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Oberservation: 5G

## 5G, New Opportunities for Private Wireless Network

Industry News

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# Mission Critical LTE Less of a Technical Thing

When people are feeling so comfortable touting how significant changes 5G is bringing or will bring to our lives, it is jaw dropping for many to realize that those who are safeguarding the communities still rely on 2G equivalent communication technologies. First responders such as police and firefighters in Europe and America started to use digital communications systems of TETRA or P25 protocols in late 1990s. Police Digital Trunking (PDT) started to roll out in China in 2010. There are many more countries still in the process of going digital. Can everybody simply hop on the 4G/5G bandwagon and enjoy the technical feast? In a perfect world, probably yes.

In America, there was one decade of effort to persuade the Congress to pass legislation establishing a reliable, dedicated and national high-speed network for first responders after the September 11th disaster in 2001. Partnering with AT&T, the First Responder Network Authority, created in February 2012, launched FirstNet in early 2018. In the U.K., Emergency Services Network (ESN) in the very beginning in 2014 set a challenging target to migrate blue light users to LTE. By early 2019, ESN was £3bn over budget and the 4G LTE system switch-on was delayed to the end of 2022, while many skeptics believe that 2026 is a more likely deadline.

No matter how their effort lead to up till now, as forerunners to adopt mission critical LTE, US and UK government actually help the rest of the world to shorten the learning curve. Here are some takeaways. First, nationwide mission critical LTE is a top-down initiative involving legislation to establish a strong cross-department overseeing body and to secure the right spectrum and proper initial funding. Second, thorough public consultation is a must before actually drafting the RFP. Third, the network in the long run should be economically self-sufficient, at least partially, and public-private partnership is a valid option. Fourth, don't rush into it.

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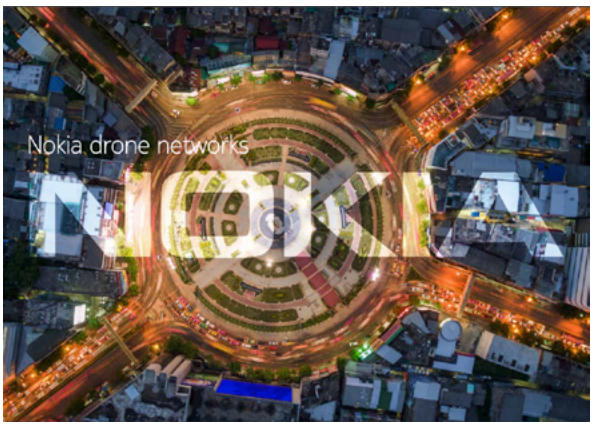
# World's 1st Test of Private Wireless Connected Drones for Tsunami Evacuation Alert





Recently Sendai City and Nokia successfully conducted a test flight of a Nokia drone on a private LTE network provided by Nokia Digital Automation Cloud. They tested the potential use of drones during a tsunami or other disasters to help in prevention and mitigation efforts. The test verified that using a private LTE network to control and communicate with the drones is an effective means for enhancing situational awareness and communicating with the affected population during a disaster. This is the first time in the world this type of trial has been conducted.

Sendai City is the center of Tohoku Region, Japan, and lies northeast of Tokyo on Honshu Island, with a population of over 1 million. The coastal areas were devastated by the tsunami caused by the Great East Japan Earthquake in 2011, and have come to be recognized internationally through the United Nations as a symbol of disaster risk reduction and reconstruction. In the verification test, it was assumed that a major tsunami warning would be issued in the coastal area near the Minami-Gamo Water Treatment Center in Miyagino Ward, Sendai City.

Nokia deployed a private LTE network near the Minami-Gamo Water Treatment Center using its plug-and-play digital automation cloud technology. Using speakers, HD cameras and thermal cameras mounted on Nokia drones, the testers delivered recorded and real-time voice messages and conducted aerial monitoring using HD and thermal camera video streaming from the drones.

During the simulated disaster, the testers were able to issue a major tsunami warning to evacuees in coastal areas through the drone speaker, and monitor the tsunami arrival zone and coastal areas through drone camera images. They also guided people to evacuation sites using the drone to convey directions, and monitored the movements of evacuees using the drone camera. The test also highlighted how first responders can facilitate disaster prevention and mitigation without risk to the personnel managing the evacuation activities.

Nokia Drone Networks is a turnkey solution consisting of one or several drones equipped with gimbals with HD and thermal cameras, a private LTE wireless network, a drone flight command and control center, and video analysis applications. Private LTE/4G provides seamless and secure connectivity, making it more suitable for mission-critical use cases than the mostly Wi-Fi-based technology used in public mobile networks. The high-performance, low-latency connection provides optimized coverage for the drones, ensuring sufficient capacity for video streaming across wide areas and enabling secure information processing. Drones can also be flown overpopulated areas with limited risk and with better control in difficult weather conditions.

# Digital Inclusion: Driving Equal Access for All

Huawei released its 2018 Sustainability Report in July. It has published this report for the 11th year in a row. The 2018 report explains Huawei's four strategies for sustainability: digital inclusion, security and trustworthiness, environmental protection, and a healthy and harmonious ecosystem.

Over the past year, Huawei has been working to help achieve the UN's Sustainable Development Goals (SDGs), build a sustainable and more inclusive ecosystem with its industry partners, and execute its own sustainability strategies.

At the launch event for the report, Liang Hua, Chairman of Huawei, said, "Huawei has been creating value for its customers through innovation. We are doing everything we can to bridge the digital divide and meet the world's needs for connectivity," Liang continued, "We want to make digital services more affordable and equally accessible to all, and to do our part in contributing to social and economic development."

Liang explained that environmental protection is also a key component of Huawei's sustainable development initiatives. Liang added, "Energy efficiency has become a major consideration for future communications networks. We have to use less energy to transmit more data, and reduce the overall energy consumption of power systems. ICT technologies can help."

Liang explained that Huawei has made many innovations in the course of its 5G research, product development, and engineering. Huawei has managed to reduce the power consumption per 5G site to 20% less than the industry average. This has been made possible by the new Huawei chipsets, system software, professional services, and advanced hardware and heat dissipation technologies. These innovative technologies have made Huawei's 5G more energy-efficient. With the right solutions, Huawei's 5G will be a green technology.

Kevin Tao, Board Member and Chairman of Sustainable Development Committee of Huawei, remarked, "We want to bring the benefits of digital technology to every person, home, and organization. To this end, we have launched a global digital inclusion initiative called TECH4ALL. For example, our RuralStar solution has connected 40 million rural residents as of the end of 2018."

Tao added, "We currently provide communications services to over three billion people around the world, and we are committed to supporting secure network operations worldwide. We honor this commitment no matter what. For example," he said, "In 2018, after a magnitude 7.7 earthquake hit Indonesia, Huawei was the first and the only vendor to the scene."

Tao also announced Huawei's new sustainability strategies, which include two major changes. First, Huawei has expanded its strategy of bridging the digital divide into a digital inclusion strategy. Building on connectivity, the company is now also paying more attention to applications and skills. Second, its strategy of supporting stable and secure network operations and protecting user privacy has been upgraded into the "security and trustworthiness" strategy.

Huawei incorporates sustainability in everything it does – in its innovation, value creation, and value sharing with its partners – so that it can deliver greater business value and social value. Looking forward, Huawei will work even harder and do its part in building a better, sustainable future.

# Radio China Magazine and MCCResources Become Strategic Partners

Shenzhen, China, Oct. 10, 2019 -- Radio China magazine (www.radiochina.info), a media and event platform to introduce the latest PMR products designed in China and to promote technical and business interaction in the global ecosystem, forms strategic partnership with MCCResources (www.mcc-resources.com), a leading publisher on critical communications globally.

MCCResources publishes 'The Critical Communications Review', a web portal, highlighting critical communications technologies such as TETRA, DMR, P25, critical messaging/paging, critical control rooms and mission critical and public safety LTE. The company also launched a YouTube channel especially dedicated to the critical communications industry. To support its members, MCCResources offers online marketing support and special advertising services.

Gert Jan Wolf, founder of MCCResources said: "Since 2010, MCCResources has closely been following the global critical communications industry, including China, which has managed to roll out its own digital mobile standard PDT. Thanks to the effort in R&D of multiple Chinese manufacturers, PDT is now commonly used by Chinese police forces. Among them, manufacturers such Hytera has successfully expanded their international presence," Gert Jan Wolf continued, "Radio China Magazine takes it as one of its major objectives to introduce PMR products to the global market, which are designed and manufactured in China. This is important for the entire communications industry and they well complement what we are doing at MCCResources. I am confident that, together with Radio China, we can create more value for the global PMR market."

Wolf and Zhu at China Radio Conference 2019 in Beijing

In September, Radio China magazine has successfully released its first issue, which covers a wide range of topics, such as the status quo of PMR industry in China and the trend of push-to-talk-over-cellular (PoC). It recently went online to better fulfill its outreach and services after publicizing its first issue magazine to the international readership. "MCCResources started as a digital media nearly ten years ago. It is deep rooted into the global PMR industry, and now is an information hub for the industry. Mr. Wolf himself is actively covering PMR events and projects across the world with the Vlog channel, which I think is very interesting and valuable. We are happy to form the synergy across the two publishing companies," said Jesse Zhu, COO of Radio China magazine.

RADIO·CHINA × MCC Resources

# Philippines National Police Launches Hytera DMR Trunking Communications System

(Manila, Philippines, Aug. 29, 2019) – Hytera, a leading global provider of innovative Professional Mobile Radio (PMR) communications solutions, witnessed the launching of its DMR Tier III trunking system at the Philippines Communications and Electronic Service 77th Founding Anniversary, which was celebrated at The Philippines National Police Multi-Purpose Center in Quezon City on August 28th. A series of live demos were carried out during the celebration.


The newly launched system is part of the smart policing project by Philippines National Police (PNP) to strengthen the connectivity through digital transformation. Hytera provided an intelligent DMR trunking system and about 20,000 digital terminals. The new system can be integrated with many other systems, such as the public switched telephone network (PSTN) and a car identification database for queries. “During the actual demo, we witnessed a seamless connectivity with Regional Headquarters from PRO-7 and PRO-11. The communication and radio check between offices is very clear. And it is a very understandable connection by using the DMR of Hytera which is deployed nationwide," said PMAJ Crysler M. Benedicto, Chief, Com Center Section, FOCCD, CES.

The legacy PNP analog radio communications system was put in service in 1995, and has a lifecycle of 10-12 years. APCO P16, the technology it adopted, was outdated compared to the radio systems used by PNP counterparts in other countries. Serious communication issues had arisen due to the aging analog system, such as high costs of maintenance caused by frequent repair and spare parts shortage, poor interoperability, inadequate coverage, and low frequency efficiency. The new DMR system was deployed to solve the problems, while bringing many other up-to-date functionalities. “The DMR technology provided by Hytera is very, very clear particularly in our area - Davao City which we are implementing Tier III. Currently, all major events in Davao, the city where the Philippine President is located, are relying on this technology particularly the product of Hytera. As we speak, it is being used for another important event in another province for their celebration. I bring my Hytera radio with me here in Manila and it is still working and has very nice voice reception," said PLTCOL Donel A Sungkip, AC, RCEO11.

# 25 Years of Impact on the World's Safety and Security

**TCCA marks a quarter century of advancing critical communications**

On 4 November 2019 – 25 years ago today, a group of stakeholders in critical communications gathered in Copenhagen to create and sign the TETRA Memorandum of Understanding (MoU). Those individuals and their companies became the founder members of the TETRA MoU Association, now known as TCCA – The Critical Communications Association.

Over those 25 years, TCCA has grown to become a global organisation, continuing to drive the development of TETRA technology through its TETRA Industry Group and ETSI, but also catalysing and leading the development of critical broadband 4G/LTE and 5G standards. This takes place through TCCA's Market Representation Partner status in 3GPP, support of the ETSI MCX (Mission Critical voice, data and video) Plugtests™, and TCCA's Broadband Industry and Critical Broadband Working Groups (BIG and CCBG).

TCCA's core principle of open standards – the foundation for the success of TETRA – has remained unshakeable since those first pioneers came together in 1994. The TETRA market was built on the unique Interoperability (IOP) Testing & Certification Process, developed and led by TCCA's Technical Forum (TF). The first TF meeting was held at the UK Home Office in London in February 1999, and the first IOP certificates were published in November 1999. 20 years later the TETRA IOP process continues to lead the world in independent certification for critical communications.

The TETRA pioneers

On a sunny Friday, November 4, 1994 the founders of the TETRA MoU assembled in Copenhagen. The meeting was hosted by TELECOM Denmark A/S.
Major users and manufacturers were represented including the Netherland Police, UK Home Office, Ericsson, Motorola, Nokia and Philips Telecom.
Also present was the European Commission (DG XIII), the accredited test house, Telelaboratoriet and the chairman of ETSI STC RES06, Mr. Brian Oliver, who stressed:
"This agreement by several large users and manufacturers will ensure that TETRA has timely introduction to the market, and that potential users become aware of the operational and cost benefits."
As a successful result of this meeting and following meetings held by the group, all interested parties are invited to join on the discussion.
...
1st & 2nd row from left to right: *Ole M. Lauridsen*, Telecom Denmark, *Brian Oliver*, STC RES 06, *Phil Godfrey*, Philips Telecom, *Jussi Löppönen*, Nokia, *Bruce Heyman*, Motorola, *Steffen Ring*, Motorola.
Last row from left to right: *Flemming Jensen*, Telecom Denmark, *David Rowe*, UK Home Office, *Hans Borgonjen*, Police Dept. Netherlands, *R. Ginman*, UK Home Office, *Jens Møller*, Telecom Denmark, *Ulf Borison*, Ericsson, *Jørgen Richter*, EU Commission, DG XIII.

TCCA's IOP process was developed to enable a truly open multi-vendor market for TETRA equipment and systems. This approach gives users clear benefits in terms of a wide portfolio of compatible equipment, competitive pricing and rapid development of new product models. The IOP process also benefits industry by creating a wider accessible market, faster market take-up and greater potential for investment in new developments. TCCA's IOP testing is witnessed by an independent body, currently by ISCOM, part of the Italian Ministry of Communications.

TCCA is now working with partners such as the Global Certification Forum (GCF) to develop and implement a global MCX interoperability testing and certification regime, and works with an increasingly wide range of industry partners to advance critical communications worldwide.

**25 years of excellence**

Jeppe Jepsen is TCCA's Board Vice-Chair, the Association's Director of Broadband Spectrum and Director of International Business Relations for Motorola Solutions. He was Director of TETRA at Motorola when the original MoU was signed, and has seen the Association and the critical

communications market develop first hand since 1994.

”Over these 25 years the Association has expanded the market to all parts of the world and all sectors of PMR/LMR. TCCA has developed across the critical communications broadband ecosystem to become the place where user organisations and industry can debate and clarify their common issues, and to be the honest place to obtain and share information” said Jepsen.

“Through lobbying of governments and regulators we have gained international agreement on broadband spectrum for PPDR, and we have set out, and continue to drive, technology roadmap agreements across the demand and supply sectors.”

Tony Gray, TCCA Chief Executive, underlines the importance of industry and user cooperation and the countless days of work put in by volunteers to develop stringent processes for the development of technical solutions. “This 25th anniversary is another opportunity to publicly thank all our members, our partners and all supporters of excellence in critical communications. The impact that such a niche but crucial market has on the world’s safety and security cannot be underestimated, and we are proud that TCCA is firmly embedded at the centre of developments.”

**The importance of standards**

Brian Murgatroyd, Chair of the ETSI TC TCCE (Technical Committee TETRA and Critical Communications Evolution), outlines the reasons why TETRA has been such a long-lasting success and the choice of critical communications users.

“TETRA was conceived at a time when there was a need to provide reliable, secure and inter-operable digital mobile radio services for professional users. This was made a reality by the development of an open standard of really high quality and detail. It was produced by experts from several mobile radio companies and governments, devoting years of painstaking work and who foresaw the possibilities of a modern digital system that would offer many functions and services. An open standard has ensured good competition between manufacturers which has kept prices affordable and most importantly has encouraged continuous innovation,” said Murgatroyd.

“The TETRA standard was first developed in the 1990s but is still being improved today and is seen as having a long- term future well into the 2030s and beyond. It now consists of more than 130 separate technical specifications and more than 35 technical reports and guides.

“However, although a good standard is the basis of success it could not have happened without the co-operation of users, operators and manufacturers, hence what is now called TCCA was conceived and has always had a very close connections to ETSI and the TETRA standard.

“We are still developing the TETRA technology to ensure it will still be fit for purpose for the next 20 years, but we have extended our remit to cover developments of specifications for critical communications broadband services. In particular we are developing new interfaces to ensure successful interworking between TETRA networks and mission-critical broadband systems. We wish TCCA a great future for another 25 years.”

**About TCCA**

TCCA represents all standard mobile critical communications technologies and complementary applications. Our Members are drawn from end users, operators and industry across the globe. We believe in and promote the principle of open and competitive markets worldwide through the use of open standards and harmonised spectrum. We maintain and enhance the TETRA Professional Mobile Radio (PMR) standard, and drive the development of common global mobile standards for critical broadband. TCCA is a 3GPP Market Representation Partner, supports the ETSI MCX Plugtests™, is a member of the Mission Critical Open Platform (MCOP) project, and our Members actively contribute in 3GPP working groups. To find out more, please visit www.tcca.info and www.critical-communications-world.com/madrid

# Hytera PTC760 Wins "Best New LTE or Hybrid Device" Award at ICCA


(Kuala Lumpur, Malaysia, June 19, 2019) - Hytera, a leading global provider of innovative Land Mobile Radio communications solutions, received the award of the “Best New LTE or Hybrid Device” for its LTE & TETRA convergent device PTC760 at the 2019 International Critical Communications Awards (ICCA) on June 18th in Kuala Lumpur, Malaysia.

The Hytera PTC760 Multi-mode Advanced Radio is the revolutionary TETRA & LTE hybrid device offering the ideal platform for critical voice and broadband data services. Providing a unified communication experience, this feature rich handset with multiple connectivity options is the ideal communication solution for critical situations. To serve users following different technological protocols, Hytera also offers DMR & LTE version of Multi-mode Advanced Radio such as PDC760. As an industry leading convergent communications solution, Hytera Multi-mode Advanced Radio has been adopted by fast growing user groups from different sectors.

Accepting the award at the ICCA ceremony, Yelin Jiang, Executive VP of Hytera said: “It is a great honor for Hytera and subsidiaries to receive these awards in recognition of our relentless efforts in the professional communication industry worldwide.”

Organized by MA Exhibitions, the organizer of Critical Communications World (CCW) 2019 in association with TETRA & Critical Communications Association (TCCA), the ICCAs are regarded as the most sought-after accolade in critical communications. Celebrating innovation, excellence and execution in mission critical communications, the International Critical Communications Awards recognize products, organizations and individuals who push the boundaries of technological capabilities.

# More Countries Adopt Mission Critical Multi-mode LTE Handsets

On Nov. 4th, Hytera disclosed to the Chinese stock market its latest contract winning, saying that it has signed a 24-million USD structural agreement with a system integrator, and it will supply its multi-mode LTE intelligent handsets to public safety users in an unspecified Asian country.

Hytera is among the first manufacturers to launch narrow & broad band convergent handsets. Its PDC/PTC series enable the DMR or TETRA users to tap into LTE technologies to take advantages of the data capacity, meanwhile ensure reliable mission critical voice communications empowered by DMR or TETRA technologies.

Recently Motorola Solutions launched APX NEXT All-Band P25 Smart Radio, which enables American first responders to use the existing P25 infrastructures and the newly established mission critical LTE network FirstNet.

Tactilon Dabat by Airbus is said to be the world's first smartphone and full TETRA radio in one device. It is a smart, strong and secure device for public safety and mission critical users. In its stronghold TETRA market in Middle East, Airbus has started to deploy its projects of private LTE systems for mission critical users.

EP series is TD Tech's version of smart convergent handsets for professional users. EP821 is the flagship model with a large display. EP821 adopts a public-private network convergence design to support abundant frequency bands for public and private networks.




# Florida SARNET Receives Hytera Donation to Better Prepare for Hurricane Season

(MIRAMAR, Fla., Aug. 21, 2019) - Hytera, a leading global provider of innovative Professional Mobile Radio (PMR) communications solutions, has donated a second RD982i-S Digital Mobile Radio (DMR) repeater to Statewide Amateur Radio Network (SARNET) in Florida ahead of the 2019 hurricane season. The donated equipment has already been installed and made ready for use in the event of an emergency.

SARNET is a network of linked UHF voice repeaters that serves the State of Florida. The repeaters are operated by their local trustees and the network that connects them together does not interfere with the local use of the repeaters. SARNET facilitates the distribution of critical information and valuable, real-time updates to the community. During any significant crisis, SARNET may be called upon for support through an official state emergency request. During an emergency, radio traffic in an affected area can become very busy and requires
careful monitoring to ensure continuous communication for emergency teams. When an official request is made, SARNET operators work with county and state Emergency Operation Centers to assist and manage communications. The installation of the newly donated Hytera repeater will allow for improved communications between SARNET and the National Hurricane Center (NHC) via hand-held portable radios.

During the last Florida hurricane season, Category 5 Hurricane Michael roared ashore on the afternoon of October 10, 2018, devastating several panhandle counties in northwest Florida. By the next morning the Florida SARNET was taking critical calls from Emergency Operation Centers and the Red Cross from the affected areas. Cell phone coverage had been knocked out in most areas as was electricity and the internet. SARNET stayed on the air with amateur radio operators providing communications support for Emergency Management, the Red Cross, a search and rescue task force from Miami, and volunteer organizations needing status reports for the next eleven days. Since that event the SARNET has been expanding to cover additional communities across the state as equipment becomes available.

Potential threats from hurricanes include powerful winds, heavy rainfall, storm surges, coastal and inland flooding, rip currents, tornadoes, and landslides. In addition to threats from the storm, lengthy power outages can compromise communication networks making recovery efforts difficult. "The amateur community and SARNET is grateful for the support from Hytera in providing this equipment that enabled us to replace failing legacy equipment. Without such support it would have been extremely difficult to provide continued support for the NHC during this hurricane season," said Joe Poersche, an operator at SARNET, call sign "WB4HIS."

Hytera recognizes the selfless work that Florida SARNET does for the local community, particularly in times of a natural disaster such as a hurricane. We are proud to be a part of this mission and to support the volunteers who donate their time and expertise to help make the world a safer place.

# Telecom Infrastructure Provider Launched Shared Convergent Network

China Tower Corporation Limited, world's largest telecommunications tower infrastructure service provider, has piloted the effort of establishing mission critical convergent LTE networks in China, and recently launched a convergent network for emergency communications and dispatching in Guang'an, Sichuan, a southwestern province.

China Tower did comprehensive researches into customers' needs, and launched the network after two years planning, development and deployment. It established a digital trunking network with digital trunking handheld terminals, vehicle mounted terminals, radio base stations and drones, and formed a city/county-level emergency communication platform through unified scheduling management in the background. At the same time, it integrates push-to-talk-over-cellular voice, CCTV and other systems. The platform can be shared and accessed by multiple departments of government in case of emergencies.

CHINA TOWER 中国铁塔

# TD Tech Releases Smart 4G HD Body Camera

Themed on "Advance Intelligence", HUAWEI CONNECT 2019 kicked off in Shanghai on September 18, 2019. It gathered worldwide ICT industry players to discuss the industry outlooks and future opportunities. The conference also functioned as a platform of showcasing advanced information and communication technologies. At the conference, TD Tech released its smart 4G HD body camera, the EC310, gaining intensive interest from the delegates.

# World's Largest Private Wireless Network for Utility in Operation

On July 9th, Nanjing Power Supply Company of State Grid of China put the world's first 1.8G Hz private wireless network for utility into operation in Nanjing. This network includes 460 base stations, managing to have full coverage of the company's power distribution in metropolitan area of Nanjing. The company says it is world's largest commercial wireless network dedicated to utility.

"Compared to the public network, the private network frequency is dedicated, network-specific, and terminal-specific to achieve end-to-end autonomous control," said Zhu Hong, director of IOT office of Nanjing Power Supply, " The private wireless network also subdivides various types of power services. The terminal equipment are specially customized, and the transmission process is encrypted to further enhance the network security."

# TD Tech Deploys Broadband Trunking at Harbin Airport

TD Tech recently completed the deployment of a LTE broadband trunking system for Harbin Taiping International Airport, one of the busiest airports in Northeastern China. The deployment is based on TD Tech's Witen broadband trunking solution, which managed to integrate multiple heterogeneous systems and establish a universal communications platform to run all the different operations, including the core business of Airport Collaborative Decision Making (A-CDM).

This broadband trunking system realizes effective network coverage for the operation area in the airport, and provides functions such as visualizing full-service operation, converged audio and video services, secured data transmission, and multi-system integration and intercommunication.

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CNAS CE RoHS

# Prof. Shaoqian Li： 5G, New Opportunities for Private Wireless Network

Shaoqian Li, Prof. at University of Electronic Science and Technology of China, IEEE fellow

## Editor's note:

On October 31, the Ministry of Industry and Information Technology along with China Telecom, China Unicom, China Mobile and China Tower jointly announced the launch of 5G commercialization, and the three major carriers launched their 5G service packages the following day. 5G now is the new reality, and the context here is that only a few countries have just started to pioneering into 4G technologies for their mission critical users, such as police, firefighters and EMS, and much more countries are still in the process of building their narrowband digital (TETRA/PDT/DMR/TETRAPOL/P25) networks. Will all the effort be obsolete by 5G? If yes, when? If not, how they complement technically? There are many more questions of the like, to which we are not looking for ultimate answers, instead we try to invite experts to share their views. Earlier this year Radio China talked to Professor Shaoqian Li from University of Electronic Science and Technology of China.

5G cannot be simply understood as an upgrade of 4G technology. Li introduced that a generation of mobile communication technology is usually 10 years. Since 1978, during 1G and 2G, the fixed line became mobile and personal. Since 1996, 3G and 4G enabled mobile communications to go broadband. Since 2016, 5G international standards have begun to be formulated, and its evolution has followed two paths: one is to continue with broadband on the 4G path, which is Enhanced Mobile Broadband; the second road goes beyond with Ultra-reliable Low-latency Communication (uRLLC) and Massive Machine Type Communications (mMTC), targeting vertical industries.

China Mobile, China Telecom and China Unicom, the three major public communications carriers have started 5G pilots in many cities in China. The industry expects that Enhanced Mobile Broadband (eMBB) will be first commercialized. In the eyes of the majority of individual consumers, 5G usually means high-speed network, high-definition video, VR/AR, cloud games, etc., and they are willing to buy such services. eMBB will be able to promote the carrier's revenue growth. At the same time, carriers are also exploring the vertical sectors to find new business models and opportunities.

**5G as Private Network**

Li pointed out that behind 5G technology, there is obvious thinking logic of private wireless network. For example, the system management authority of the public network is very high, and in order to reduce the network delay, the 5G edge computing decentralizes the system permissions, and many control capabilities are placed at the edge of the


network to form a local network. This is a typical private network design. Each 5G network slicing of different services and resources can be regarded as an independent private network.

Therefore, 5G theoretically can serve hundreds of industries as private network technology. However, in reality the three major operators will face severe challenges when they enter the vertical market. On the one hand, there is still no unified standards for edge computing and network slicing, and it is difficult for devices and network management systems of different manufacturers to interoperate. On the other hand, the demands of the vertical industries are extremely complicated and customized, which is new to traditional carriers. They are expected to operate like private network carrier and in-depth integrate the capabilities of 5G with industry demands.

5G itself is not yet mature. At a presentation, "Opportunities and Challenges of 5G", a Li said that 3GPP completed the standard's Release 15 in 2018 mainly for eMBB; Release16, which further satisfies the demand of uRLLC, is expected to freeze before the end of this year, and mMTC is even further down the road. Li believed that, on a global scale, the 5G carriers' services will mainly be eMBB in the following few years.

**How to Tap into 5G**

The private network usually refers to the professional network for governmental departments, public security, energy, forestry, rail transit, etc., which are somewhat different the verticals that 5G targets. But the boundaries are not solid and will be gone at the end of the day. In recent years, driven by the demand, the private network has grown by leaps and bounds. It is not merely two-way radio communications any longer; instead, it is a dedicated network that integrates mission critical voice, high-definition images and video, and data.

Private network users generally need reliable, low-cost and customized network capabilities. The technology evolution is relatively slow. Currently, narrowband technologies are the mainstay. Some industries and users have just started to adopt LTE for their private network. It seems to be too early to discuss 5G for them. However, as Li sees it, the

private network comes from where the public network starts. Since the carriers' networks serve a massive number of consumers with nationwide coverage, they are supported by a huge industrial chain; the private network always leverages public network technologies to increases its own versatility of serving users. For example, the mainstream standard TETRA of the private network is derived from GSM. Similarly, there is a PDT standard formulated for the Chinese public safety communications. In the LTE era, designed for private network, China's B-TrunC broadband trunking communication standard adopted technical specification of LTE-TDD.

After the arrival of the 5G era, public communications carriers will cross the borders and go into vertical industries; private and public networks will have deeper integration. Private network users and suppliers should pay attention and grasp the opportunities brought by 5G. On the one hand, public carriers can cut into private networks with 5G technologies to provide highly competitive communication solutions, such as 5G drone backhaul. On the other hand, some industrial users of private network will consider building their own 5G network to facilitate their business expansion and transformation.

Li said that the public network will not replace their private counterparts. In many sectors, such as the public security and the rail transit, they have stricter requirements for network security and management control, so they are more inclined to use a network that is independent from the public network. Any minor communication disruption might cause problems of public safety and social stability, which is beyond what the public carriers can handle. "Different industries have different needs, and the complexity is beyond imagination. Integrating networks, services, applications and information into one is the real private network," said Li.

In some aspects, the private network can merge with the public network to utilize the latter's powerful connectivity and 5G services. In addition, Li pointed out that there are only three large public network carriers in China; it is difficult for them to meet the tens of thousands of customization requirements from vertical industries. There will be independent and private operators running 5G networks. In Europe and America, people now begin to discuss 6G, and "micro-operator" is among the topics, which means opportunities for private network players, but it requires a strategy.

**Era of All Things Connected**

Whether it is for the public or a private network, 5G promises not merely high-speed network connections, but also Internet of Everything powered by much stronger connectivity infrastructures. Li compared developing communication technologies to road construction. After the road of 5G is paved, all the industry stakeholders will need to experiment and build better vehicles to carry cargo. These vehicles and cargo are what network of all things carries.

In Li's view, as a technical standard for vertical industries, 5G should be deeply integrated with industry IT to find new demands, technologies, businesses and business models. This will be a slow, gradual process. 5G opens the door to the Internet of Things, but it is still a long way to go to realize the information exchange and connection between people and things, things and things, and to enhance people's ability to control and accurately manage the physical world in real time. It is not just about the evolution of R16 and R17 standards, but also the development of 6G and 7G.

"5G is just the beginning, not the end," Li emphasized. "The Internet of Everything needs global wireless access with full application, full spectrum, full coverage technology. Technology and application cannot be realized in the short term, and it needs long-term evolution in stages. Each stage or generation can only reach a limited target. Internet of Everything connects only valuable nodes. There will be a large number of customized networks, which open doors to a whole new level of private network communications communities."

# Airbus Tests the World's First Hybrid Tetra 5G Network

October 29, 2019, Guangzhou – Airbus successfully completed tests between 5G smartphones and terminals for the Guangzhou Government's shared radio network which connected with China Telecom's 5G network in Guangzhou for the first time. The reliability and security of Airbus technology proved that it is, once again, at the forefront of the technological evolution.

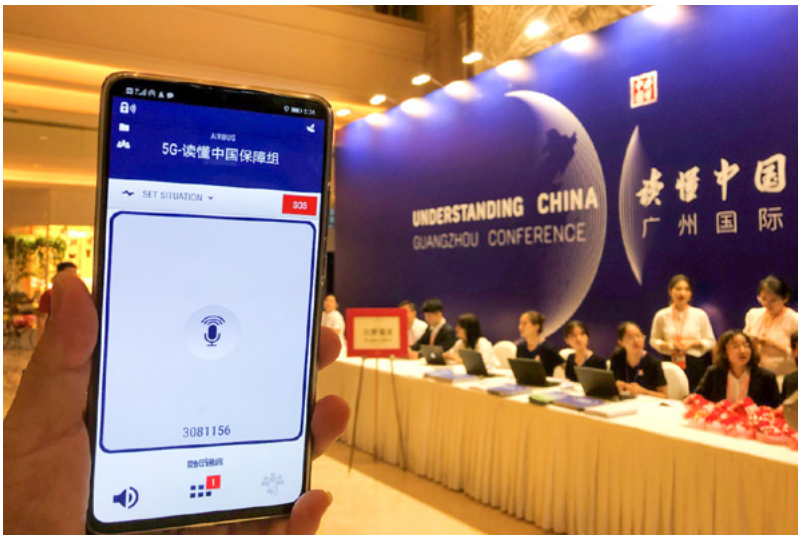
With the use of the secure Tactilon Agnet application, end-users from the Guangzhou government agencies are now able to experience full interoperability between the two networks. Furthermore, Tactilon Agnet allows seamless voice and data services between end-users on the Tetra network and those using 5G, including group and individual calls, messaging services, video and data sharing as well as geo-positioning and push-to-talk features.

Airbus's Tactilon Agnet – a state-of-the-art professional application and collaboration platform for business and mission-critical users – has been installed on various devices for use by the government of Guangzhou. This includes smartphones, secure phones with dual-operation systems, body-worn cameras and satellite smartphones.

The Guangzhou Government's shared Tetra Network, implemented by Airbus, is the very first hybrid network in the Asia-Pacific region. It is interconnected with 4G networks from all three Mobile Network Operators (China Telecom, China Mobile, and China Unicom). The network has already proven its high reliability and resiliency during the immense Fortune Global Forum by providing the event with the first Tetra and LTE hybrid network at the end of 2017.

The Guangzhou Government Shared Radio Network is one of the biggest city-wide Tetra networks in the world. It serves over 50,000 subscribers from police forces, fire and ambulance services, local utility companies, and the emergency response office, among others. The network has a three-dimension coverage which comprises air, on-ground and underground coverage, providing widespread and seamless communications for all users.

With its interconnection with 4G and 5G networks, the Guangzhou Government Shared Radio is now paving its way towards the future.



# Qualcomm Overcoming 5G mmWave Challenges

November 7, 2019, Beijing – Experts from industry associations, governing bodies, research institutes, carriers and manufacturers gathered at China Radio Conference 2019 in Beijing on November 6 and 7 to share their insights on a full array of topics about 5G applications, IoT & industrial internet, emergency management, private network communication, utility IT and PoC. 5G spectrum was one of the most frequently quoted key words throughout the two-day fully packed agenda.

The consensus among the speakers at the conference was obvious. Spectrum is critical for 5G success. Among licensed, shared and unlicensed spectrum, mmWave now becomes the new frontier of mobile broadband. Transmissions at mmWave bands suffer from significantly higher path loss and susceptibility to blockage, and mmWave RF complexity makes meeting the cost and power constraints of mobile devices extremely challenging, the main reason why mmWave for mobile communications has historically been not feasible until now. 5G NR mmWave promises the answers, according to Lorenzo Casaccia, Vice President, Technical Standards, Qualcomm Technologies.

During his presentation, Casaccia gave a panoramic view of allocated or targeted 5G spectrum across the world and said that Qualcomm is overcoming numerous wireless challenges to mobilize mmWave and proving the skeptics wrong about mmWave can never be used for mobile. Runtian Kan, Deputy Secretary General of China Radio Association, at the conference also shared his thoughts on spectrum planning for 5G mmWave in China.

Lorenzo Casaccia, Vice President, Technical Standards, Qualcomm Technologies

Runtian Kan, Deputy Secretary General of China Radio Association

# GSMA: mmWave Bands Critical to Ultra-high Speed Network

A clash between the US and Europe over 5G's future development at The World Radiocommunication Conference 2019 (WRC-19) – taking place in Egypt from 28 October to 22 November 2019 – could risk $565bn of economic expansion globally over the next 15 years, warned the GSMA today.

This economic growth from next-generation 5G services depends on the availability of a specific strand of radio frequencies, known as 'millimetre wave' frequencies, which are set to be identified for use by mobile operators at WRC-19. However, efforts by Europe to constrain the use of these critical frequencies due to claims of potential interference with some space services has 5G's future hanging in the balance.

"The stakes are high - a new generation of 5G services and the economic growth accompanying them will depend on the spectrum decisions taken at WRC-19," said Brett Tarnutzer, Head of Spectrum, GSMA. "We are calling for Europe to join the US in taking a pro-5G stance at WRC-19 to protect its digital future. Some administrations are still determined to limit mobile use of airwaves that 5G requires to reach its full potential. This protectionist attitude will have consequences for our global economy if allowed to prevail.

"Our focus is on ensuring that all regions are on board with the win-win resolution that will allow for robust 5G deployments globally while protecting satellite interests worldwide," said Tom Power, Senior Vice President & General Counsel, CTIA. "Reports indicate that the fastest 5G peak speeds today are in the US, and that's because the US was the first to deploy mmWave. The benefits of using this spectrum are clear but only through global harmonization at WRC-19 will all regions gain the greatest value."

**Benefits of mmWave spectrum**

mmWave bands are critical to providing ultra-high speeds and ultra-high capacity for a wide range of consumer, business and government services that require almost instantaneous delivery of large amounts of data. This includes entertainment services such as downloading ultra-high definition movies in seconds, virtual and augmented reality applications, remote surgery with 'haptic' feedback, precise control of industrial devices and robots, and autonomous vehicles.

Three thousand delegates from over 190 nations will meet at WRC-19 to agree on how this spectrum may be used. Different countries may have different approaches and strategies, but WRC is the meeting point for all nations to maximize the potential for 5G within their borders by thinking globally. The process of harmonization at WRC-19 delivers global roaming and economies of scale for vendors and carriers, and that translates into lower costs, faster deployments and greater convenience for consumers.

**Clash over airwaves at WRC-19**

The build-up to WRC-19 is a four-year process and the use of mmWave spectrum has been the subject of intense technical study throughout. WRC-19 is the final decision after a lot of analysis and technical study.

Technical studies supported by the Americas, Africa and Arab states, have demonstrated that 5G using mmWave spectrum can co-exist safely and efficiently alongside weather-sensing services, commercial satellite services and others. These were conducted within the ITU, a UN agency. In the US, the FCC developed emission limits on 5G to protect weather sensors in nearby spectrum bands. Ahead of WRC-19, the FCC and the State Department also worked with regulators from other countries throughout the Americas, achieving consensus at the CITEL conference in Ottawa in August.

Despite this body of evidence, European countries are looking to limit the use of mmWave spectrum by setting protective technical conditions.

"It is important to follow studies which make realistic assumptions about how networks will function and make the best use of the spectrum for all," added Brett Tarnutzer. This approach is being followed in the Americas, Africa and the Middle East but we need to find a global solution, including Europe. Large 'guard bands' will be needed – that is empty tranches of unused spectrum separating services - if we have technical limits which are too severe. This will restrict the economic benefit we can gain from finite spectrum resources and harm consumers and industry."

# ETELM's Take on Mission Critical LTE

## Interview with Paul Ward, Director at ETELM SAS

What do you think of CCW 2019 ?

CCW is one of the big annual shows for us. The Asia market for us is generally very interesting. Here users and integrators always want the leading-edge technology, which is why the Asian market is important for us. We as a technology development and manufacturing company supply the most advanced TETRA & Mission Critical LTE infrastructure. We always want to work in areas where they got interest and they have the capability to go heavily into technology. I've attended most CCW events over the last 15 years. At CCW2019 we got the best response in terms of the user interest and level of knowledge of the latest technology within the mission critical communications industry.

What's the core business for ETELM?

Our core business is mission critical communications infrastructure based on TETRA & Mission Critical LTE. We have a wide range of users in different vertical sectors, including security services, transportation, oil & gas and utilities. Each sector has unique requirements and so the flexibility of our solutions is key to meeting users' requirements today and are futureproof.

What new technologies from ETELM are showcased during CCW?

We've got some great technology which is probably leading the market of mission critical infrastructure, finding the right partners is important but it's so good to meet so many users

who want access mission critical 4G services and TETRA technology. ETELM has developed 4GLinked the most advanced, fully integrated TETRA & LTE technology, which gives users the ability to deploy TETRA over any standard LTE Core network.

Do you have some reference cases for mission critical LTE?

ETELM has fully developed our own range of LTE eNodeB RAN. Our base stations are designed for the mission critical market, and we have also developed systems for rapid deployment, in a Man Pack or Vehicle Mount unit. This was recently tested with a Fire Service in France for responding to forest fires, where there is no radio or cellular coverage. The solution provided rapid deployment of mission critical LTE in an incident response vehicle, providing geo-positioning, tracking and real time video, for safety of personnel and operational efficiency. We have other users involved in transportation and the utilities sector all planning for the benefits of mission critical LTE.

**About ETELM**

ETELM is a French company with over 35 years' experience in the field of professional radio communications infrastructure. With a strong foundation in its domestic market ETELM's technology is fully developed and manufactured in France and over 50% of our systems are exported globally. ETELM develops and supplies advanced radio communications infrastructure including LTE, TETRA, DMR and Analogue base stations (that can be fully integrated to the LTE Core) along with a range of software applications including network management, dispatcher, voice recorders and gateways to other technologies.

# Will TETRA Survive?

## An interview with Phil Kidner, former CEO of TCCA

What do you think of CCW 2019?

CCW 2019 was a very interesting show, targeted primarily at the Asian region, I was very pleased to see visitors from many other parts of the world. It is important that the CCW continues to visit different regions.

How TETRA should converge with LTE to make PMR better?

TETRA continues to be the safest, most secure wide area digital network for all professional users. No other technology currently offers the same level of functionality. It provides voice and data communications. Whilst its data rates exceed other PMR technologies, there is a growing need for broadband data which will be best provided by LTE. This technology continues to be developed to make it more suitable for the professional users. I believe that in the immediate future TETRA and LTE will work together to provide these users with their best communications.

What's your opinion on Chinese PMR market?

Some users in China and elsewhere choose other technologies. They believe that these deliver the services they need at the price they wish to pay. This is clearly a choice for individual users but in doing so they are compromising on readily available and proven TETRA functionality.

What opportunities do you see that 5G will bring to us (PMR industry) ?

LTE and eventually 5G will play a significant role in the future of communications for professional users. PMR will continue to be the proven and reliable technology as part of these communications for several years to come.

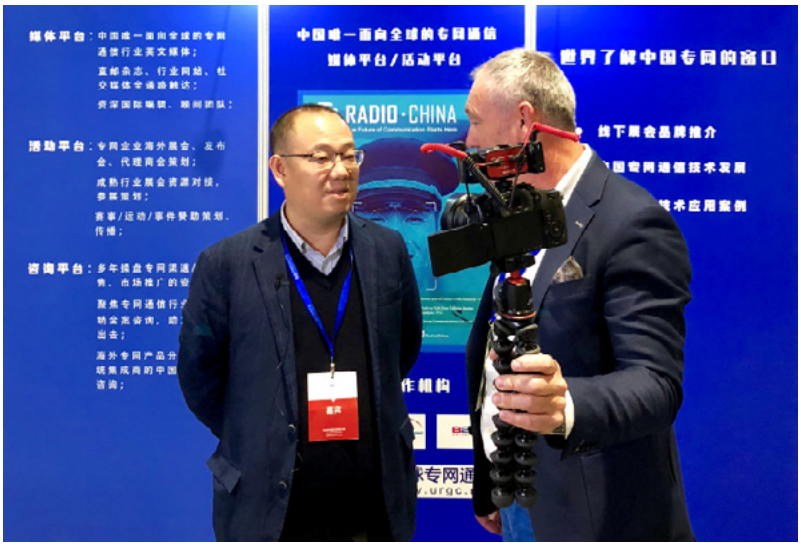
*Mr. Phil Kidner retired as the CEO of the TETRA & Critical Communications Association (TCCA) in 2017 after 11 years of leading the industry association.*

# Convergence & Evolution for a Safer World

## An Interview with Tiger Lu, CEO, Kirisun Communication

**At China Radio Conference 2019, Radio China as the official media speaks to some of the key exhibitors to find out what's new. Besides the conference agenda, show floor was set up for product and solution providers throughout the two days at Etrong convention center, Beijing on November 6 & 7.**

**Radio China & MCCResources** (RC & MCCR): Kirisun is a veteran player in the traditional PMR industry. What makes Kirisun as it is today and what for the future?




**Lu:** Kirisun was established in 1986 with the headquarters in Shenzhen, a high-tech city developing rapidly in China, with an excellent ICT industrial ecological chain and rich reserve of talents, which helps greatly with the development of Kirisun. Kirisun invests at least 15% of its revenues each year in R&D, with more than 100 development engineers. With its own patents, Kirisun has developed several industry-leading products, such as the GP700, the first intrinsically safe two-way radio based on a carrier network. Only by continuous innovation and advanced technology can Kirisun survive in the fierce competition. Kirisun has established R&D centers in Shenzhen, Beijing, Guangzhou in China and in the UK. Meanwhile, Kirisun is also a member of the DMR, dPMR, PDT association.

By virtue of excellent products and services, Kirisun has won more and more share in the domestic market. Meanwhile, it has been providing products and services to more than 80 countries, including US, UK, Spain, Australia and New Zealand. However, in international markets, good products are far from enough. It requires the manufacturer to respond quickly to customers' needs in order to enter local markets and to develop marketing channels. To serve customers more quickly and better, Kirisun has already set up local service teams in US, UK, Turkey, Philippines and Russia.

Kirisun insists quality first and focuses on cost-effective products and solutions. We grow up with partners and provide best service to our customers from all the industries. Professionalism, sharing, trust, cooperation are the basic principles for Kirisun standing and prospering in the industry market for now and the future.

**RC & MCCR:** Just several days ago the major carriers officially their 5G services. In such a context, where does Kirisun see itself in the 5G era?

**Lu:** Kirisun has its own judgement of the technological evolution. We see more convergence and evolution down the

Kirisun DMR solution was adopted by the Olympic stadium in Beijing

road for private network or PMR users. Kirisun will dig deep into the market segments and customize solutions for transportation, security, firefighting, energy, etc. At Kirisun we say, "Convergence & Evolution for a Safer World". We will enhance the converged communication technology and ensure the communication for a safer world.

**RC & MCCR:** What new products does Kirisun bring to this conference?

**Lu:** Kirisun showcases innovative PoC & converged communication solutions targeted at vertical sectors such as emergency rescue, firefighting, energy, utilities, etc. Kirisun has brought push-to-talk-over-cellular to a new level with intrinsically safe PoC radio GP700 for the industrial users. For DMR radio, we have our flagship models including DR700 single frequency repeater, DP990 professional DMR radio, which was adopted by the Bird's Nest, the iconic Beijing Olympic stadium. TD80 is our latest dual-mode touch-screen radio, along with DSJ-M9 body worn camera. We are very honored to provider our DMR radios DP405 for the conference to facilitate the event organization.

**RC & MCCR:** We see many experts from the industries at this conference. What's Kirisun's objective of being here?

**Lu:** We're expecting to learn and communicate ideas with industry experts, as well as all the excellent enterprises from domestic and overseas, aiming to understand deeper what the industry users are really looking for. Surely, we regard the conference as a good venue to promote our brand and solutions to our potential customers and partners.

# The Differences among MCS, VoLTE, PoC

MCS (Mission Critical Service) is a broadband trunking standard defined in 3GPP Release 13/14/15, which includes MCPTT, MCVideo and MCData service. MCS provides System Management Service, Voice Service, Video Service, Data Service and System Level Interworking.

**MCS FRAMEWORK**

• MCS Server: Provides MC-PTT/Video/Data service.

• SIP (Session Initiation Protocol) Core: Complies with 3GPP TS 23.228 standard; Responsible for MC-PTT/Video/Data user registration, service selection and routing in the signaling control plane.

• LTE Network: Provides LTE EPC (including MME, HSS, xGW, eMBMS GW and PCRF etc.) and eNB entities.

• IWF (Interworking Functionality): Provides interface for PSTN and Narrowband system.

• Application AS: Provides GIS, Voice/Video Recorder, Dispatching system, etc.

**MCS Evolution in 3GPP**

| RELEASE | MCS |
|---|---|
| R12 | • GCSE: Essential for Group Communication over LTE<br>• ProSe (Proximity-based Services) |
| R13 | • MCPTT<br>• IOPS<br>• Enhancement to Proximity-based Services |
| R14 | • MCData<br>• MCVideo<br>• Enhancements for Mission Critical Service |
| R15 | • Interconnection and migration between MC systems<br>• Interworking with LMR systems<br>• Study into Future Railway Mobile Communication System |

**WHAT CAN MCS DO?**

The rich trunking service meets the customers' demands for voice, video and data.

**MCPTT**
**(Mission Critical Push-To-Talk):**
Group / Private Call, Emergency Group Call, Imminent Peril Group Call, Ambient Listening Call, User Broadcast Call, User Regroup, MCPTT Private Call Call-back Request, Floor Control for Audio Cut-In Enabled Group, MCPTT Group Selection, Enhanced MCPTT Group Call Setup Procedure with MBMS Bearer

**MCVideo (Mission Critical Video):**
Similar to MCPTT voice, but

for video, such as: Group Call, Private Call, Emergency Group Call, Imminent Peril Group Call, User Broadcast Call etc., Video Push / Pull, Transmission Control

**MCData (Mission Critical Data):**
Short Data Services, File distribution, Data streaming, Conversation management
System Level Interworking
3GPP defines the interworking interface between MCS and narrowband systems in R15 version, which supports the interconnection between MCS and TETRA/P25.

**MCS, VoLTE, PoC Comparison**

VoLTE (Voice over Long-Term Evolution) is a standard for high-speed wireless communication for mobile phones and data terminals which based on all IP conditions on the IP Multimedia Subsystem (IMS) 4G network. It is an end-to-end voice scheme, providing not only high-speed data services, but also high-quality audio and video calls. Dedicated hardware is required for terminals to be able to support VoLTE.

PoC (Push-to-talk over Cellular): PoC is a new mobile technology, which can make one-to-one or one-to-many calls quickly. PoC originated from PTT trunking service. It is a mobile data service with PTT function implemented on public mobile network.

| Difference | MCS | VoLTE | PoC |
|---|---|---|---|
| Network | LTE | LTE | 2G, 3G, LTE |
| Terminal Hardware Requirements | Chip support | Chip support | No need |
| Type of Group Call | Signaling: Point-to-point access between called and MCS Server. Media: eMBMS access, Downlink point-to-multipoint | No group call | Point-to-point access between called and PoC Server. |
| QoS Guarantee | Yes | Yes | No |
| Call setup latency | Low | Medium | High |

In terms of latency, performance and service, MCS has a great advantage and it is so far the best technology combining broadband access with trunking communication. It is the first choice for mission and business critical users who want to tap into the latest development of both broadband and narrowband communication technologies.


## Editor's note:

When the traditional PMR community looks into LTE either for its data capacity or for future migration paths, LTE means very different things in different contexts. MCS promises the future of mission critical broadband communications. PoC very likely will replace traditional two-way radios for non-critical communications. What is MCS, a whitepaper by Hytera, explores the difference of technologies under the LTE umbrella.

# Caltta Repeater PR900, an Exemplary Industrial Design

Shenzhen has taken the lead when it comes to communication and industrial design in China. The Digital Repeater PR900 released by Caltta in 2019 is one example of an excellent communications system device that embodies Shenzhen's distinct style. Now let's take a closer look at the product's industrial design.

The control panel in the center has a polished finish similar to piano lacquer, which is a stark contrast with the textured surface on other parts of the front panel. The 2.0-inch LCD and simplified navigation menu and buttons feel more gadget-like and add a hint of sophisticated glamour to the generally plain appearance of communications infrastructure devices.

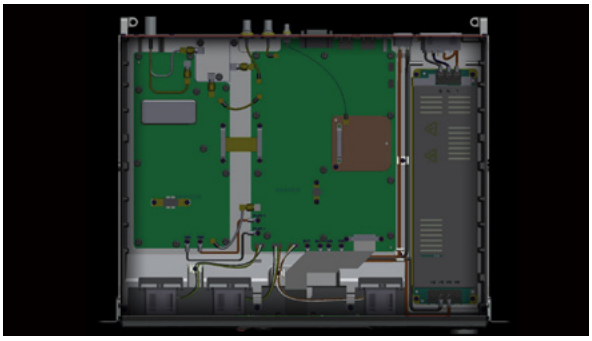
Inspired by the front grille of a famous German automobile, the PR900 adopts convection-type intake grille on the left and right parts of its front panel. Compared to those with conventional horizontal grilles, this 44-mm high device features a more compact and intricate structure. The high-speed air that flows through grilles when it runs with a full load is the surest sign of its strong performance.

PR900 is a standard device designed for 19-inch cabinets. The concave guide rails on both sides are made of aluminum and beautifully contrast with the black oxide treated case, making the product appear slimmer and neater. When being used as an emergency device, the PR900 can be more reliably and conveniently assembled and disassemble

Ports on the rear side of the PR900 are neatly arranged, with the AC/DC power port, data interface, and RF interface ordered from left to right. The concealed heat-dissipation design at the base allows for more efficient heat dissipation without compromising the product's overall simplicity.

After the shell is removed, the most impressive design is the integrated aluminum alloy base. Like a car's chassis, the base determines the stability of the overall product and manages heat balance. After careful simulation and extensive analysis, our designers adopted an ingenious solution that uses independent heat dissipation for the left and right heat sources (power supply and RF) and auxiliary heat dissipation for a heat sink on the baseband unit. With the three silent powerful fans equipped on the baseband unit and heat dissipation fins, it substantially increases the heat dissipation efficiency of the entire system and guarantees uninterrupted 24/7 operation of the digital repeater in all environments.

Based on a modular design, internal components including the AC/DC power module, baseband processing module and 50W module are arranged symmetrically, with connecting cables and flat cables neatly sorted. In addition, locking screws and flat cable connectors with latches further improve the reliability. For professional users, it is not difficult to see that major function modules can generally be replaced within one minute, making it easier to conduct long-term maintenance. For "Hams", the device's modular structure allows refit and reassemble freely to meet specific requirements of different segments of the industry.



**About Caltta**

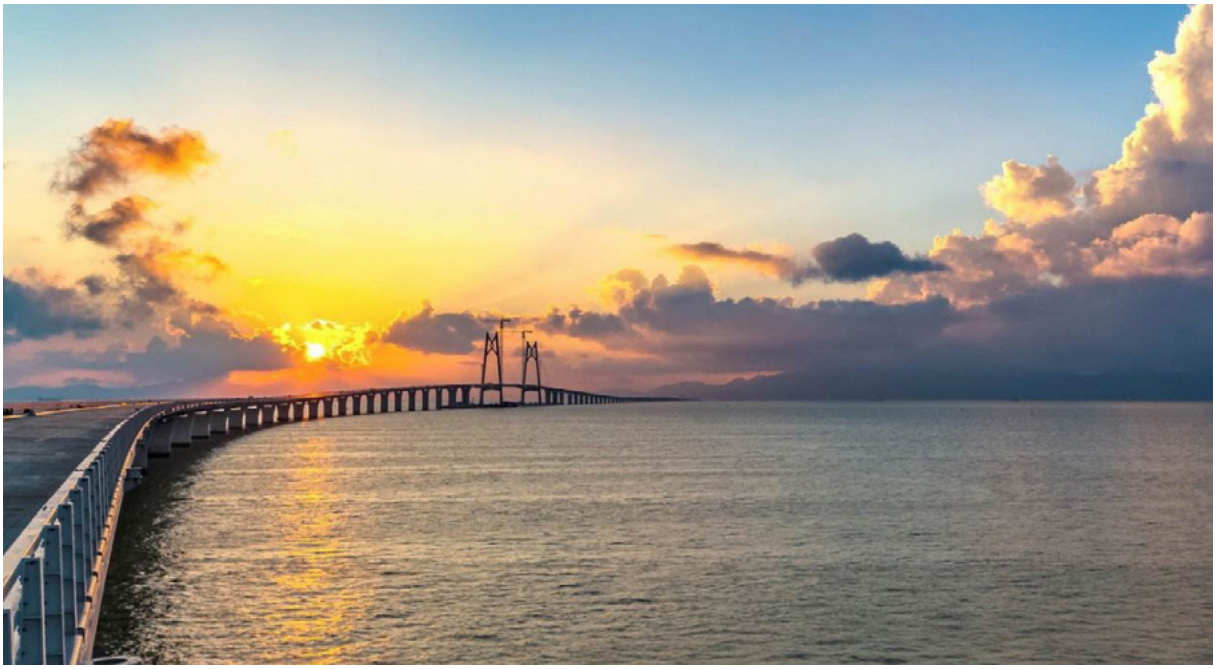
CalttaTechnologies Co., Ltd (a subsidiary of ZTE) is a leading provider of integrated professional trunking communication solutions. The company is committed to delivering value to customers by providing innovative solutions and Converging All to Talk.

With more than 700 experienced professionals and over 300 trunking technology patents, Caltta provides comprehensive solutions for customers from public safety, government affairs, transportation and utilities etc. So far, Caltta's solutions have been successfully deployed in more than 40 countries for over 3 million users.

Products :
DMR Infrastructure, DMR Repeater, DMR Radios, DMR+LTE Convergence Network Infrastructure, LTE Infrastructure, LTE Radios, Multi-mode Radios, Emergency Command System, Portable LTE System, eChat Server and Client, PoC Radios, Integrated Dispatch System.

Please contact us at caltta.sales@zte.com.cn
Visit www.caltta.com to find out more.

# Push-to-talk over World's Longest Sea Crossing



The Hong Kong-Zhuhai-Macau Bridge (HZMB) is a 55-kilometre (34 miles) bridge-tunnel system consisting of a series of three cable-stayed bridges, undersea tunnel, and four artificial islands. It is both the longest sea crossing and the longest open-sea fixed link on earth. The HZMB spans the Lingding and Jiuzhou channels, connecting Hong Kong, Macau and Zhuhai, the three major cities in the Pearl River Delta. Since opening to the public, HZMB has greatly improved the comprehensive competitiveness of the Pearl River Delta region by shortening the distance between Hong Kong, Zhuhai and Macao from the original 3-4 hours to the present 45 minutes.This fast and convenient bridge promises sustainable and steady prosperity for the Guangdong-Hong Kong-Macao Greater Bay Area, boosting businesses and benefitting millions of people.

Because of its unique structure and great length, HZMB needs a highly professional and efficient radio communication network with visualized command and dispatch platform to ensure smooth daily operation. To secure efficient and safe communications between three ports of the three cities, versatile voice and data services are needed, including trunking calls and dispatching solutions. The whole staff need to be in a seamless radio network which enables them to initiate instant communications in case of emergency.

BelFone push-to-talk-over-celluar (PoC) two-way radio BF-CM336 is a small and smart portable with a dispatch platform which covers the communication needs of a control room. With features such as built-in GPS, voice recording, real-time radio status, talker priority, IP54 dust and water protection, BF-CM336 is a new generation of radio that enables the usage of PTT over WCDMA, GSM and Wi-Fi networks, delivering expansive coverage in every area and situation, excellent data transmission rates and the best audio quality. The dispatching application optimizes work management as well as emergency response. Moreover, the dispatch system incorporates GIS map to make visualized commanding& dispatching. BelFone PoC solution empowers control room workers to better fulfill their missions and facilitate the operation of the bridge.


PTT Over Cellular

PROCHAT

**BelFone PoC Features:**

- Diverse and Expansive Network Coverage
- Real-time Radio Status
- Voice Recording
- Versatile Calling Functions
- Talker Priority (Supervisory Override)
- Visualized Dispatch Platform with GIS Map


**About BelFone**

Fujian BelFone Communications Technology Co., Ltd. is a pioneer in PMR industry with over thirty years of experience and expertise, providing a full range of radio solutions from analog radios, PoC radio, entry-level DMR radios, repeaters, and accessories, to DMR Tier III trunked systems, benefitting thousands of customers across the world. Over the decades, BelFone has grown into a one-stop PMR solution provider as they continue to excel in the design, R&D, manufacturing, sales and services of professional radio terminals as well as system solutions. BelFone employs customer-oriented thinking and state-of-the-art technologies to empower users in a great variety of industries such as public safety, public utilities, government administrations, railways, construction sites, small businesses, etc. BelFone is dedicated to bringing more efficiency and safety to the workforce. For more information please visit www.belfone.com

Lisheng
www.cnlisheng.com


# COMPANY PROFILE

Lisheng (Fujian) Communication Co., Ltd. has specialized in manufacturing PoC radios, standard DMR radios, Standard dPMR radios, portable analog radios, mobile radios, repeaters, CB radios, Marine radios etc for more than 25 years. Along with its own research and development department, Lisheng integrates production and sale into one factory and is equipped with much advanced production and testing equipment such as SMT, network analyzer, general-purpose tester frequency analyzer, vibration test, keypad life testing, battery performance test, etc. With three advanced JUKI SMT imported from Japan and two fully automatic production lines of SMT, it has a daily output of 3000 sets.

Depend on strict QC procedures include AOI auto matic testing system, which ensure the quality of products and achieve a first pass yield above 98%. Besides, the company has also established a standard test lab which is high-and-low temperature resistant, low-pressure, vibration-proof and has passed the international authoritative certifications such as ISO9001/ISO14001, CE and FCC. Completely meeting related requirements of RoHS directives, it has won the recognition of each member country of the EU for product safety.

Lisheng
www.cnlisheng.com

The perfect QC team and the strict implementation of AQL0.4 quality test standard have better guaranteed a high quality of the products and thus met the requirements of famous enterprises such as Clarigo in Shanghai which is branch of Motorola and TC Group which is the largest telecommunication company of Thailand.

Integrity, impetus and concentration have always been Lisheng operation philosophy; Lisheng have adhered to excellent quality and considerate after-sale service for more than twenty years, which has created a solid market and sales network. 70% of Lisheng products are sold to overseas markets, such as, Europe, North America, Africa, Southeast Asia and Middle East.

The future 2-3 years, Lisheng Communications will further set up strategic agencies in some countries, and will aim to form large sales projects and bring the products into several wireless communication markets, to become the most popular two way radios supplier in the world.

Convergence | Evolution | For a Safer World

PMR Expo

Meet Kirisun at No.B03 in Hall 10.2

Exhibition Centre Cologne, Germany. Nov 26-28, 2019

# Kirisun KDT Lite Trunking System

## Key Features and Benefits:

- **Open Standard**

  Kirisun DMR Trunking system is designed based on DMR Tier III open standard protocol and AIS open standard interface, achieving interoperability and creating a common application interface specification for DMR infrastructure.

- **Smooth Migration**

  From analog, DMR Tier II and MPT1327 to DMR trunking, Kirisun DMR trunking system supports smooth migration for customers to optimize their investment portfolio.

- **Reliable Software Controller**

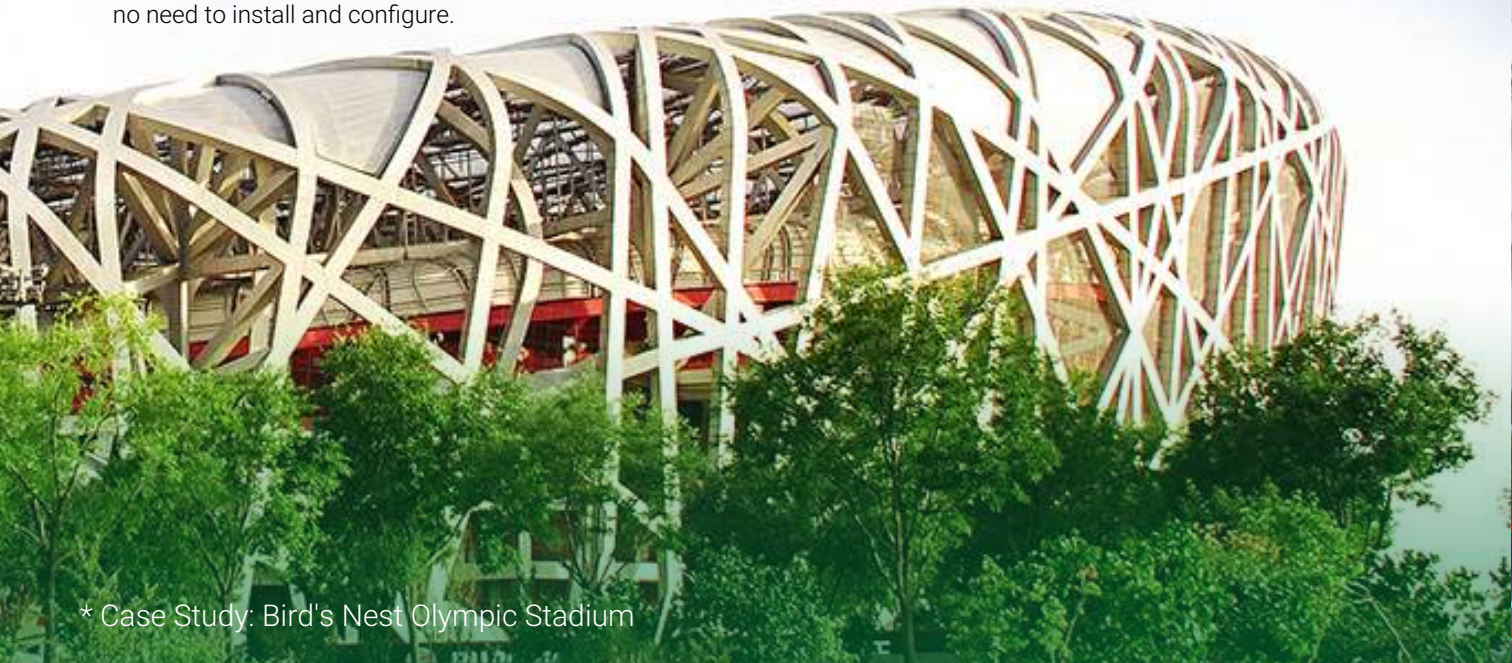
  Each repeater could be activated as the base station controller, to manage the current site channels and communicate with the central node switch, ensuring the trunking service always on.

- **Overall Delivery**

  For the 2-carrier DMR Trunking base station, Kirisun provides one-stop solution which ensures overall delivery, no need to install and configure.

## Terminal Package:

- DP990 4PCS
- TM840 1PCS



* Case Study: Bird's Nest Olympic Stadium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# BelFone ETX

## Trunking Communication System

Seamless Communications with Command Solutions

Integrated Blade Module Design
Great Stability and Scalability
Flexible Networking



DMR

TIER 3

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Communications for Efficiency and Safety

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