



# MIGRATING RAIL NETWORKS FROM ANALOGUE TO TETRA

**Command and control communication systems provider Prescom is overseeing the switch from analogue to a digital TETRA radio system on two busy RATP rail lines in Paris**

**T**HE migration of a professional radio network is rarely an easy task. This kind of operation becomes critical when several months or years are needed to fully deploy new digital radio terminals in trains, while having to keep two radio systems in operation simultaneously during the rollout period.

The deployment is made even more difficult when it involves installing new radio systems on one of the world's busiest railway lines carrying more than one million passengers every working day.

The Regional Express Network of RATP (the Parisian urban transport operator) is a network comprising two main RER lines running through the Paris region from east to west and from north to south. To ensure the security of the passengers and to allow an efficient management of the lines, the trains communicate through a radio system with the ground and a control centre.

#### Voice communication

The radio system provides facilities such as voice communication

between trains, and between trains and the control centre, plus alarm transmission in case of emergency on the line or railway emergency calls. The radio system in use is a solution based on an analog UIC (International Union of Railways) radio network that is becoming obsolete. As RATP has deployed a wide TETRA radio network over its rail system, it naturally decided to migrate the management of these two lines to an up-to-date digital technology based on TETRA.

As it is not possible to equip all

the trains at once, it was necessary to come up with a solution allowing for a smooth and seamless migration to TETRA. As a result, RATP launched a consultation to provide an interoperability solution between the UIC network and the new TETRA network.

The aim of the project was to provide the best interoperability solution to enable migration between the current wireless system used between the trains and the

Continued on p42

control centre and the new digital wireless network based on TETRA. However, the project not only involved the supply of a gateway to enable the interoperability, it also required a solution to provide a compact all-in-one dispatcher that could facilitate future maintenance operations.

### Interoperability

Following a call for tender process and the submission of bids by several shortlisted suppliers, Prescom was awarded the contract to supply the interoperability platform and the compact all-in-one dispatcher. The solution proposed is based on the widely proven Prescom platform MSS, which provides a close and secure interaction with the radio networks used by RATP.

In addition, this platform is able to communicate with the different servers used by RATP to manage its trains. Plus, the MSS platform, which is mainly used as a gateway between the TETRA and UIC radio networks, can also manage different types of operator station over IP such as the new compact all-in-one dispatcher called ESTER TOUCH.

To handle the project, Prescom's R&D team had to resolve several key issues in order to provide the best

possible interoperability between the UIC radio network and the digital TETRA radio network.

To achieve an efficient interconnection to the TETRA network, Prescom has integrated the Cassidian TCS (TETRA Call Server) interface on its MSS platform. Associated with an E1 link for voice, the TCS provides all the signalling required to manage groups, SDS, priority and individual calls. This architecture also makes possible a reliable design with several E1 access and TCS servers.

### Voice latency

One of the key points of the project is to manage the voice latency between the different systems. In fact, on an analogue radio network the PTT is almost instantaneous. However, over a digital radio system the PTT can take hundreds of milliseconds. As a consequence, it is necessary to record the beginning of any communication coming from the trains on the analogue system to avoid cutting off the start of any communication. As

professional radio communications for railways are always short such a feature is mandatory.

Another key point is to transfer analogue signalling using sweep frequency

## 'To facilitate the maintenance and the reliability of the system, Prescom's radio over IP gateway has been used to transmit the UIC signals over the RATP backbone'

signals into SDS in two ways.

Installation and commissioning is another key issue, as only very short periods of access to the rail network are allowed to make the necessary modifications to the radio system. Prescom has also designed a new board to replace the existing ones, while enabling the integration of the new gateway, along with a way of switching back if something goes wrong. To facilitate the maintenance and the reliability of the system, Prescom's radio over IP gateway has been used to transmit the UIC signals over the RATP backbone.

The role servers used by railway operational staff are linked with the radio terminals. These servers provide, among other things, dynamic information about the train, such as its name (related to its origin and destination), its position and some status information. This status information is important and must be displayed to the dispatchers, as well as being reported to the other systems too.

For instance, if a distress alarm is generated by a "chirp" on a UIC

analogue radio network, this information has to be transformed into a distress status alarm on the TETRA network. In the reverse situation, it is necessary to generate a specific "chirp" to the analogue radio terminals in the train when a distress alarm is received via an SDS from a TETRA radio terminal.

### Test platform

Tests have been performed by RATP and Prescom to find the best audio setting without noticeable delay between the different systems. Thanks to the high flexibility of the MSS platform in managing delays between radio networks, a very satisfactory solution has been defined.

The first test platform was deployed in December 2011 allowing audio tests to be performed between the UIC network and TETRA network on the operational network. These tests were satisfactory and worked as designed. The project is now about to enter a production and on-site acceptance phase, so that TETRA and UIC trains will be in use on the same networks before the end of the year.

