chapter 7 Critical Communications

Promoting the power of open standards

Mladen Vratonjic, Chair, TCCA

Although a unique continent in terms of its resources and cultures, Africa shares with the rest of the world the need for critical communications – particularly for public safety, given that the region faces increasing threats from unstable political regimes, terrorism, and cross-border organised crime. With the African Union having 55 country members, international cross-border security is as important as that of national homelands. It is therefore essential that public safety and security services can collaborate effectively and seamlessly.

To that end, many African nations have implemented PMR Public Protection and Disaster Relief (PPDR) systems in the 380-470MHz spectrum band, in accordance with the ITU-R Resolution 646 on critical communications.

Among its key recommendations, the resolution states that an approach based on global and/or regional frequency ranges may enable administrations to benefit from harmonisation while continuing to meet national planning requirements. It says this will enable them to recognise the benefits of spectrum harmonisation, such as: increased potential for interoperability; clear guidance for standardisation; increased volume of equipment resulting in economies of scale, more cost-efficient equipment and expanded equipment availability; improved spectrum management and planning; more effective international aid during disasters and major events; and enhanced cross-border coordination and circulation of equipment.

Open standards narrowband PMR systems have been implemented in the spirit of the ITU Resolution, with TETRA being the technology of choice for a wide range of public safety users and vertical market implementations. These include the manufacturing, mining, oil and gas, transportation and utilities industries. African countries where TETRA is in use include Botswana, Chad, Djibouti, Egypt, Somalia, Kenya, Algeria, Angola, Mozambique, Nigeria, Senegal, Guinea Conakry, DRC, Tanzania, Uganda, Lesotho, Botswana, Swaziland, Namibia, and South Africa. In the latter, the technology supports the South African Police Service and other critical users.

However, catalysed by the widespread availability of mobile broadband, users are looking for broadband data capability that narrowband PMR alone cannot provide. The TETRA standard is unrivalled for secure and resilient voice and narrow/wideband data, but was not designed to be a broadband bearer. Critical communications users are therefore looking to LTE technology.

Although LTE can provide the broadband bearer, the standard requires additional development to deliver and support the specific security features and availability and resilience required by critical communications users. This issue was originally highlighted by the TCCA's Critical Communications Broadband Working Group (CCBG) which, in common with all the TCCA's working groups, is comprised of volunteers who are experts from across the critical communications market.

Collaborating with other key stakeholders around the world, the TCCA is working closely with standards bodies ETSI and 3GPP to define the features and capabilities necessary to establish a commonly accepted, global LTE standard that will support mission-critical communications in the future.

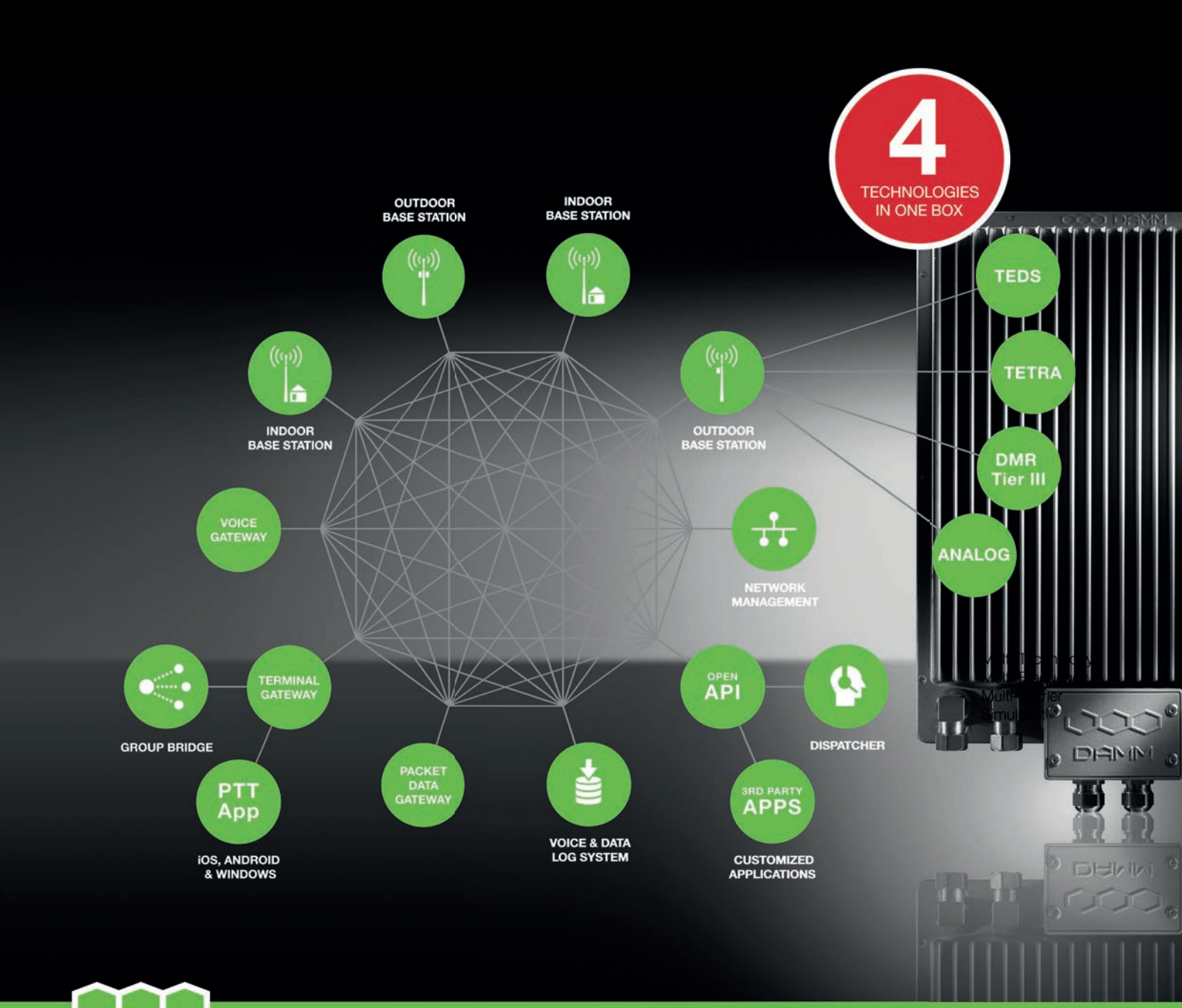
In parallel, the TCCA is active in lobbying governments and regulators to ensure there is sufficient spectrum for future critical LTE services – unlike today's PMR systems, mission critical LTE does not have its own dedicated frequencies.

The latest World RadioCommunications Conference has revised Resolution 646 to address broadband spectrum needs. It has added 694-894MHz as the globally harmonised frequency range, from within which parts are to be considered when undertaking national planning for PPDR applications.

To date, the African Telecommunications Union has not yet implemented a harmonised band for broadband PPDR, but sub-regional groups such as SADC have started revision of the framework. Some administrations that are considering critical broadband are deciding nationally within 700-800MHz on the amount of spectrum needed for broadband PPDR. For example, a number of North African Arabic states are harmonising broadband PPDR frequencies in the 700MHz band, and others are yet to implement nationally their decisions.

As an organisation, the TCCA only exists because of its members and their commitment to the development and promotion of standardised critical communications. We are therefore concerned to see a push by some manufacturers to promote broadband systems in a manner contrary to the spirit of the ITU Resolution.

A few such systems have been introduced without consideration of the existing arrangements and systems deployed, and with no studies that support compatibility between broadband channel and narrowband



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arrangements. The introduction of these broadband systems in 380-470MHz can cause issues with existing PMR systems nationally. They can also create cross-border interference issues with other services that are allocated in the same frequency range, such as Meteorological Satellite, Global Maritime Distress and Safety System (GMDSS).

As a result, should critical communications be required to work internationally to support aid for emergencies, major events, incidents or disasters, the ability of first responders to carry out their work could be severely impacted.

Another issue is the use of proprietary technologies that can also affect system interoperability, stifle economies of scale, and prevent the healthy competitive environment that standards-based mission critical communications have delivered across the world for decades.

Safety and security are two of the key tenets that support society. The ability to communicate effectively is critical in ensuring governments can build and preserve national and international stability. As we move towards a future where standardised critical LTE for broadband will be implemented, it is important to keep the ITU Resolution recommendations and 3GPP standards front of mind.

The critical communications industry needs to continue to develop in the spirit of openness and co-operation to maximise the effectiveness of the services. TETRA's open standard has been the key to its market success and longevity. The addressable market is small – there are less than 50 million critical users worldwide, compared with nearly five billion commercial mobile subscribers.

However, those relatively few critical users are the people that we all depend on in a crisis. They are crucial to society globally, and open standards support them, driving innovation forward and keeping costs down, which is an acutely relevant issue where government funds are concerned.

To influence governments, regulators and stakeholders on the development of the future of critical communications, the stronger the voice of the industry, the greater the impact will be. We are a niche market but we must strive to ensure that as many organisations as possible from Africa – everyone with an interest in ensuring a safe and cohesive continent – plays their part in joining us as we continue to promote the power of open standards. ■

The TCCA (TETRA and Critical Communications Association) would like to thank member companies Airbus, Motorola Solutions and Sepura for their help with this article. www.tandcca.com

Emcom deploys DMR for Swaziland police

South Africa-based PMR solutions specialist Emcom Wireless announced that it had completed a multi-million rand digital mobile radio (DMR) network for the Royal Swazi Police Service (RSPS).

The company said it worked closely with various stakeholders from the police and government in designing, developing and deploying the system in a way that is best for the unique operations of the Swazi Police Services.

The firm added that one of the reasons DMR was chosen by the RSPS was because it offered a quicker return on investment compared to other and more traditional technologies. While Emcom was unable to give details of all the equipment used for the network, when the company was originally awarded the RSPS contract in March 2015 it said it would implement a Tait DMR Tier III system.

During a handover ceremony held at Hlatikulu in southern Swaziland in early February 2016, senior members of the police service were given a field demonstration of DMR's capabilities, such as its clear voice quality and secure SMS feature.

Mr. Mabuza, head of the RSPS' research and planning unit, said: "We particularly

Sepura enhances TETRA picture messaging solution

Sepura launched *IMAGE 3.0*, an enhanced version of its critical comms application that allows the transfer of pictures from a control room to field personnel using TETRA mobiles.

IMAGE now has a new modern interface that is said to be intuitive to use and includes drag and drop functionality. Sepura said this reduces training time, and crucially increases the speed at which an operator can react in an emergency.

According to the firm, the app is scalable for use in any sized network, and can be accessed simultaneously by multiple client apps and multiple users in different geographic locations.

Hytera DMR handsets support RFID

Hytera expanded its portfolio of critical comms devices with two compact handsets, the *PD405* and the *PD415*, which both support conventional DMR as well as analogue radio.

One of the key features of the series is an RFID reader module. The radios can then be used in Hytera's *Patrol* system, enabling users to scan distributed checkpoints in a building and send their current location to a control room where their positions are monitored in real-time on a digital map.

Both the *PD405* and the *PD415* support pre-programmed text message transmission, and feature TDMA direct mode which allows up to two simultaneous calls, even without repeaters.

Emergency comms in 10 minutes with compact TETRA

The *Claricor Cell* from Airbus Defence and Space (ADS) is a compact communications network based on TETRA technology. The small system has been designed to be quickly set up for vehicle convoys, firefighters or rescue operations in remote regions. There are several options for voice and data transmission when using the base station and the TETRA switch in *Claricor Cell*, including fixed line, IP radio link, LTE and satellite.

The system comes in rugged boxes to enable easy transportation and works in rolling vehicles. ADS said it can be setup by end-users within ten minutes, and that the tap-proof TETRA system is pre-configured and has a plug-and-play functionality.

like the fact that we will be able to use the trunking features to host multiple talk groups, prioritise calls, and make use of GPS features." He added that GPS will enable the monitoring of officer locations in real time, as well as the secure management of incidents from a new command and control centre in Mbabane.

Mission-critical TETRA for Stellenbosch

Public safety personnel working in the South African region of Stellenbosch and its municipal area have been equipped with TETRA radio terminals from Airbus Defence and Space (ADS).

The company made the announcement in May 2016 and said that over the next five years it will provide various devices that will enable users to communicate "more safely and efficiently" in an area that covers around 830km^2.

Stellenbosch's administration chose different terminals for each public safety service: fire brigades will use Airbus' *P8GR* and *THR9 Ex*; traffic police will be equipped with the *TH1n*; while the cleaning department will have the *THR880i*.

In contrast to standard analogue paging devices, ADS said the *P8GR* enables secure two-way communication between the control centre and operational units.

The *THR9 Ex* is described as a robust radio designed for explosion-prone environments. ADS said it is also offers the best protection against physical and environmental exposure.

The slimline *TH1n* is claimed to be the thinnest and lightest TETRA terminal in the world, while the intrinsically safe *THR880i* offers uses unique features such as multiple ways to communicate.

Emcom sets up DMR system for Lesotho Electric Company

April saw the announcement that the Lesotho Electricity Company (LEC) had taken delivery of a nationwide digital mobile radio (DMR) system, designed and deployed by Emcom Wireless.

Prior to implementing DMR, LEC's communication system was said to be not only costly but often cumbersome. The company had previously used a combination of standalone analogue repeaters, cellular systems and landlines for communications between its management, centres and field staff that are all scattered across the mountainous kingdom.

Emcom's project team began by carrying out a detailed field study that involved extensive travel across the entire country. The company said: "Our initial scoping days involved trekking up some of the wildest terrain in Africa in search of suitable summits to mount repeaters, and we had to face snow, lightning and rain as challenges in determining the best locations."

These experiences are said to have given Emcom a valuable insight into what LEC needed as a solution. The compamy selected DMR Tier 3 products from Tait Communications, and then spent a year designing, building and testing the system under different conditions.

One notable aspect of LEC's DMR network is its integration with a RediTALK dispatcher loaded with *Google Maps*. This enables the operations team at head office to have real-time location visibility of all radios and vehicles on the network, talk to specific radios when required, and monitor elements such as standing time, speed and distance from an incident, all on one screen. ■

Paul Ward, International sales director, ETELM

Nicolas Hauswald, Commercial sales director, ETELM

Founded in 1981, ETELM's PMR products are fully developed and manufactured in France, and the company states that more than 50 per cent of its systems are exported globally.

The company regards itself as "a visionary expert" in critical communications, and in 1995 it claimed a first by becoming one of the first companies to develop TETRA solutions. It now also considers itself to be a pioneer in applying LTE technology to PMR solutions. At AfricaCom last November, ETELM unveiled the *eLBS*, a new eNodeB LTE base station which integrates the company's own LTE technology with TETRA.

While highly experienced in the critical comms market, ETELM is a relative newcomer to Africa. Commerical sales director Nicolas Hauswald admits that up until around 18 months ago, the company's main focus was on the French and European markets and that Africa was not part of its strategy. So why come to the continent now?

"There are a lot of needs regarding critical communications in Africa today, as well as great expectations from customers because they know what is available. They look at LTE as well, but budget is an issue nowadays. For the oil and gas sector, the

Phil Kidner, CEO, TCCA

The year ahead: According to IHS*, Africa and the Middle East will experience the fastest rate of digitisation in the world. Shipments of LTE technologies (incorporated within other technology by IHS) to the region increased by more than 300 per cent in 2015** compared with a global average growth of 26 per cent. PMR remains a robust market in the region, with TETRA shipments more than doubling, and other PMR technologies combined increasing by 149 per cent in Africa alone.

Today, LTE can and does provide broadband support for critical communications users, enabling applications such as the transmission of incident details, images and video clips, and high-speed internet access to social media, which is becoming a valuable tool to the public safety services. But this is not LTE for critical communications. The standard continues to be worked on and equipment is not yet available, so these applications are carried over the commercial networks and users are likely to have no greater priority than people accessing *Facebook* or *YouTube*.

In addition, the rollout of LTE is limited in Africa which presents an obvious barrier to any widespread mobile internet use, and mobile broadband networks currently only cover around 50 per cent of the population (source: *The Mobile Economy, Africa 2016*, GSMA).

If networks do not provide coverage and availability, they cannot support critical communications. We see continued opportunities for the growth of purpose-designed PMR standards and for the continued use of PMR capabilities for voice even as LTE becomes more widely available and standardised for critical support.

However, there is no doubt that in the future, critical LTE will form a key part of critical communications solutions throughout Africa.

**Statistical information on the critical communications market supplied by TCCA member IHS Markit.*

***The latest full year for which data is available at the time of writing.*

cost of such a solution is not that big for them, so this sector is not in crisis for us; it still works fine. But when we talk about transport or security, it takes more time for a sale to get through. So price is still an issue. But there is a lot to do because there are not that many solutions deployed today, or they are old solutions that are 15-20 years old."

Since coming to Africa, ETELM has been working mainly with oil and gas companies in several countries such as Congo, Nigeria and Algeria. Total is mentioned as a key customer here.

It also has some clients in the transport sector. Hauswald says: "We cover bus, tramway and metro networks, because they cannot depend so well on the mobile operator networks – when you go underground, there is no coverage so you need to have a dedicated network that can be controlled. So we have several networks deployed mainly in North Africa, Algeria and Morocco.

"We are also working in the security sector. For example, we are working with the Kenya wildlife security company which covers all the national parks, so we have deployed a solution there."

So what is ETELM bringing that's different? Here, international sales director Paul Ward says that one of the things that the company really identifies with Africa is that there is a big opportunity for MNOs.

"Mobile operators are looking at what they term 'enterprise networks' and are really starting to focus their energies and their marketing on mission critical as an addition or complement to their traditional commercial networks. And one of the big advantages that we offer is all of our base station technologies – TETRA, DMR, analogue, and of course the eNode B – can be deployed on their existing transmission networks.

"So the price point for an operator to deploy mission critical in areas that have got vast geographical territories starts becoming viable. For Africa, we feel there is a big market that operators could open up for us."

Work on the *eLBS* first began around six years ago, and Ward considers LTE to be a major component of its future product portfolio. "We see an ecosystem of different technologies and LTE is a big part of that. All of our products are based on the LTE core network, so what we envision, certainly in the next five, possibly 10 years, is a single network which is LTE-based on the LTE standard with different types of technologies all seamlessly connected and sat on that network.

"That's what we have developed. So we have got TETRA base stations directly connected to LTE, obviously eNode B via the *eLBS*, and then you've got PMR and analogue base stations. Different technologies, but all using single transmission networks."

The role of LTE in critical communication networks continues to be the subject of some debate within the industry. Many users are still waiting to see how it will all play out and as a result, ETELM will continue to focus on both TETRA and LTE, as commercial sales director Nicolas Hauswald points out: "We do not believe LTE will replace TETRA; they will work together. LTE and TETRA both have drawbacks financially and technically in terms of deployment so there is room for both."

So where does that leave the user in Africa who is deploying to a greenfield site – what type of network would Hauswald recommend for them? "A hybrid solution. Why? Simply because in Africa you have wide territories with very low density in terms of population or in terms of coverage requirements. LTE is adapted to more dense areas but is more expensive than TETRA. So with TETRA you could have wider coverage, with LTE you can have better bandwidth as you can have more applications running. You can find a balance between in a hybrid solution so the cost will not explode if you need to cover full territory."

So what about the foreseeable future – what are the challenges ETELM envisages in the African market over the next 12 months? For Hauswald, there are two things. "What we expect in a year's time is to have several networks deployed and we would hope to have at least one nationwide network (that would be more for the blue light services). We are working on it, and have targets in South Africa and in Central Africa.

"Secondly, budgets are limited in Africa and investment is limited, and I would say that is the main challenge we are facing. But we hope to get through this and increase our presence in Africa in 2017."

Shimon Dick, VP, sub-Saharan Africa, Motorola Solutions

Motorola Solutions describes itself as a creator of "innovative" mission-critical communication solutions and services that help public safety and commercial customers build safer cities and thriving communities around the world.

Vice president of sub-Saharan Africa, Shimon Dick, says the company has been supporting the public safety community and other verticals in need for mission critical solutions for more than 85 years, providing customers globally with public safety solutions, integrated command and control communications, and managed and support services.

According to Dick, Motorola Solutions considers Africa to be a strategic market that is robust and dynamic, with high potential and growth rates in many countries.

"Motorola Solutions began its operation in Africa in 1960 as one of the first global companies on the continent. Today, our activities span across more than 48 African countries, with many customers in the government, public and private sectors.

"In recent years, the world of radio communication has shifted from analogue to digital. This global trend has not skipped the African continent where we have implemented many tens of digital radio systems from our TETRA, ASTRO and *MOTOTRBO* portfolios."

Over the past year or so, Dick says the company has been helping many of its customers, such as those in the public safety, and oil and gas industries, to continue their migration to the digital era. And as Africa is seen as a strategic region, he says the firm also expanded its partner network to help extend its reach across the continent.

"Our digital radio systems implementations in Africa have proven very successful, and we believe they represent a huge leap forward compared to the analogue systems which are still used by many public safety entities in the region. Many of the transitions were to TETRA systems, which are perfect for public safety use, along with ASTRO systems, which provide superb coverage in wide and complex terrain."

Like many other countries around the world, Dick says African nations face rising challenges in the area of public safety: natural disasters, crime, terror and the need for better border controls.

"Our core technologies address exactly these challenges, as we provide advanced communication systems, command and control solutions, video analysis and other smart public safety solutions. We serve public safety and commercial customers in industries including law enforcement, fire, emergency medical services, utilities, mining, manufacturing and education.

"In conjunction with the global trend, in 2016 we've witnessed more organisations adopting digital radio systems and we expect that trend to continue in 2017. Moreover, we expect to see organisations adopt new technologies like LTE, and utilise bandwidth for data applications."

According to Dick, a good example here would be voice over IP, such as Motorola Solutions' *WAVE* which is a push-to-talk

platform for work group communications. "*WAVE* enables PTT communication between disparate networks such as radio, cellular, Wi-Fi, and telephony. Our public safety-grade system, *WAVE 7000*, is used for projects that require highly critical communications such as the UK's new Emergency Services Network."

As organisations, especially those in public safety, strive to enhance efficiency in challenging times, Dick says demand for LTE technologies as a means of enhanced data communication is likely to increase. "We also expect to see more data-based applications, either over LTE networks or other existing digital networks. These applications could be evidence management solutions, enhanced command centres, and new application associated with Industrial IoT.

"These applications connect with one of the key trends we see in many countries, which is the proliferation of new kinds of data. Massive volumes of data are being generated 24/7, and there's a critical need to harness the information to improve an organisation's work, especially in the world of public safety."

Dick says Motorola Solutions is helping many public safety agencies around the world to take advantage of the Internet of Things (IoT) and Big Data. "We are doing this by connecting the dots among multiple databases, social media networks and evidence libraries, and in minutes rather than days through cloud-based software and services. We also analyse the vast collection of real-time data coming from sensors and other IP-enabled devices (drones, wearables, etc.) and act upon it.

"We believe that, very soon, these trends will also come to African countries, helping them face new public safety challenges. At Motorola Solutions we see this data trend as key for developing new services for our customers. In the past year we've invested heavily in innovation, developing new abilities on the software side, in order to utilise all the data around us."

To support all this, Motorola Solutions made a number of acquisitions in 2016. They include: public safety software company Spillman Technologies; Gridstone, which develops mobility solutions for public safety agencies; and the Mobile Assets Communications System (MACS) from Cyfas Systems to enhance the command and control solutions portfolio for the UK's emergency services users.

When looking ahead at the world of public safety, Dick believes radio technologies like TETRA and ASTRO will continue to serve many countries in the coming years as they transition from analogue to digital networks. "We see these technologies as part of the path that will lead gradually to LTE systems. While public safety agencies will always need a fail-safe option to communicate by voice, the need for additional applications will drive adoption of LTE as a complementary technology, allowing sharing of photos and videos among officers, command centres and the public.

"Government agencies around the world have already begun to integrate LTE as part of their public safety communication networks. The UK government's Home Office is moving towards a new public safety LTE based network provided by Motorola Solutions, expected to be relied on by more than 300,000 emergency and public service users at more than 300 agencies across the country. And earlier this year in the United States, the Los Angeles Regional Interoperable Communications System and Motorola Solutions successfully demonstrated the LTE and LMR networks for the first time during the Roses Parade in Pasadena, California, which attracted 750,000 spectators.

Phil Kidner, CEO, TCCA

The TETRA MoU Association was established in 1994 to create a global forum to act on behalf of all parties interested in TETRA technology.

In 2012, in order to reflect its broader remit of promoting the development and adoption of common standards for critical communications worldwide, the organisation changed its name to the 'TETRA and Critical Communications Association' and is now known simply as the 'TCCA'. It said the change was in response to the growing demand from PMR (professional mobile radio) users for mobile broadband services. Here, the TCCA believes the industry should leverage the capabilities of complementary technologies such as LTE, rather than develop completely new ones.

Today, the association represents more than 160 organisations across the world, and since 2006 it has been headed by former UK police officer Phil Kidner.

According to Kidner, a lot of African critical communications is still analogue so users have to decide whether they're going to go to digital PMR or whether they are going to go straight to broadband.

"There are companies in Africa that are encouraging [users] to go straight to broadband. I don't believe that's the answer for them. I believe they've got to get at least a lifetime's use out of PMR which today will provide them with a wide area, private (encrypted if they want), voice and narrowband data solutions.

For example, some parts of Australia are very similar to parts of Africa where there are wide-open spaces and mining is big business. They all use PMR and are piloting broadband, but their day-to-day, mission-critical business is done on PMR.

"So what I would say to users in Africa is don't be seduced by the hype. Broadband will be part of your future but it is not there yet. Take this step into a PMR, digital PMR, and you'll see it will deliver 99.x per cent of everything that you need."

Kidner is keen for the TCCA to become more active on the continent. In February 2016, he organised two events, one in Cape Town and another in Gaborone, Botswana.

"The event in Cape Town (which was about TETRA in South Africa) was standing room only. So I thought we've got to do two things about this. One was to broaden the event so the focus is not just on TETRA but on critical communications; and the second thing was to decide whether it should be in Cape Town or Johannesburg."

Working with event organiser Knect365, TCCA looked through the database for AfricaCom 2015 and found that there were more than 500 public sector attendees. Kidner therefore saw an opportunity to run an event alongside AfricaCom 2017, and points out that this will be about critical communications, not just a single technology.

"The TCCA is focused on all standard communications. We come from a TETRA heritage and we are never going to lose that, that's part of our being. But we are now interested in delivering what the users want, so if they want a particular standard that is not TETRA, that is fine by us."

The second thing the association is focusing on is how it migrates those users towards broadband. In its view, current mobile broadband technologies are not yet ready to provide the sole platform for critical communications.

"We believe that PMR – whatever brand of PMR it is – has an ongoing role for many years yet," says Kidner. "I am confident that if you went out and bought a TETRA or even a P25 network today, you will get a lifetime's use out of it before you thought broadband communications is now ready and moved across to it. So the future as far as I can see is hybrid; its PMR and broadband working together. Some

people tell me that I am just an old guy and broadband is here and that we should all move to it. I don't believe that."

LTE & critical comms

When it comes to working with mobile broadband, LTE is the technology the TCCA has put its weight behind. "There are only 40 million PMR users in the whole world but there are 7.6 billion cellular phone users. So all the investment is clearly going into the cellular market and we need to be part of that. But 40 million versus seven billion has been a tough struggle. We are now market representation partner in the 3GPP and have succeeded in getting a group within that process dedicated to critical communications.

"We want the LTE standard to include functionality for critical communications. We don't want to go down the road that some technologies have gone down of just being like LTE – that is a disaster because you pay a premium. We want to be a part of the mainstream standard, and that is what we are focused on doing for our users regardless of what they are currently using today. That is going to take a long time. There are products available today, but if you're a public safety user you don't take risks with your communications. You need proven technology. So I believe that using PMR and broadband together is the answer.

"If you are another type of critical communications user, let's say an airport, you've got different issues. Perhaps you can use broadband more easily than a widespread nationwide system. But then the issue is where do you get 1.4MHz of spectrum and how much is it going to cost you? So the airport still needs PMR but that is their decision."

Kidner continues by explaining that TETRA uses four slots in 25kHz while LTE is looking to use a minimum of 1.4MHz of spectrum. So does TETRA's narrowband technology present limitations for users?

"When you buy a TETRA network, you primarily buy a voice network but get a data network for free. Yes, it is narrowband but there's such a lot you can do with that – you can do all the usual database enquiries, send your resources, know where they are, know when they have arrived, know when they have finished, all the easy stuff, on narrowband. You can send and receive colour pictures on your radio's screen to show missing children or wanted people. That's a really powerful tool being used today.

"But there are some functions – video and some of the more interactive applications, for instance – that need to be enhanced by broadband. Critical communications users are choosing to do that on broadband today; they are using their mission critical data applications on TETRA, and their more 'nice to have' applications on broadband.

"Of course at some point, those nice to have applications will become mission critical. But whilst they are using public networks they are not going to become mission critical overnight because, as we know, they are not designed to be there all the time or every time

"If a site goes down on the cellular network, there might be another one nearby that people can use, or perhaps it will get fixed whenever the operator can get resources.

"That is not good enough for mission critical. For mission critical, when you press that button it's got to work first time, every time, whether you are inside or outside."

Release 13 of the LTE standard published in March 2016 features mission critical voice which means, in theory, you can have an LTE mission critical product, says Kidner. "Release 14 is due in 2017 and will include data and video, and then there is some more which will be in Release 15. So the standards are there and we are going through the processes.

"The bullish manufacturers say we are just waiting for the standards to be ticked off, we've got the products, we will roll them out within months of the standards completing. But other bearish manufacturers say no, it takes two years after the standards. I think the launch of products will come somewhere in between."

But Kidner goes on to warn that that would not be the end of it, as all first adopters take a big risk with any technology, not just LTE. "There is an adage within public safety that says you want to see somebody else have all the blood and problems and you will follow on when it's sorted. We are a conservative industry and we will take it one step at a time."

But is he worried that it will then be time to talk about 5G? Kidner admits that at present, it is difficult to understand what's in and not in 5G. But he adds that the TCCA is reassured by the 3GPP that it will be an evolutionary process for critical communications, and talks will continue between the two organisations to ensure that remains the case.

Digital Mobile Radio

So what about DMR – where does that fit into all this? Like TETRA, Kidner explains that DMR was a standard written by the European Telecommunications Standards Institute (ETSI) for global adoption.

"TETRA was designed for public safety and high-end critical communications; DMR was for lower use and then there was dPMR.

"DMR has pushed the boundaries. DMR II and III has come along and so users have a choice between those and TETRA. What you use depends on what you need, functionality, etc. DMR and TETRA are both growing technologies but DMR is going to grow a lot. I see some of the users in Africa adopting DMR and I don't see that as a problem if that suits their needs.

"The step from analogue to digital can be achieved with DMR and you can also achieve it with TETRA, of course. TETRA is mission critical through-and-through, and DMR has evolved into that."

Inevitably, Kidner believes TETRA has the edge, and enthuses about it as being the "best technology in the world" for critical communication users.

"As we sit here today, there are 3.6 million critical communication users using TETRA radios. That is 3.6 million policemen, firemen, medical services. These aren't radios stuck in the cupboard; they are being used in life and death situations around the world."

Citing forecasts from IHS, Kidner says six million people will be using TETRA radios by 2020, and that the market is expected to grow 37 per cent in the next three or four years.

"So we see TETRA as growing and don't see it dropping. DMR is also emerging because, up until recently, two thirds of all PMR radios in the world were analogue. A lot of those mainstream critical communication users have already gone or are going to TETRA, while DMR seems to be picking up a lot of the analogue to digital movements for lesser demanding requirements."

Where does Kidner expect to see that growth in Africa come from?

"The Cape Town authorities put in their TETRA network in around 2000/2001, but what you can buy today is significantly upgraded because of what we have done during that period of time.

"What you have is a virtuous circle – new and existing users feed all the developments into us, we take them to ETSI, we get them standardised, it comes out of ETSI, and we include them in our interoperability process. That means you can then go and buy, for example, a Hytera radio and use it on your Motorola network.

"So we have kept the technology up-to-date. Even as we speak, we have several groups working on the latest additions to the TETRA standards. It continues to be an evolving virtuous circle."

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