



# MOTOTRBO™ SYSTEM ENSURES RELIABLE COMMUNICATIONS ALONG PERUGIA'S MINIMETRÒ LINE

OVER GROUND AND UNDERGROUND WITH MOTOROLA SOLUTIONS' IP SITE CONNECT



## PERUGIA'S MINIMETRÒ

Perugia's minimetrò is a light railway, which links the suburb of Pian di Massiano to Perugia's stunning historical hilltop town centre. The railway starts from the valley floor and climbs for just over 3km, wiggling around ancient constructions and monuments. Two of its seven stops are underground and it also includes two tunnels. Opened in 2008, the line currently has 25 cars, each carrying up to 50 people; in 2013 the railway carried an average of 10,000 passengers daily. The carriages run on rubber wheels and move on a pulley system powered by electric motors. The railway has cut road traffic by 2–3 million vehicles every year along the route, significantly reducing emissions and positively impacting the environment and quality of life in the city.

With the assistance of Motorola Solutions partners Tx Elettronica and Aikom Technology, Minimetrò has installed a MOTOTRBO digital radio system with IP Site Connect for its maintenance, safety and management teams to be able to communicate efficiently along the length of the railway.

### CUSTOMER PROFILE

**Organisation:**  
Minimetrò S.p.a.

**Industry:**  
Public transportation

**Location:**  
Perugia, Italy

**Partners:**

- Tx Elettronica s.n.c.
- Aikom Technology

### Motorola Solutions Products:

#### For Minimetrò S.p.a.:

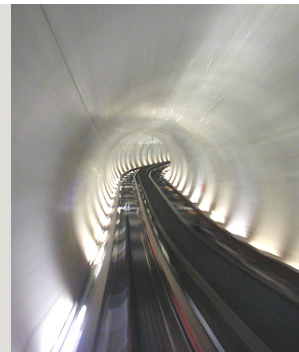
- 10 DP4801 Portable Two-Way Radios
- 7 DR 3000 Repeaters
- IP Site Connect

#### For Perugia's Fire and Rescue Service:

- 1 DR 3000 Repeater
- 1 CM340 (66-88MHz) Mobile Radio used as a transponder

**“We have been delighted with the quality of radio communications and coverage along the line. The MOTOTRBO system is reliable, cost-effective and easy to manage. The radios are robust and user-friendly.”**

Arch. Andrea Vignaroli, Head of Purchasing, Minimetron S.p.a



## CHALLENGE

The railway runs through hilly and densely built-up terrain and includes one 750m-long stretch of tunnel and two underground stations. Minimetron required a really powerful radio communications network, which would allow staff based at the seven stations – or working or travelling along the line – to communicate clearly across the same radio frequencies. It also needed radio coverage in the tunnels and the basements of the stations; the main engine room is housed below Pincetto station, whilst maintenance workshops and garages are located underneath other stations. As the basements are made of reinforced concrete, operators cannot get a mobile phone signal in these areas.

## SOLUTION

Following presentations by Tx Elettronica and Aikom Technology, Minimetron selected a MOTOTRBO digital two-way radio system comprising ten DP4801 handheld radios, seven DR 3000 repeaters and IP Site Connect. Working together with Aikom Technology, Tx Elettronica installed and configured the MOTOTRBO system, with one DR 3000 UHF repeater being installed at each of the seven stations. Then Tx Elettronica provided training and ran tests to ensure the whole network was working optimally.

The DP4801 radios are used for voice communications by Minimetron's management, maintenance and safety teams. Personnel call in with messages relating to service on the line including details of maintenance, requests for repairs and issues affecting safety. The DR 3000 repeaters provide two channels, allowing two simultaneous transmissions on the same frequency utilising Time Division Multiple Access (TDMA) technology. Operators can make group calls when they need to communicate with several people simultaneously, or can select individual calling when they want to speak to a specific person or need to communicate confidential information.

Using MOTOTRBO's IP Site Connect system, Minimetron has linked its seven single-site repeaters along the railway via a standard IP Network. The automatic site-roaming feature also eliminates the need for users to physically change channels as they move along the railway. So, as an operative's radio moves out of range of the repeater located at one station and into the area covered by the repeater at the next station, it will automatically connect to the subsequent repeater helping ensure seamless communications as the operator travels along the line.

An extra standalone DR 3000 UHF repeater linked to a CM340 mid-band (66-88MHz) mobile radio used as a transponder was installed for Perugia's Fire and Rescue Service at Cupa station, at the centre of the 750m long tunnel. The DR 3000 repeater receives the signal from the firemen's UHF portable radios in the tunnel and so allows continuous radio coverage inside the tunnel on the local fire services' UHF frequencies in case of any emergency on this stretch of the line. The DR 3000 is linked to the CM340 radio, which uses an antenna located outside of the tunnel to relay the communications within the tunnel on to the Fire Services' regional network. These communications are, in turn, relayed on to Perugia's local operations centre who can then also relay communications back via the same route. This ensures fire and rescue teams working inside the tunnel can stay in constant two-way communication with their teams on the outside.

## BENEFIT

The MOTOTRBO system was quick and easy to install. The minimal infrastructure and hardware needed ensures an excellent return on investment. Controllers can also centrally monitor and manage the system easily, via MOTOTRBO's repeater diagnostics and control utility, for example, so ensuring the network remains optimally operational at all times.

IP Site Connect ensures reliable, seamless voice communications along the whole line, including in the tunnels and the stations' basements. Using an IP connection eliminates factors that might have impacted on a standard radio network, such as tall buildings and hilly terrain. That operators no longer need to remember to physically change channels as they travel from station to station has also dramatically improved communication and productivity.

Safety along the line is ensured with the Fire and Rescue service being able to access its radio frequencies and communicate clearly with its operations centres at all points along the line, in case of any emergency.

Plans are being considered for a second minimetron in Perugia. If this proceeds, the MOTOTRBO network will be extended to offer coverage along that line too. In future staff may also further utilise the network for location tracking using the DP4801's built-in GPS receiver and for non-verbal communication using MOTOTRBO's texting capability.

## Benefits:

- Clear voice transmissions along the 3km line, including underground sections, in a heavily built-up area with both man-made and natural obstacles
- Easy-to-use radios with automatic site roaming
- Fire and Rescue services can access their frequencies inside the tunnel between Pincetto and Cupa
- Rapid installation
- Easy monitoring and management

For more information on MOTOTRBO, please visit us on the web at [www.motorolasolutions.com/mototrbo](http://www.motorolasolutions.com/mototrbo)

MOTOROLA, MOTO, MOTOROLA SOLUTIONS and the Stylized M Logo are trademarks or registered trademarks of Motorola Trademark Holdings, LLC and are used under license. All other trademarks are the property of their respective owners. ©2015 Motorola Solutions Inc. All rights reserved.