eLTE and TETRA collaboration: for smarter cities

New developments are bringing about a gradual shift towards wide coverage and multimedia in the field of public safety informatization. With its eLTE and TETRA integration solution, Huawei is helping customers to set up comprehensive, multi-dimensional command and dispatch systems for Public Protection and Disaster Relief (PPDR).

Wide coverage and multimedia: New requirements for smart cities

Terrestrial Trunked Radio (TETRA) is a professional trunking standard used in the public safety sector for smart cities. The mature technology provides an array of functions and mature, stable systems; supports flexible networking; and has powerful error correction and anti-interference capabilities. It also possesses the advantages of a complete industry chain and wide coverage. TETRA is now the most widely deployed emergency communication system, providing a highly reliable communications system, with wide coverage and rapid deployability for command
and dispatch for customers in public safety and other sectors.

However, the emergence of new services is precipitating the need for bearer technologies with higher bandwidth and lower latency that support multimedia transmission. One reason for this is the growth of the Internet and the increasing popularity of mobile Internet, which has caused access to information to become increasingly flattened, boosting demand in the public safety sector for multimedia services such as visualized command, real-time information transmission, and high-frequency database queries. In addition, developments in ICT (in particular cloud computing, big data, and mobile Internet) are having a far-reaching impact on emergency communication networks. In order to bear pictures, video and high-speed data, dedicated wireless networks face new challenges, including multi-dimensional visual command and dispatch, large-capacity HD video backhaul, and multimedia service deployment. Now, the informatization of the public safety sector features wide coverage and multimedia.

An emergency communication network that can support comprehensive, multi-dimensional PPDR command and dispatch systems that meet the requirements of government and public safety sector clients will need to encompass the following: 1) A basic emergency network consisting of a wide-coverage, interconnected wireless digital voice trunking network. 2) Dedicated wireless multimedia broadband networks built in key areas and hotspots that can meet the needs of public safety departments for multi-dimensional control and management on key areas, mobile offices, and geographic information system (GIS) coordination, and can develop multimedia services during actual application.

In the domain of urban railway systems in smart cities, current wireless train-ground communication systems are prone to interference and service discontinuity due to multiple co-existing networks. In such cases, TETRA networks can be used for train dispatch and emergency dispatch, and LTE networks can also be built to support broadband requirements such as passenger information systems (PIS) and interior closed-circuit television (CCTV). In the future, LTE will also support communication-based train control (CBTC) by implementing a unified communication platform for the two networks.

**eLTE and TETRA: A perfect coordination solution**

Huawei’s enterprise LTE (eLTE) is a wireless broadband solution that supports interconnection with the TETRA system. It was developed based on 4G LTE standards to meet industry demands, with a focus on multimedia applications. At present, the eLTE solution can be connected to the narrowband digital trunking system – TETRA, in two ways – through a gateway interconnection model or a system interconnection model. These two models allow for the hybrid grouping of eLTE and TETRA users. They support professional trunking functions, including group and point-to-point (P2P) voice calls, and floor pre-emption and release.

The gateway interconnection model uses a back-to-back method that leverages the trunk gateway and TETRA Vehicle-Mounted Radio to achieve service interworking of eLTE and TETRA at the terminal side. This model simplifies network logic and facilitates interconnection, allowing for effective coordination and cooperation between both systems, and ensuring the service, signal, and
process independence of both systems. This greatly enhances the service provisioning capability and deployment flexibility of the communication network. As a consequence, the gateway interconnection model has seen widespread application in the industry.

The system interconnection model makes use of a customizable software development kit (SDK). The application SDK is built using specific software packages/frameworks, hardware platforms, and operating systems, and provides standardized open interfaces and pre-integration service suites for the easy integration of LTE networks with upper-layer applications. This enables system-level interconnection of eLTE and TETRA. The advantages of this model are service reliability and the capability to provide more professional trunking services, making it suitable for scenarios such as large networks, large-scale service capacity, and the unified bearing of multiple services.

**Successful case studies**

Huawei successfully developed an eLTE and TETRA interconnectivity solution for the Nanjing Municipal Government, creating the world’s first LTE-based eGovernment broadband trunking network. The network was also the first to support interconnection with the TETRA system, allowing for hybrid grouping of eLTE and TETRA users and professional trunking functions between them (such as group and P2P voice calls and floor pre-emption and release), and helping to protect existing investments. The Nanjing Municipal Government was able to leverage the Huawei eLTE solution to deploy an emergency communication network spanning the whole municipal area, establishing a unified information platform for all its departments. The system enabled various operational functions, including voice trunking services, visual command and dispatch, real-time data monitoring (such as electrical power and hydrological data), video surveillance of transportation and key locations, and mobile government offices. The emergency communication network and unified information platform significantly enhanced efficiency and collaboration between Nanjing Municipal Government’s departments, and helped to successfully ensure the smooth running of large scale public events in Nanjing, such as the 2013 Asian Youth Games and 2014 Youth Olympic Games, by putting into place a high-efficiency command system for critical situations.

Zhengzhou is a major city and transportation hub in central China. Line 1 of the Zhengzhou Metro uses TETRA products for voice command and vehicle dispatch, and has also deployed Huawei’s eLTE urban rail solution. The eLTE solution provides a passenger information system (PIS) and dedicated broadband data and video services such as vehicle-interior mobile video surveillance (CCTV). The two solutions are used alongside each other to provide different functions in a successful mutually complementary fashion. The two systems have been in stable operation since November 2013, not only meeting Zhengzhou Metro’s various service requirements, but also significantly boosting the operational efficiency of the metro and optimizing the passenger experience. As a consequence, the system has been highly praised by the customer. Of note, Huawei is currently testing LTE-based communications-based train control (CBTC) with Alstom and other partners in the transport sector. In the future, eLTE will support CBTC services, which will usher in a new era of wireless broadband communication in the railway sector.