space in the place

Prompted by COVID-19, the TfL project was an attempt to provide radio communications to cover a number of extra buses, laid on in order to help passengers in the UK capital to socially distance. It involved collaboration between the aforementioned public transport provider and Tait, with the latter supplying Push-to-talk over Cellular (PoC) capability, fully integrated into its already-rolled-out DMR Tier III network.

Giving an overview of the COVID-19 project, a statement from Tait released at the time said: "TfL has used [PoC] integration in daily operations taking place throughout the crisis. When it needed to add more buses to its fleet, TfL and Tait worked together to quickly modify the TeamPTT solution to make it suitable for use by the external bus drivers.

"The whole project came together in less than four weeks. We created a scalable radio service to enable up to 80 buses to be added to TfL's PoC service, providing communications – as well as an emergency link – to its Network Management Control Centre [NMCC]."

Thomas Brewster is Transport for London's service delivery manager for surface transport technology and data, putting him directly at the centre of the project. Going into detail about its background – while also providing some

context regarding TfL's overall comms network – he says: "The original roll-out of the Tait PoC service dates back to January 2020, which was obviously prior to the Coronavirus pandemic.

"We had around 200 users at the point when COVID-19 hit, primarily rolled out to what's known as our 'street users'. These are the people who stand at particularly busy interchanges, relaying information back to the control centre about what's happening on the roads and at our bus stations.

"Users of the Tait PTT technology have the ability to talk amongst themselves using the cloud, and over DMR Tier III via common cellular devices. The latter is enabled through a Tait communications app."

According to an audit carried out by TfL in March last year, the company had a fleet of just over 9,100 buses at its disposal, contracted from 13 separate operating companies. These ran over 700 different routes across the city every day, covering everywhere from Croydon to Colindale.

The situation grew more complicated, however, with the onset of the COVID-19 pandemic in early spring of last year, a situation which immediately ushered in the need to establish a variety of measures to help keep passengers apart.

In the first instance, these took place on the buses themselves, for example through banning the use of adjacent seats. At the same time, meanwhile, TfL also attempted to make buses less crowded by putting on more services at particularly busy times. The most obvious example of this was during the time of the day known as 'the school run', and it was the work in this area for which it won the ICCA.

Going into greater detail, Brewster says: "TfL was asked by the Department for Transport to provide additional capacity on our designated school routes, which are always numbered in the '600s'. This designation doesn't mean that another passenger can't get on, but from a service perspective we'll run a particular trip twice a day, specifically for the benefit of children traveling to and from school."

He continues: "The first thing we had to do – obviously – was provide the buses, which we accomplished through approaching bus companies that we could contract with. They came from all over the country.

*TfL social distancing measures included the banning of the use of adjacent seats on buses*

Adobe Stock/ Halfpoint

"At the same time, we had to provide some kind of comms solution for the vehicles, which frankly – because they weren't TfL stock – could have been anything. That provided its own unique set of potential problems, particularly in terms of things like fit-out, as well as training of the drivers.

"We didn't know when the buses were going to arrive with us, or what we would be able to install in the cab. There were also no specifics when it came to the type of smartphones the external drivers would be using, with each bringing devices issued by their own separate organisations."

According to Brewster, there were two key criteria for communications roll-out in the new vehicles. The first was that devices – whatever form they ultimately took – had to be "vehicle agnostic", while leaving as small a 'footprint' as possible. The second, meanwhile, was that use didn't require drivers to break the law, in particular UK regulations forbidding drivers from using handhelds while behind the wheel.

"We had a very intense planning session over the course of about five days," says Brewster. "Arguably the biggest issue was figuring out how PTT could be achieved without actually picking up the device.

"We solved this through the use of wearable, remote speaker mics – linked to the smartphone by Bluetooth – operated by touching one of three buttons. The smart device itself sits within a mounted cradle, attached to a high-pressure suction cup, in an area of the cab where the driver could not handle it while operating the vehicle.

"At the same time, we also needed to make sure that the speaker was loud enough, and that the driver could be heard over any noise that might be coming from the vehicle or the passengers. The set-up enables them to communicate with both garage control and, in the event of an emergency, the TfL Network Management Control Centre."

It is clear from talking to Brewster how innovative – not to say unique – he believes the TfL roll-out to be. This is despite the increasing use of PoC technology across any number of different verticals, something that he freely acknowledges.

One reason for this belief is the way the solution leverages TfL's pre-existing DMR Tier III network, thereby enabling pretty much instant access to a variety of system-wide configured talk groups. Another reason is its provision of asset tracking via nothing more complicated or bespoke than the device's own internal location technology.

Drilling down further into the voice functionality, Brewster says: "The set-up is entirely predicated on group calls. One-to-one is possible, but drivers are prevented from doing that via a 'kiosk' mode. At the other end, the garage uses Sonim XP8 ruggedised handsets, and if a driver initiates communication, all of those users are dragged into a single talk group. Anyone at garage control can then respond to the driver.

"The third button on the radio mic initiates an emergency call through to our Network Management Control Centre. The NMCC operators each have a tablet-view of where the buses are, as well as also having access to the Tait Comms smartphone app so they can communicate with the driver." ▸

> **"We didn't know when the buses were going to arrive, or what we would be able to install in the cab"**

## Going it alone

The TfL PoC roll-out demonstrates just what can be achieved through effective collaboration and co-ordination, no matter how difficult the circumstances. By way of a contrast, our next deployment, which likewise coincided with a crisis situation, illustrates the possibilities when an organisation demonstrates the will to blaze a trail on its own.

Frederic Jans-Cooremans is project and radio spectrum manager for Brussels-based public transport operator STIB. He has spent several years working on what the organisation claims is the largest private TETRA network in Belgium, developed to be an independent means of communication for the whole company. As fate would have it, the tender for this went out just a few months prior to the 2016 Brussels terrorist attacks.

Taking place across the city, the attacks took the form of three co-ordinated suicide bombings, all of which targeted its transportation network. The last of these took place at Maalbeek metro station at the height of rush hour, with the first two bombs being detonated around an hour earlier at Brussels Airport. Thirty-two people were killed, not including the three bombers, while more than 300 were injured.

As might be imagined, the bombings plunged the city into something approaching a state of chaos, not least when it came to the transport system, large sections of which were temporarily suspended. According to Jans-Cooremans, however, events immediately following the attacks had also made it increasingly difficult to communicate using digital equipment. This included not only commercial smart devices, but also the Belgian emergency services' TETRA network, ASTRID.

Discussing the fall-out from the attacks, he says: "I remember that day very well, partly because of the massive impact it had on people's lives and routine. From my window at work, I could see a huge queue of people stretching in front of the central station, due to screening by the military. The situation was an incredible mess.

"From STIB's perspective, the first thing to get back up and running was the buses, something which took place the day after the bombings. The tram was two or three days later, but only on the surface, rather than portions of it which go underground. The Metro line regained full service about two weeks after, but people were very nervous about using it."

Moving onto STIB's communications capabilities, he continues: "At the time, we shared – and currently still share – the Belgian emergency services TETRA network for things like the Metro. At points during the day, we were finding that it simply didn't work that well, with calls made by our personnel being shut down after something like 10 seconds.

"One reason for this was that the network had been suddenly flooded with emergency services users from all over the country, called in via mutual aid. This led to some base stations reaching full capacity, something which had an obvious knock-on effect.

"At the same time, all of these emergency users – quite naturally – possessed higher priority than we did when it came to the use of ASTRID. I think it's important to state that at no point did the network suffer an outage, simply that the volume of communication taking place was unprecedented.

"Our trams and buses weren't affected by any of these issues, possessing as they do their own analogue network. Buses were VHF, while trams operated on UHF."

Jans-Cooremans began working for STIB in 2009, having previously been with a private radio solutions company. As he tells it, a core ambition even before he moved over was to install private TETRA for Brussels' public transport, something he started laying the groundwork for almost as soon as he arrived. ▸

*Brussels' public transport ground to a halt on the day of the 2016 terror attacks*

Adobe Stock/Tobias Arhelger

# Audax®
BODY WORN VIDEO

# WORLD LEADERS IN PIONEERING BODY WORN VIDEO TECHNOLOGY

## Rapid collection and generation of high quality evidence recognised in courts.

- Live stream video and audio.
- Secure AES 256 encryption on camera and live stream.
- H.265 compression for better memory management.
- IR for night-time use on both camera and helmet camera attachment.
- All-in-one device with no tethering required.
- Real-time mapping showing location of assets with GPS via Google Maps.
- SOS panic button that connects to a control room.
- Unique for Bio-AX, it can be remotely commanded to live stream from the control room and can be remotely 'stunned' if mislaid, ensuring privacy.

## WHY AUDAX?

Members of Made in Britain (The register of British manufacturers).

Independently tested and certified quality products with 2-year warranty as standard.

Providing license free BWV system that 'fuses' secure evidential video gathering with feature rich software, encrypted live streaming, Google Map overlays, and remote viewing.

## TO FIND OUT MORE, VISIT: WWW.AUDAXUK.COM

Adobe Stock/Sergii Figurnyi

*Brussels is a major tourist destination*

> **"I was constantly asking, what if there's a big problem with the shared TETRA network?"**

Fast-forward to 2014, and after much discussion and preparatory work, the tender for the network finally went out. It was eventually won by Zenitel-SAIT (now Securitas), which set about provisioning not only the Brussels Metro but also buses and tramways.

Going into greater detail, Jans-Cooremans says: "Ever since I joined the company, my aim was to initiate a TETRA network, distinct from ASTRID. I'd actually had that idea years before, when STIB was one of our customers. There's STIB optical fibre almost everywhere along the tracks in Brussels, so I always wondered why the transport system didn't have it.

"Before the tender went out, I was constantly putting the question of what if there's a big problem with the shared network. I was not alone in saying that, and the events of 2016 – and the study that followed – added a certain amount of extra urgency to the project."

Regarding the burgeoning STIB network itself, it will cover the whole of the Brussels public transportation system, reaching from the inner city to the suburbs. Leveraging two carriers, and more in the city centre, it operates on 410-420MHz, which is the frequency set aside for Belgian commercial TETRA.

Digging deeper into the roll-out itself, Jans-Cooremans says: "I primarily focus on installation of the outdoor coverage, all of which is now functional. There were a variety of different ideas about installation in regard to buses and tramways, but they're all procured now.

"In terms of the roll-out itself, the key challenges have taken place in the realm of infrastructure. We're able to share masts with ASTRID – which is running at 380-390MHz – but there was still the need for new structures in certain regions and on certain buildings. To a degree, public transport is seen as less important than the emergency services, so there was quite a lot of dialogue with the relevant authorities."

He continues: "The other key environmental issue was in relation to field strengths, in particular regarding the safety of people being a short distance from our base stations and repeaters. We had to conduct simulation studies in order to be sure to be well within the imposed limits.

"We ultimately worked that out by deciding to transmit using very low power, via radiating cables. These are specifically designed for transmission in confined areas, and the impact is very tiny."

Coming back to the 2016 terror attack, one other vitally important piece of learning, according to Jans-Cooremans, is around radio use itself. While he, quite rightly, has absolutely nothing to say about emergency services' strategy that day, he is at pains to point out some of the principles ingrained in STIB TETRA users as part of their daily use.

"There are many ways to improve the performance of a network," he says, "such as increasing the amount of base stations, as well as upping the number of carriers per base station. At the same time, it's important that users are made to understand how to get more out of their radio, particularly when a large-scale event occurs.

"For instance, one thing we would heavily discourage is the scanning of different talk groups – in fact, we disable that functionality altogether. Use of scanning requires the nearest base station to transfer each of the different talk groups to a single radio, which is a huge waste of capacity. You can understand why a manager would find it useful for monitoring purposes, but it's not part of our strategy.

"Another tip from the user perspective is simply to keep the PTT button pushed if you're being kept waiting, rather than ending the call and being pushed out of the queue. We also recommend communication through talk groups rather than one-to-one calls. Again, all this is just basic radio discipline."

While apparently disparate, the projects discussed in this article have two key things in common. First, they demonstrate just how important effective comms technology is to the running of modern, large-scale, public transport systems. At the same time, they also showcase exactly the sort of innovation becoming increasingly synonymous with the critical communications sector.

# ENGINEERS NEEDED NOW!

## Two-Way Radio Project/System Engineer

We are looking to recruit an experienced Project Engineer, who will be responsible for the building, installation and maintenance of new & existing radio systems, as well as occasional support to our hire division. The successful candidate shall be able to oversee the implementation of radio systems to the designed specification, and be able to adopt a logical & methodical attitude to troubleshooting.

- 28 days holiday ✔
- Use of a company car ✔
- Tools, Laptop and Uniform ✔
- Pension scheme ✔
- Health insurance scheme ✔ (subject to eligibility)

Roadphone NRB
www.radiohire.com

NOW HIRING

Roadphone NRB
THE COMMUNICATIONS SPECIALISTS

**APPLY TODAY**
**www.roadphone.co.uk/careers/**

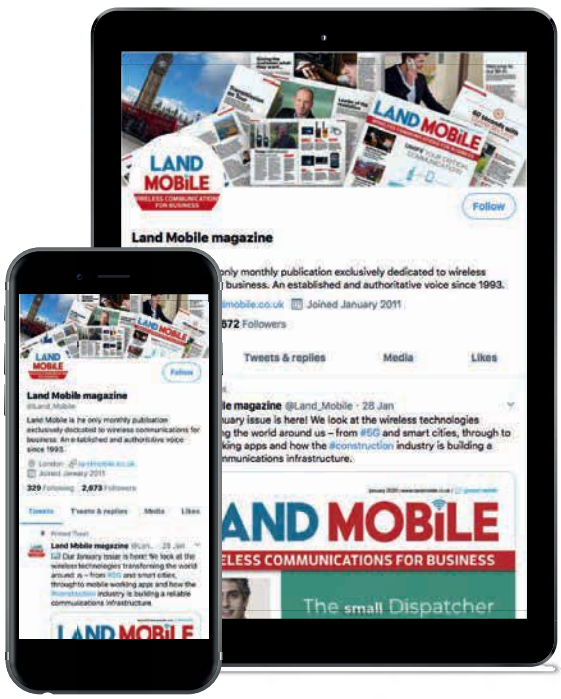
# Tell your side of the story

Join the discussion and stay up to date with the latest news

Look out for LAND MOBILE's tweets on breaking news and industry events

Tweet us at **@Land_Mobile**

**Expand the reach of your network**
Connect with us via. LinkedIn
Search: "**Group: Land Mobile**"




3 WAYS to connect

**Twitter:** @land_mobile
**LinkedIn:** linkedin.com/groups/4761728
**Website:** landmobile.co.uk

LAND MOBILE
WIRELESS COMMUNICATIONS FOR BUSINESS

Adobe Stock/TellingPhoto

# What's past is prologue

With the UK's Emergency Services Network in the middle of a crucial year, **Philip Mason** talks to ETSI's **Brian Murgatroyd** about parallels between Airwave and ESN roll-outs

I first developed an interest in public safety communications in late 2016, having found myself suddenly thrust into the role of deputy editor for *Critical Communications Today* (or *TETRA Today*, as it was then).

I had been around for about a month when I was called upon to cover my first BAPCO (British Association of Public Safety Communications Officials) event, taking place in Newcastle in the UK. A core theme of the conference was – about a year after the main contracts had been signed – the Emergency Services Network.

As those who were also in attendance may recall, there was a certain feeling of concern in regard to ESN at the time, not least relating to anticipated network coverage. Indeed, I remember a conversation with another attendee – a police officer – during which anxiety was expressed due to perceived potential questions around the technology.

Thankfully, those concerns have now been assuaged, thanks in large part to the scale of the work carried out by EE, as well as crucial coverage testing initiatives such as ESN Assure. Further encouragement, meanwhile, has also been provided via recent pilot projects, such as those involving Durham & Darlington FRS and the UK Immigration Service.

As well as an increased level of reassurance, however, the past few years have also witnessed an increased and broader sense of awareness on the part of those running things from the centre.

Others will be in a better position to comment, but it would appear that the Home Office now fully understands the value of close collaboration and communication with users. The recent embrace of standardised technology, meanwhile, indicates both the ability and willingness to pivot if the situation calls for it.

That being the case – and in the middle of another crucial year for the project – the focus of this article is going to be some of the other lessons that may or may not have been learned across the course of ESN so far. But rather than concentrating purely on the years 2011 to 2021, we are going to go back a bit further to the initial roll-out of Airwave.

How does the ongoing roll-out of mission-critical broadband in the UK compare to the move from analogue all those years ago? More to the point, are there urgent questions highlighted by services' experience back then that still need to be answered about the current network?

## Parallel situations?

Brian Murgatroyd is current chair of the technical committee for TETRA and critical communications at standards organisation ETSI. More to the point, however, he also previously led the critical communications security team at PITO (the former UK Police Information Technology Organisation) during the original roll-out of Airwave.

Discussing his background, as well as the role he played back in 2000, he says: "As head of that team, my role was to implement all the security features of TETRA into Airwave. We all started in the Home Office and then got shuffled over to PITO, forming into teams going over the contract line by line.

"At the time, the whole process – as well as delivery timescales for security functionality, and potential post-contract issues – were uncertain." ▸

# Visit our website for the latest:

**News** **Features** **New Products** **Events**
**Interviews** **Expert Opinion**

**LAND MOBILE** online is full of content and comment across the wireless comms sector. Visit it at:

**www.landmobile.co.uk**

**Land Mobile** informs the complete wireless communications for business buying chain in the UK - all the way from the manufacturer to the end user.

LAND MOBILE
WIRELESS COMMUNICATIONS FOR BUSINESS

At the risk of repeating some things that readers may already know, it is probably worth stating some of the reasons why Airwave was adopted in the first place. This will not only provide some general context, but also a level of insight into the parallels between that project and the current roll-out of ESN.

Speaking of this, Murgatroyd says: "Airwave was deployed fundamentally to increase resilience, performance and functionality when it came to emergency services' critical communications. It's a great technology, and in that sense, really not dissimilar to ESN at all.

"Prior to Airwave, that resilience existed, but only in a very primitive fashion, plus there were virtually no features available on services' legacy equipment other than speech. Organisations at the time were using wide-area VHF systems as well as local UHF, with no real interconnectivity between the two. It was also very difficult for users to communicate when out of area – only specialist users with multi-channel radios could do it."

He continues: "The other concern with the previous systems was a lack of security. Monitoring by criminals – and the press – was rife. The equipment was also subject to all kinds of radio interference, for instance in the South East from the French. It sounds amusing, but at the time it was very difficult to achieve the co-ordination of frequencies and get French users to stick to them."

According to Murgatroyd, initial UK TETRA trials took place on the island of Jersey in 1998, following a 12-month consultation during which user requirements were determined. This was followed by technical trials in Hemel Hempstead and the Isle of Skye, with the testing phase finally culminating in a two-year county-wide pilot in Lancashire. "That was designed to iron out any bugs and confirm fitness for the job," he says, "which it mostly did."

The geographical roll-out was finally completed in 2005, with certain other features following on shortly afterwards. The technology has been delivering a high level of service ever since. This is not to say that there haven't been issues, however, or that there weren't initial concerns, something which again links back in with the current deployment of ESN.

## Resilience and security

As indicated, Airwave currently enjoys a huge level of trust among UK emergency services personnel. This has been illustrated throughout the development of ESN, in particular by the initial nervousness at the prospect of Airwave no longer being available.

According to Murgatroyd, though, the earlier roll-out was not without its initial concerns, or indeed the occasional, often serious, operational issue. He says: "Given how comprehensive the incumbent system was at the time, it was probably no surprise that one of the initial worries was that Airwave wouldn't match up in terms of coverage, and in particular, resilience.

"These concerns were highlighted early on, when a fire broke out in a tunnel in Greater Manchester, thereby knocking out numerous base stations for an extended period. Resilience was called into question again when flooding took out the mains power to several sites, which were subsequently revealed to only have 15 minutes' worth of back-up."

As may be expected given his background, one other worry also identified by Murgatroyd was the lack of security features available towards the beginning of the Airwave project. These had to be developed quickly, due to the simple fact that – according to him – no-one had actually implemented the security part of the TETRA standard at that point.

With that in mind, to what degree does he see parallels between Airwave and ESN, particularly in regard to any teething troubles and/or lessons learned? To what extent has the programme demonstrated the ability to both anticipate operational problems and deal with them effectively?

"Regarding the security piece, I have absolutely no concerns with the Emergency Services Network whatsoever," says Murgatroyd. "I can't discuss the measures in detail, but suffice to say a multi-layered approach has been adopted.

"It will go beyond simple encryption, and I'm entirely satisfied that it will be well up to standard. In terms of resilience and coverage, again there's every indication that the system will work as it should, particularly in regard to the latter.

"A huge amount of resources have been invested in the network, and there are also direct parallels between ESN Assure and similar initiatives 20 years ago, with tools at that time provided by Sepura and Motorola Solutions."

He continues: "If I have a concern, it's what happens if the network comes under duress. We know that they've increased the number of base stations, but aside from the rapid response vehicles, it's incredibly important to enhance resilience as well.

"During the early roll-out of Airwave, this was very much something which we had to learn from experience, as illustrated by the two incidents which I mentioned earlier. Thinking of the tunnel fire in particular, that revealed the need to provide diverse routing from the base station sites to the switches, in order to take out any single point of failure. After the flooding, meanwhile, we hardened the network by installing generators at key sites.

"I'm pretty confident – as we all are – in the ESN priority and pre-emption piece. That will work a treat. But it won't help if the power has gone off to 50 base station sites simultaneously."

As indicated earlier, the scepticism initially associated with the Emergency Services Network project is dissipating. This has followed on from a number of positive developments, many of which have resulted from those in charge being ready to learn from both the near and distant past.

There is one more potential area of learning that needs to be touched on, though: the exploitation of the network itself. For Murgatroyd, this is absolutely key, particularly given his view of ESN as fundamentally an "enabling" technology.

"When Airwave was rolled out, the emergency services did things in a certain way," he says. "With the new technology, however, they had the opportunity to completely change the way business was conducted, even at a strategic level.

"This was apparent in Scotland, where Airwave's ability to communicate between county areas contributed to the amalgamation of emergency services organisations. That being the case, imagine what they'll be able to achieve once ESN is up and running.

"Of course, every change has to be incremental, but there are things we probably can't even envisage yet. I really hope this opportunity isn't wasted, and the network is exploited to its full capacity."

TCCA
CRITICAL
COMMUNICATIONS
WORLD 2021
SAVE THE DATE
SERVING THE CRITICAL COMMUNICATIONS SECTOR
FOR MORE THAN 20 YEARS
3 - 5 NOVEMBER 2021
IFEMA, MADRID, SPAIN
WWW.CRITICAL-COMMUNICATIONS-WORLD.COM/MADRID
@CRITCOMMSSERIES
TCCA CRITICAL COMMUNICATIONS SERIES
PLATINUM SPONSORS:
MOTOROLA SOLUTIONS
LEONARDO
Hytera
GOLD SPONSOR:
ERICSSON

Adobe Stock/Delphotostock

# Voices of a nation

**Philip Mason** gives an update on the US TETRA market, finding contrasting opinions about the anticipated use of the technology going into the future

When it comes to the international TETRA market, there are very few territories which have proven as potentially complex as the United States.

In terms of the public safety side of things, for instance, companies have been unable to get a foothold due to the federal government's historical preference for parallel technology P25, at least when it comes to narrowband. Those wishing to sell into other 'mission critical' verticals have found the road only slightly easier, meanwhile, dealing with a variety of other factors, such as those around the use of spectrum.

From the TETRA industry's perspective, all this has possibly represented somewhat of an unfulfilled opportunity. This feeling has likely been compounded by the sheer size, and therefore potential value, of the market in question.

There are hundreds of 'mission critical' organisations operating across the States after all, all of which need to communicate with each other via the use of some kind of radio.

With that in mind, in this article we are going to bring readers up to date with the state of the market as it stands today, several years after our last specific focus on TETRA in the US. A lot has happened since the standard's first commercial roll-out in 2013, not least a slow but steady uptake of the technology across different verticals.

At the same time – crucially – we are also going to be looking at the potential impact of broadband on LMR as a whole, with the former already elbowing its way into the conversation via FirstNet, Verizon Frontline and so on. Public safety isn't the only sector dallying with 4G, however, with utilities companies, mining and more now seriously looking at the potential benefits of increased bandwidth.

## Difficulties of the market

PowerTrunk is one of the key players in the US TETRA market, having been responsible for numerous roll-outs across a variety of different verticals (including the 2013 New Jersey Transit system obliquely referred to above). The company's president and CEO is Jose Martin.

Speaking of its original entrance into the US market – and why the company decided to invest in the territory in the first place – he says: "The United States has traditionally been an incredibly difficult environment for TETRA. This is a huge country, and even today there are people who know little – or even nothing – about the standard.

*New Jersey and New York were among the first locations for commercial TETRA in the US*

"There's more knowledge on the east coast, mainly because of the customers that we've built up. But in somewhere like the Midwest, for example, people have never heard of it – or relate at all to what organisations are doing in Europe or the rest of the world."

He continues: "In terms of why we wanted to get involved, we simply saw the United States as greenfield. We did it because it was the last frontier for TETRA and, ultimately, we always need to find new markets.

"Our very first North American customer was BC Hydro, which is a utilities company based in British Columbia, in Canada. They put out an RFP open to all different kinds of digital radio technologies, and we won. As it turned out, at the time, Canada and the US had very similar standardisation rules. They amended theirs very quickly because of BC Hydro's decision, but the Americans are tough."

Without wanting to get too bogged down in the political aspects of this topic, Martin outlines several factors which he believes have historically limited the implementation of TETRA across the US.

The first of these is the Federal Communications Commission (FCC)'s method of what he refers to as equipment authorisation. According to him, this was – and in some frequency

bands still is – based on "emission masks and occupied bandwidth limits", rather than "modern adjacent channel protection (ACP) criteria, as is common in the rest of the world". In his words: "TETRA's non-compliance with emission masks gave rise to the misconception that it would cause interference."

Another factor, meanwhile, is the expectation that all narrowband radios operating on public safety bands – for instance, 700MHz – must be compatible with the government-preferred P25 standard. As mentioned, this has, rightly or wrongly, all but negated TETRA for use by US first-responders.

Coming back to the present day, PowerTrunk has at this point participated in around 25 TETRA projects, involving a variety of different verticals across both Canada and the US. These have included San Francisco and John F. Kennedy airports, utilities operator Diverse Power in Georgia, as well as the Flint Hills Resources Pine Bend Refinery in Minnesota.

Arguably the most famous work undertaken by the company, however, is the dual roll-out carried out on behalf of two east coast public transport providers, New Jersey Transit (NJT) and New York City Transit (NYCT). These not only illustrate how effective – not to say versatile – TETRA is as a technology, but also the level of ingenuity which has traditionally been required in order to actually get it deployed in the United States.

Discussing these headline projects, Martin says: "Everything started in New Jersey with the transit agency, where we were subcontracted by Alcatel-Lucent USA, in co-operation with whom we had won the contract. They were looking for something which could support advanced data applications, as well as, obviously, exceptional quality when it came to voice.

"Because of the aforementioned equipment authorisation issues, we developed what might be regarded as 'pseudo' TETRA, which worked well. That required modification of equipment on our part as well, until the FCC – after the award – ultimately amended its certification rules to accept the TETRA spectrum, without modifications, in the 800MHz and 450-470MHz bands."

He continues: "NYCT became interested in 2014, having seen the work which had been carried out with their neighbour across the river. Again, that required a certain amount of ingenuity on our part, in order to make use of the 700MHz and 800MHz spectrum which they had available.

> **"If you combine New York and New Jersey, we supply to the largest public transport authority in the world"**

"After we won the contract, we were able to comply with FCC rules by developing multi-mode devices, where the user has the ability to select either TETRA or P25. The P25 aspect is fairly rudimentary, representing Phase 1 functionality, alongside group calls, as mandated by the Department of Homeland Security, through the P25 Advisory Panel.

"If you combine the New York and New Jersey contracts, you could argue that we provided critical communications technology to what is essentially the largest public transit organisation in the world. Both agencies co-operate together and are interacting all the time."

We shall return to the east coast – and in particular the so-called Garden State of New Jersey – later in the article.

## The shock of the new

Speaking to Jose Martin, you sense a palpable optimism when it comes to the future of the standard as deployed in the United States. Progress may be comparatively slow, he suggests, but the technology is gradually proving its worth, deployment by deployment.

Someone with what could be described as a more tentative outlook, however, is Omdia senior principal analyst for public safety and critical communications Ken Rehbehn. For him, TETRA will likely continue to face an uphill battle in the States, primarily due to the unfamiliar nature of the technology on the part of the majority of users.

"There are reasons to be optimistic when it comes to TETRA, certainly," he says. "The companies involved have already made the investment, meaning that every additional customer gain is relatively inexpensive to get. At this point, it's primarily a matter of educating people.

"We also know TETRA's various benefits as a technology, something which stands it in incredibly good stead. It's a robust, incredibly secure, effective media for group communications, coupled with a highly scaled ecosystem. In terms of the market, I would say transit is a particularly good target for TETRA, and the story is very solid there.

"At the same time, it's quite a complex technology, for instance when it comes to supporting the security aspects. That being the case, it might be a challenge to convince American utilities to veer away en masse from solutions which they already know and trust, whether that's DMR or even analogue."

*Utilities companies are investigating the use of broadband*

Adobe Stock/agnormark

Adobe Stock/Bumble Dee

Staying on the subject of utilities in particular, Rehbehn believes that the situation will likely be further complicated by energy companies' apparent willingness to look at private broadband networks. This could be further compounded by a recent development, again taking place in the realm of spectrum.

Elaborating on this, he says: "Another factor in all this is the imminent reorganisation of the 900MHz frequency, something which is heavily used in the US utilities sector.

"Following a process of lobbying by a private LTE network operator called Anterix, the FCC has agreed to aggregate a block of SMR spectrum in that band, specifically to support LTE. Anterix's strategy – perfectly reasonably – is to engage with the utilities sector, in order to instigate migration to a primarily LTE-based approach."

Looking beyond the subject of just TETRA for the moment, what effect does Rehbehn believe the change outlined above will actually have on the broader market? If utilities companies really are slow to move away from tried-and-tested technology, why should the situation be any different when it comes to the adoption of broadband?

"It will certainly be a long process," he continues. "However, it's one that's been in play for several years. LTE is now a mature, much-better-understood technology than it was, certainly compared with 5G.

"At the same time, the story within the utilities sector in particular is compelling. They have the opportunity to update their systems, moving towards a technology which handles data very effectively, while also offering the benefits of group voice communications."

## Greetings from Asbury Park

There are clearly different points of view regarding the future of TETRA, and indeed critical communications as a whole, when it comes to the US market. Rehbehn, for instance, believes that broadband will likely impose an increasingly strong presence, whereas Martin remains less convinced.

That being the case, perhaps the last word should go to someone with a direct experience of using the technology itself. And who better than New Jersey Transit, which commissioned the US's first commercial TETRA network almost 10 years ago.

*US public safety represents a huge market*

Discussing why the organisation chose TETRA, its director of radio communications, Andy Schwartz, says: "Back in 2013, the idea was to keep the system as technology-neutral as possible, letting the requirements of the business dictate what we chose. One solution does not necessarily fit all circumstances, and we wanted something very specific."

He continues: "In terms of the roll-out itself, we targeted the system for use across the enterprise, including light rail, all of our buses – of which there are around 2,300 – as well as contracted independent bus companies, and our non-revenue operations personnel. We wanted the provision of both voice and data on a single network, with the latter being used primarily for location services.

"We need to automatically update the location of every bus approximately once every 30 seconds, which in turn feeds into electronic signage, maintenance alerts and so on. Nothing huge from a data perspective, but crucially important to the successful operation of our transport system."

According to Schwartz, the network is now fully deployed, with over 4,000 subscribers. The final phase of the project – expected to be fully rolled ▸

# The Critical Communications Association

# Join us

Members of TCCA design, manufacture, build, implement, utilise, analyse, promote, develop and deploy critical communications worldwide.

Collectively we have created the critical communications of today. Together we are shaping the critical communications of the future.

Supporter of ETSI MCX Plugtests™

Market Representation Partner for Critical Communications

A GLOBAL INITIATIVE

Guardian of the TETRA standard

## Critical communications for all professional users

To find out more, please contact

admin@tcca.info

@TCCAcritcomms

www.tcca.info

> **I look at broadband primarily as a complementary technology to what we already have**

out towards the middle of this year – is the TETRA integration of advanced features for the company's existing computer-aided dispatch system.

Deployment has not necessarily always been easy, however. This was the first commercial TETRA system in the US, after all, and the organisation essentially had to learn as it went along. One core difficulty in relation to this has been coverage planning, specifically taking into account the sheer variety of terrain existing across the state of New Jersey (the network operates within 800MHz).

"It's been the project that never seems to end," says Schwartz. "By December 2013, we'd put up enough of the new network to cover the services operated by our partner bus companies, as well as light rail trollies, maintenance vehicles and so on. Phase 2, which involved getting our own buses on the system, is now also complete, after addressing additional coverage needs.

"One of the most complicated things in relation to the project has been providing coverage. Most people's view of New Jersey is informed entirely by what they see when they arrive at Newark Airport – very industrial, in other words – but the topology is much more varied than that."

Schwartz illustrates this by mentioning his own home in Sussex County, located northwest of the more urbanised Essex County and the city of Newark. At the same time, there is also the likes of Asbury Park ("where Springsteen comes from"), located around 40 kilometres to the south of New York City, across an expanse of water known as New York/New Jersey Bight.

He continues: "The place where I live is heavily forested, with lots of hills and lakes. They call Sussex 'The Skylands', and we occasionally have black bears roaming around here. At the same time, somewhere like Asbury Park is situated on the coastal plane, where it's very flat and sandy. The 'Jersey Shore' in other words.

"We also have dense urban areas, such as Newark and Jersey City, and the design approach needs to be different with each type of area. The system has ultimately been designed to provide capacity and coverage where it's most needed, almost like a commercial cellular network."

Alongside coverage, meanwhile, another challenge has been the integration of New Jersey Transit's aforementioned legacy computer-aided dispatch (CAD) solution with its new state-wide TETRA radio system.

According to Schwartz, this has been accomplished across all 2,300 buses. The organisation's parameters, however, require "mission-critical redundancy", meaning that the CAD's data path must be able to utilise both cellular modems and/or TETRA. This requirement – according to Schwartz – is fairly complex to implement, and should be completed soon.

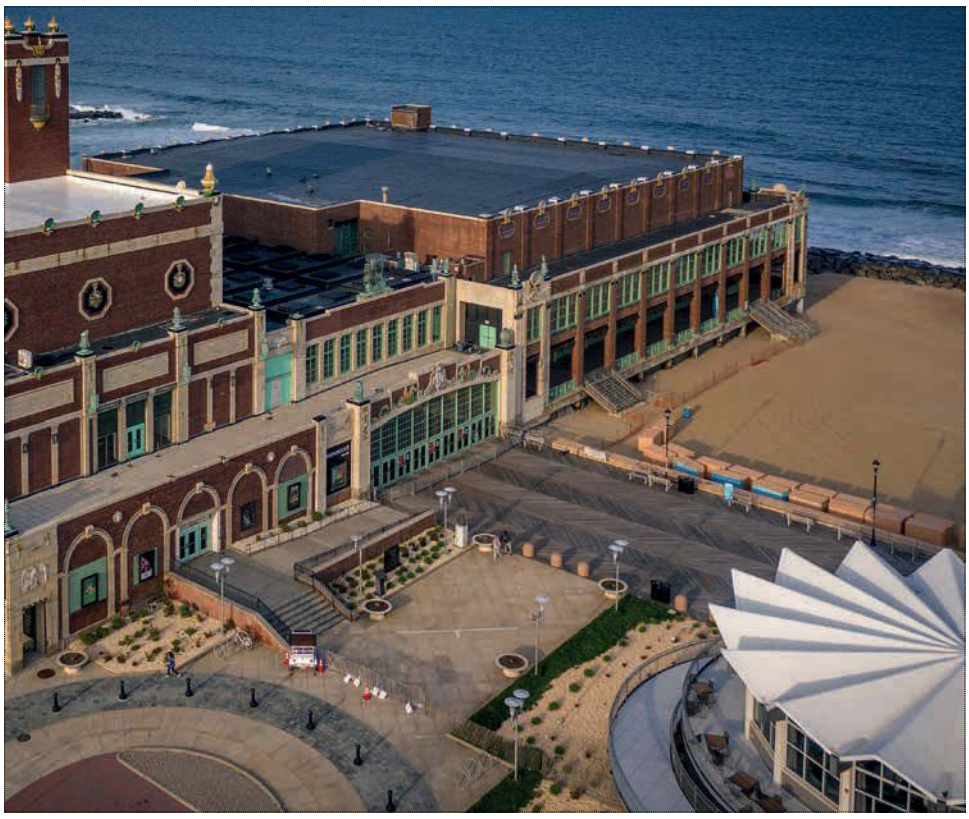
This complexity, he assures me, has to do with externally managing the mechanics of using two data paths, rather than anything to do with TETRA technology.

Coming back to the subject of the US TETRA market as a whole, he says: "My expectation is that we're going to continue to see growth, with take-up of the technology slowly picking up speed. We were the first to roll out in the United States, and we're now getting other transport companies coming to us to ask for the benefit of our experience.

"The entrance of TETRA into the American market took an incredibly long time, and as such many companies went down a different path. But people really are now starting to see the value in it, especially in the utilities and transport sectors, with a lot of the big airports choosing the technology. I don't think it's going to take off like wildfire, but you're going to see slow and steady growth."

Addressing the broadband question, he continues: "I look at broadband primarily as a complement to what we already have. There's clearly a place for it, and of course we use cell phones ourselves. But the idea of replacing a mission-critical private network with a broadband provider? It could happen one day, but at the moment, it's not even on the table."

When it comes to critical communications, the United States continues to be one of the most-talked-about markets across the world. With so many predictions about its future direction, it will be fascinating to see where things go from here.



*New Jersey consists of many different terrains including the beachfront at Asbury Park*

Adobe Stock/Jin

# CC NETWORK

## THE NEW CRITICAL COMMUNICATIONS NETWORK IS NOW OPEN

Become part of a new digital community

Access expert blogs, posts, journal articles, conference sessions, news and more

Network in dedicated channels

Explore new lines of thought

## FIND OUT MORE

**www.critcommsnetwork.com**

Adobe Stock/snowing12

# All together now

*Critical Communications Today* discusses some of the key highlights from the recent BAPCO Online conference, including several Emergency Services Network updates

Staged as a replacement for the organisation's rescheduled annual showcase in Coventry, BAPCO: The Online Event did a good job of bringing attendees up to speed ahead of what will likely be a crucial year for public safety communications in the UK.

As might be imagined, a core focus of BAPCO Online was the Emergency Services Network, with visitors receiving multiple Home Office updates on the state of the project across the course of the event's three days. The first of these was positioned as the opening keynote, with newly installed ESMCP programme director John Black providing a 'big picture' overview.

Black began his 20-minute presentation by addressing some of the doubts that have surrounded the project from the beginning, and which remain in some quarters even now.

Discussing this, he said: "We've recently been asking again if this is the right solution for us, given that the world has moved on since we started this journey. We had an independent review that has absolutely validated that we're on the right track."

He continued: "Airwave is coming to the end of its life, and cannot be the basis for integrated voice and data solutions for the future. Plus, it's a bespoke network which is extremely expensive to run. We're confident that we're on the right track, and we're confident that the rest of the world is with us."

Moving onto the update itself, Black began by reiterating much of what has been achieved on the project up until this point, from progress on coverage and the air-to-ground network, to the leveraging of the Kodiak push-to-talk app.

He also mentioned the ESN Direct 1 product, the first iteration of which is currently being trialled with the UK Immigration Service. He said that Direct 2 – which will provide interworking with Airwave – should be "live and available to use" by springtime.

Continuing on the subject of network progress, he said: "The end-to end solution – the radio area network, the core, the data centres – they're all there. They all work today. By April we want to start getting the Samsung devices into the hands of users across the emergency services, in order to build feedback and confidence.

"In the longer term, we can talk about all the things we could potentially do with the [network], but what needs to be addressed in the short term is what we need to do to turn Airwave off. [How do we] provide the critical voice and data communications that the services want?

"In terms of the release we all want – ESN Version 1 –, we don't have a date yet, but are working to get one out as soon as possible. That will have all the functions we need in order to manage mass transition and roll-out. By the middle of this year we should have a much better overall programme plan, developed in collaboration with the senior users."

One of the key topics across the BAPCO Online ESN sessions was the involvement of those actually using the network, something which – as you might hope – has become increasingly top-of-mind as the project has progressed.

In terms of Black's presentation, for instance, this was reflected in particular in the second half, during which he touched on both user participation as well as the management of expectations in terms of timescale. The event's second ESN presentation, meanwhile – taking place at the start of day two – focused almost entirely on the experience of those already using the network in some capacity.

This session was introduced by ESN director of deployment and user insight Becca Jones, who began with an update on the aforementioned 'early adopters', for instance Durham & Darlington, and Dorset & Wiltshire fire and rescue services. "Despite COVID-19, we've been able to make some pretty steady progress over the course of the last year," she said.

Finishing her introduction, Jones also listed the organisations tasked with hosting operational testing of the ESN Beta, which will be followed by Version 1.0, as mentioned above. These include Avon and Somerset Police, Cheshire Constabulary, Merseyside Fire & Rescue Service, West Yorkshire Fire & Rescue Service, and the UK Ambulance Radio Programme.

Following Jones, the session was continued by two representatives from the user organisations themselves, in the form of Merseyside Fire & Rescue Service's Mark Jones, and ESN programme director for the South West region, chief superintendent Colin Searle.

Discussing Merseyside FRS's motivation for hosting Direct 2, Mark Jones said: "Merseyside has always been willing to take calculated risks in order to move projects forward, and this was no different. We always knew that would be an extremely challenging task with many lessons to be learnt.

"Because no-one had ever done this before, we opted for a simple, contained, system architecture. We completed user acceptance testing in August, using Direct 2 devices, alongside two web dispatch terminals."

Jones finished his part of the presentation by mounting a live, real-time demo of interworking between an Airwave handset and a Direct 2 device, both of which were set to the same talk group. "Only a simple test," he said, "but hopefully it proves we're going in the right direction."

Searle continued on a similar theme, also discussing his organisation's experience of becoming involved with the programme at an early stage. Describing the initial relationship with 'the centre', he said: "I think it would be fair to say that when we started, it was difficult.

"[At that point] the expectations of the programme weren't exactly our expectations, and the relationship started off a little bit on what I would describe as a parent/child footing. We've had to work hard to change that, and we definitely have.

"We're now in a position to influence how ESN is developed, how it's tested and, ultimately, how it's delivered. We've been able to challenge the programme about its processes, and set more realistic expectations."

Searle finished by referencing Theodore Roosevelt's famous 'Citizenship in a Republic' speech. "We wanted to be in the thick of it; in the arena," he said. "There is no effort without error and shortcoming."

> **"Our relationship with the programme started off on what I would describe as a parent/child footing"**

As well as the Emergency Services Network, BAPCO Online also featured presentations from several other national emergency services broadband roll-outs. These included Ed Parkinson and Jefferey Bratcher from the FirstNet Authority giving an update on the US equivalent of ESN, as well as Erillisverkot's Ari Toivonen discussing the path to Virve 2.0 in Finland.

## Open to new tech

As anyone following the UK public safety communications sector over the past few years will know, the biggest news inevitably tends to be generated by the Emergency Services Network. There are always plenty of other talking points, however, as reflected by the rest of the BAPCO Online conference schedule.

With that in mind, another key topic across the event was the burgeoning use of artificial intelligence within the emergency services/mission-critical environment. This was explored by a variety of different presenters, including NICE robotics and AI consultant Paul Perry, who discussed 'the art of the possible' at the start of day two.

Perry began his presentation by outlining the company's interest in the use of "virtual/digital workers", and in particular how that kind of solution could potentially benefit emergency services organisations. Going into greater detail, he discussed NICE's 'NEVA' digital assistant, which is designed to take on "workflow-driven tasks, where there's not a lot of decision-making". This could – according to him – include data entry, invoicing, managing duty rosters and so on.

Perry illustrated this via the discussion of a utilities ▸

Adobe Stock/Brian Jackson

*The UK Ambulance Radio Programme will host ESN Beta testing*

> **“Let’s not talk about unprecedented times. Let’s not talk about the ‘new normal’”**

company, which he said is using the NEVA software to guide customer interactions and automatically key-in data in its customer call centre. Transposing the solution to a public safety context, he suggested it could provide an emergency services call-taker with “multiple layers of data” provided in real time from social media, the Police National Computer and so on.

Another AI-themed presentation – also on the second day – came from managing director of the European Emergency Number Association (EENA), Jerome Paris. His topic was ‘AI: what are the dangers of falling behind the public in terms of the use of the technology?’.

Paris began his presentation by giving examples of where public safety has lagged behind. One of the most obvious of these, he said, was the way Uber has been able to leverage far more accurate caller location technology than emergency services control rooms have historically had access to.

Moving the topic on to AI, he discussed the recent EENA-Corti project, which explored how the technology could potentially be used to help emergency services call-takers detect signs of cardiac arrest.

Expanding on this, he said: “At the end of the day, we could see that the AI as a decision support tool was quite valuable. It helped us to detect more cardiac arrests [in callers], [as well as detecting them] faster.”

He finished his presentation by giving two sets of recommendations, one aimed at user organisations themselves, and the other at their technology partners. Addressing the former, he said: “Try to be as open to new tech as you can. Speak to AI companies, and make data available for trials in compliance with privacy requirements. Tech partners should listen to the needs of public safety, so they offer solutions which are applicable to these very specific organisations. Test and validate new tech with users.”

The third day of the conference began with another keynote address, this time delivered by CEO of the UK’s Police Digital Service, Ian Bell, alongside director of the police National Enabling Programmes, Wayne Parkes. Together, they discussed the need to enable genuine “business change and support” via UK policing’s current digital transformation programme.

Parkes began his part of the presentation by outlining the aforementioned effort, summing it up as: “Trying to corral policing into a national roadmap around digital transformation [in order to address] some of the key decisions that it needs to make. The challenge we’ve had from frontline staff has always been how can policing tech be as good as what they use at home?”

He illustrated this by discussing the five ‘digital ambitions’, which he described as providing “a roadmap of digital priorities” across the next five to 10 years. These include ‘seamless citizen experiences’, ‘addressing harm’ (ie, using technology to help protect vulnerable people), ‘enabling officers and staff,’ embedding a whole public system approach,’ and ‘empowering the private sector.’

Adobe Stock/sdecoret

*A recurring theme of the conference was the use of AI*

In his words, key questions which need to be addressed include: “How do we exchange information better; and how do we work more collaboratively with partners? This is really key to addressing threat, harm and risk, and making good decisions.

“[One area] which has caused quite a lot of debate in policing,” he continued, “is around empowering the private sector. Our view is that they will absolutely have a big part to play in this. If you’re supporting policing, [we need to know] how to energise the marketplace to get new innovation.”

Following on from Parkes, Bell discussed expectations going forward. “For me, the focus is on the ‘how’,” he said. “How do we learn the lessons from a strategy perspective, and turn that into a reality? [At the same time] while we do that, how do we appreciate some of the strides that we’ve begun to make over the course of the last year?”

He continued: “Let’s not talk about unprecedented times; let’s not talk about the new normal. But there is recognition that while the world of madness that is COVID-19 has gone on around us, there has been a wealth of expectation that delivery has continued to occur.

“We’ve seen a wealth of progress and continued investment into major law enforcement programmes. Ultimately for us it’s about how we reposition to have capacity that begins to move us forward. How we describe what we thought the art of the possible could be over the next 10 years, and ultimately how we turn that into the impact of the deliverable.”

All BAPCO: The Online Event sessions will be available on demand until the organisation’s rescheduled annual Conference & Exhibition in October. To register, visit online.bapco-show.co.uk

# CC BITESIZE

End User Series

**A series of online conferences designed for users of business- or mission-critical communications technology.**

## JOIN US 23 & 24 JUNE 2021

### ‘Critical narrowband: The user perspective’

Split over two half-days, this new online conference will focus on current and future deployments of TETRA and DMR solutions, looking specifically from an operational perspective.

## FIND OUT MORE:

## www.criticalcommunicationsbitesize.com

Supported by

TCCA

CRITICAL COMMUNICATIONS TODAY

LAND MOBILE

BAPCO JOURNAL

British Association Of Public Safety Communications Officials

CC NETWORK

In partnership with

TCCA Critical Communications World 2021

# Use of narrowband in the field

Ahead of the first CCBitesize online conference, TCCA Chief Executive **Tony Gray** discusses the urgent need to bring users into the critical communications conversation

Taking place at the end of June, the first iteration of new online series CCBitesize will focus primarily on the use of narrowband for critical communications. Topics covered will include lessons learned from significant roll-outs, the future development of standards such as TETRA, and more.

Where the series will really differentiate itself, however, is via a unique emphasis on the user experience. Indeed, the conference will be specifically designed for organisations – such as those in public safety – which may not necessarily have the resources to attend global events taking place in the 'real world'.

Discussing why it is so vital to focus on users in this way, TCCA CEO Tony Gray says: "Users have always been the key participants in conversations around critical communications. They are the people who need to use the products and services, and they are the people who drive the market. If the users don't want or like a product, then it won't succeed commercially.

"There needs to be as many opportunities as possible for users to engage across the critical communications ecosystem, to ensure they are aware of – and can influence – future developments. Users are on the frontline, protecting our communities, and we need to do as much as we can to ensure they have the best possible resources."

Moving on to the topic of the CCBitesize events themselves, Gray expresses his expectation that they will build on the achievements of last November's Critical Communications Week, particularly when it comes to uncovering new audience segments. Elaborating on this, he says: "The new audience that we reached through CCWeek last year proved that online events can be massively complementary to those taking place in-person. Ninety per cent of the people who registered for CCWeek had never attended Critical Communications World.

"With that in mind, we hope that CCBitesize will reach an even wider audience – users in particular – and especially those with limited budgets and travel opportunities. The CCBitesize events will enable anyone with an interest in, or need for, critical communications to explore developments in the technology and use-cases which would otherwise not be available to them."

As convenient as online events undoubtedly are, that 'ease of use' means nothing if the content itself isn't up to scratch. And one look at the programme (see opposite) should provide plenty of reassurance that the first CCBitesize will be time very well spent. The event is designed to quickly deliver crucial information, straight to the user.

Discussing the thinking behind the content itself – and in particular how the presentations will help users make decisions going forward – Gray continues: "To quote Steve Jobs: 'People don't know what they want until you show it to them.'

"At the same time, it's also true that users will always have fundamentally the same high-level need for secure and reliable voice and data communications. The CCBitesize

content has been designed to sit in that space, between current requirements and future development. Users' needs will by definition change as the technology to support them evolves, with the potential of each evolution being recognised and exploited in turn. We believe that the event will play a key role in helping to shape that landscape."

As mentioned, the first CCBitesize will focus on the role being played by narrowband technologies. Of these, TETRA in particular continues to represent the gold standard when it comes to critical voice communications, and as such will play a key role at CCBitesize.

Discussing why it is so important to focus on narrowband, Gray says: "Current narrowband solutions like TETRA will remain a crucial part of the critical communications technology mix for the foreseeable future. They have supported users' critical voice services and provided reliable – if limited – data applications for decades.

"Look at the countries that are considering critical broadband for nationwide public safety and you will find a narrowband network already, quietly and efficiently, providing robust and trusted support. They are not going to be turned off any time soon."

He continues: "TETRA remains the best, and currently only, way to deliver fully standardised, proven, secure, interoperable voice and short data. It is in use by a huge variety of sectors worldwide, from small, private systems to huge nationwide public safety networks.

"It is a trusted technology, giving user organisations full control of their communications and related investments. It is designed for the sole purpose of delivering gold-standard critical communications, spectrally efficient, with end-to-end encryption, customised coverage, and even off-network service."

CCBitesize will be a crucially important series for the sector, while also heralding the return of Critical Communications World in November. Register your interest and join us for Critical Narrowband: The User Perspective on 23 and 24 June.

## Preliminary programme

| | |
|---|---|
| **Wednesday 23 June 2021** | |
| **14.00-14.30 BST**<br>**08.00-08.30 CDT** | **TETRA in the time of change: the perspective of the end user**<br>An 'in-conversation with' session, discussing:<br>• The benefits and challenges of using TETRA<br>• How do you navigate changing times?<br>**Steven McLinden** MAPD GIFireE, retired senior fire and rescue officer, Wales, UK |
| **14.30-15.10 BST**<br>**08.30-09.10 CDT** | **Recent developments in TETRA networks around the world, and how these are being used effectively**<br>• How are TETRA networks currently being deployed?<br>• What are the lessons of the past that can help with future deployments?<br>**Matilde Brown Megård**, senior advisor, Critical Communications and Public Safety Network, Norwegian Directorate for Civil Protection, Norway |
| **15.20-16.00 BST**<br>**09.20-10.00 CDT** | **TETRA roll-outs in the USA: successes, challenges, lessons that can be learned around the world**<br>• Advantages of using TETRA in the US<br>• Overcoming challenges to TETRA deployment<br>Chair: **Keith Ammons**, director, North America TETRA Forum, USA<br>Panellists: **John Monto**, senior director, Collins Aerospace, USA, and others TBC soon |
| **16.00-17.30 BST**<br>**10.00-11.30 CDT** | **TETRA use case studies: what has worked well and what has gone wrong**<br>• Presentations highlighting specific uses of TETRA across multiple sectors and industries<br>• The presentations will demonstrate situations that have gone well, and not so well<br>• Lessons that can be learned from these specific examples<br>**Highways England case study: use of TETRA on a nationwide road network**<br>**Al Edwards**, technology operations manager & sponsor, Highways England<br>**Robin Davis**, TCCA & Actica Consulting |
| **17.30 BST**<br>**11.30 CDT** | **Close of day one** |
| **Thursday 24 June 2021** | |
| **14.00-14.40 BST**<br>**08.00-08.40 CDT** | **Making the best use of the technology**<br>This session will provide advice on:<br>• Radio discipline<br>• Effective communication strategy at the scene<br>• Use of LTE to support or complement TETRA<br>**Ian Taylor**, assistant chief fire officer; senior lead business change, National Fire Chiefs Council |
| **14.40-15.40 BST**<br>**08.40-09.40 CDT** | **TETRA use case studies: what has worked well and what has gone wrong**<br>• Presentations highlighting specific uses of TETRA across multiple sectors and industries<br>• The presentations will demonstrate situations that have gone well, and not so well<br>• Lessons that can be learned from these specific examples<br>**Use of TETRA at Minsk European Games**<br>**John Dundas**, consultant, DundasTech Limited, plus a representative from the Minsk European Games Operations Team<br>**Benefits and challenges of using TETRA, CLP Power Hong Kong**<br>**Terrance Lai**, senior telecom manager, CLP Power Hong Kong |
| **15.50-16.30 BST**<br>**09.50-10.30 CDT** | **Selecting the right option**<br>• Advice on the future outlook for TETRA and long-term strategic planning<br>• How to select the correct communications option based on the needs of your organisation<br>**Steven McLinden** MAPD GIFireE, retired senior fire and rescue officer, Wales, UK |
| **16.30-17.00 BST**<br>**10.30-11.00 CDT** | **Evolution or revolution**<br>Insight into the evolution of TETRA technology and usage, including:<br>• Updates to data services<br>• Security<br>• Standardisation and certification<br>• TETRA and broadband interworking<br>**Brian Murgatroyd**, ETSI & TCCE |
| **17.00-17.40 BST**<br>**11.00-11.40 CDT** | **Future direction of TETRA**<br>• New opportunities across different sectors<br>• International outlook: new opportunities in different parts of the world<br>• TETRA and broadband interworking<br>• Hybridisation: new devices<br>• What does the future hold?<br>**Ken Rehbehn**, Omdia |
| **17.40-17.45 BST**<br>**11.40-11.45 CDT** | **Summary and take-home messages** |

**Supported by**

**In partnership with**

# On to the next century

Following the recent 100th meeting of TCCA's Technical Forum, group chair **Harald Ludwig** and association vice-president **Tero Pesonen** discuss what the future holds for TETRA

*The 40th meeting of TCCA's Technical Forum, held in Shenzhen, China, in 2007*

### What are the key differences between the TETRA market now and when the group first started?

When the Technical Forum was formed, TETRA technology was brand new, and only first networks with limited functionality were in place. At that time, prospective purchasers – used to single vendor proprietary systems – had little confidence that TETRA infrastructure would really work together with radios from different manufacturers. The risk of this infant market fragmenting was evident.

The way forward therefore was to have a forum bringing stakeholders together to discuss matters on a practical level, without commercial pressure. The TETRA Interoperability Process [IOP] was instigated to ensure fully documented and certified processes were in place, in order to reassure potential buyers, as well as provide common guidance to vendors.

The IOP has underpinned the success of TETRA, which rapidly became the leading narrowband mission-critical radio technology throughout the world. TCCA's IOP process remains in place as a critical element of the TETRA ecosystem as new infrastructure elements and user devices are developed. We take it as a compliment that all the work going on behind the scenes to ensure interoperability goes largely unnoticed!

### Who was involved in the group at the start?

The first TF meeting took place on 16 February 1999 at the UK Home Office in London. Both users and operators were involved, including the Home Office itself, British Telecom, Dolphin Telecom, The Police Netherlands and KTL. Vendors included Marconi/OTE – now Leonardo – and Nokia, as well as test vendors/test house IFR and Tele Danmark. Some of those original organisations are still very active in TCCA and standardisation activities.

### How did the market/users respond to the new technology?

Everything was new at the beginning, and we had to convince the industry of the benefits of co-operation, which is the essence of the TETRA MoU. The public safety market at the time used proprietary technology, so there was no need for interoperability testing. This approach was new for all involved.

Issues were how and what to test and how to organise testing. We also discussed who would be the certification body and who will fund the process. Basically everything was an issue.

These were resolved by co-operation and collaboration across countries, operators and vendors, with the Technical Forum bringing the industry and operator/user communities together to consolidate views for prioritisation and goals. It is a good example on the benefits of co-operation for the benefit of all.

The market responded very well, as demonstrated by the fact that in most tenders, the IOP tests and IOP certificates were a fundamental requirement. It also shows that when purchasers formally ask for interoperability by putting a requirement into their tenders, they'll get it. It does not come by itself.

### What will be the key areas in terms of TETRA's continuing development going into the future?

Going forward, we see the main work item as being the development of the standard to be able to interwork with 3GPP critical broadband systems. This work has been ongoing for some time but is vitally important for those users who want a dual systems option where it is possible that TETRA is used for voice, and maybe for Direct Mode.

A second key area is in delivering improvements to TETRA data services, for instance making packet data over TETRA more efficient. ETSI TC-TCCE is already working on packet data group calls, which really enhances efficiency.

The third area is security, which always requires updating and improvement to stay ahead of the bad actors. End-to-end encryption is outside the scope of ETSI standards and is dealt with by TCCA's Security and Fraud Prevention Group (SFPG).

### What is the future for the standard? Does broadband represent a challenge?

We predict that the TETRA standard has a long and healthy future ahead. The advent of critical broadband based on 3GPP LTE/5G is an opportunity for TETRA as it could increase the overall volume of critical communications telecoms being used, leading to a wider overall global market for both standards.

It is very clear that large national PPDR networks will migrate to broadband to benefit from higher data capacity. However, this will take time due to the complexity of implementing the new technology, as well as building the value chain in order to meet the day-to-day operational requirements of critical users.

# Never miss an issue

## Subscribe now to stay informed with:

- **News**
- **Features**
- **New Products**
- **Events**
- **Interviews**
- **Expert Opinion**

To apply for **free** regular copies of **LAND MOBILE** magazine

Please visit our registration website
**registrations.markallengroup.com**

3 WAYS to subscribe

**Online:** magsubscriptions.com
**By phone:** +44 (00) 1722 716997
**By email:** subscriptions@markallengroup.com

LAND MOBILE
WIRELESS COMMUNICATIONS FOR BUSINESS

Sponsored by

NOKIA

# Free webinar:
## What will change with 5G for public safety?

**Tuesday 15 June** 9:00am BST / 10:00am CET

## By attending this webinar you will learn:

- **How 5G will enhance public safety services and use cases**
- **What are the new technologies enabling the magic of 5G?**
- **What are 5G deployment models?**
- **What is the time frame for its availability to the public safety community?**

**Marc Balliet**

Public Safety Business Consultant, Nokia

**Thomas Rehberg**

Head of Public Safety Market Segment, Nokia

Hosted by

CRITICAL COMMUNICATIONS NETWORK

**Find out more at**

**https://bit.ly/2RfmEcx**