TETRA – the digital standard for professional mobile radio

TETRA, the worldwide digital standard for professional mobile radio, offers excellent speech quality, high data transmission rates and secure, encryptable connections.

TETRA – an open standard

At the start of the 1990s, the European Telecommunications Standards Institute (ETSI) was commissioned by the EU to create a European standard for professional digital radio. The most important parts of the TETRA standard (terrestrial trunked radio) were adopted at the end of 1995 in national votes.

The influence of users on the development of TETRA can be clearly seen. Government authorities and organizations with security missions in particular have worked together intensely to achieve standardization. Specifically, the compatibility required by the Schengen agreements is not possible without an approved European standard such as TETRA.

TETRA has meanwhile been introduced on all continents and like GSM is well on the way to becoming a world standard.

NATO in the past released one of its frequency bands – 380 MHz to 400 MHz – and made it available to European NATO countries for use by government authorities and organizations with security missions. The European TETRA standard and the harmonized frequency bands make it possible for the first time to implement a Europe-wide public safety network.

Features of professional mobile radio systems

The most important requirement for mobile radio networks for professional use is availability and security against eavesdropping. Secure physical connections are based on proper technical planning of the network but also on the possibilities offered by the standard. For instance, the handover specified in the TETRA standard ensures that a call can continue smoothly even when moving from one cell to another.

Security against eavesdropping is attained by encryption. For this pur-
pose, the TETRA standard also contains specifications that define the encryption of the air interface and/or end-to-end encryption, for instance.

In emergencies, quick call setup in a public safety network is essential, because every second counts. The call setup time in a TETRA radio cell is therefore ≤300 ms.

Another important feature of professional mobile radio networks, and primarily of public safety networks, are the group-call functions, since the overwhelming majority of communication between users is via group calls. The head of a police or fire-department squad does not inform each squad member individually but passes the information on to everyone involved at the press of a button.

TETRA systems provide radio connections in all conceivable forms. They support voice communications (single, group and announcement call), data transmission (circuit mode data and packet mode data) and short data service using a wide range of data transmission rates and error-protection levels. TETRA employs TDMA (time division multiple access) technology with four integrated communication channels at 25 kHz channel bandwidth. Harald Haage

Fast data transmission
TETRA provides 7.2 kbit/s on a communication channel. If necessary, up to four channels can be banded, increasing the data rate to as high as 28.8 kbit/s. Currently work is underway to enhance the standard for even higher transmission rates.

Diverse interfaces
To ensure a standard that is open and used by many manufacturers, TETRA defines the following basic interfaces:

The **air interface** establishes compatibility between terminals of different manufacturers.

The **device interface** guarantees the independent development of mobile radio applications.

The **intersystem interface** (ISI) allows the connection of TETRA networks of different manufacturers.

The **direct mode** ensures secure communication when exiting the covered area, enabling direct radio traffic between mobile radios without the need of a network infrastructure.

Interfacing to wired communication networks are also standardized, leaving only the design of the interfaces within the infrastructure up to the manufacturers. Standardization makes for fair competition, but gives third parties the freedom to implement economical solutions for applications.

Outstanding cost efficiency
The open TETRA standard ensures fair competition. Industry’s broad support of TETRA allows users to choose from a large number of companies at reasonable prices.

Secure cooperation
Cooperation between different types of radio networks is becoming more and more important. TETRA networks make it possible to have a large number of connections to external communication networks. For instance, TETRA networks can be connected with public and private telephone networks, different kinds of data networks and also with large command and signalling networks. All these networks can be accessed from mobile radios. Virtual networks within the TETRA radio network ensure that every organization can work independently without requiring its own infrastructure and without having to give up the advantages of a large multifunctional system with efficient resource management.

Open for applications
The open interfaces allow users to create applications or to have them created. A lot can be planned and taken into account in advance except, of course, one thing – a fully turnkey solution for a communication network. The openness of the TETRA standard, however, will help users get closer to their ideals, since it provides room for new applications and enhancements.