Going underground

In early January it was reported in the media that the London Underground now had the capability for radio communications on the entire network, at any location, through the Airwave network. Three prime movers speak to BAPCO Journal *about the project.*

The system works by using a "leaky feeder" cable that emits a radio signal along the tunnels, allowing communication across the Airwave network.

After the terrorist attacks of 7/7 the need for a complete and comprehensive radio system was made all the more necessary, although the system had been considered and worked towards since 2000. The new system allows all users of Airwave to communicate no matter where they are on the underground network, making their jobs safer, more efficient, and improving the security of the public for both large scale and minor incidents.

The implementation of this system was so successful that Airwave was awarded a Chief Constable's Commendation in recognition of their work.

The BAPCO Journal spoke to all the leading parties involved in this project, including Airwave, the NPIA and the British Transport Police, the primary new users of this system, to gain a full understanding of the work involved that lead to this commendation and what the implementation of the system means for the future of policing on the London Underground.

Josh Berle, Client Advisor, Airwave

"The work to install a system on the London Underground that would enable officers to communicate has been in development since almost 2000. However, the logistical challenges meant it took a lot of time and planning to ensure everything could be put in place for the current setup. We worked alongside the Police IT Organisation (PITO – now disbanded), and subsequently the NPIA, British Transport Police and London Underground Ltd to ensure the project ran smoothly, didn't interfere with the running of the underground and would be fit for purpose once completed.

There are many contractors who work on the underground during the few hours of the day, around 1am to 5am, where work can be undertaken on the lines. Therefore there was a lot of work that had to be done to even arrange for work to be carried out. Additionally the LU had its own radio communication system called Connect that it had to install and manage and we couldn't interfere with that work.

"Our system works by using a leaky feeder cable that emits a radio signal along the tunnels allowing

communication across the Airwave network from any position on the underground network. In order to ensure the system won't go down should an area of the tunnel be affected during a major incident – such as the explosions on 7/7 – we have eight vehicles that can attend a scene and lower in a new feeder so that a signal can still be found.

"Installing Airwave on the underground, ahead of schedule, will bring huge benefits for police officers and the public they serve in London, for both large-scale events like concerts and football matches, and in the future at the 2012 Olympics."

Blair Southerden – National Police Improvement Agency

"The National Policing Improvement Agency (NPIA) had been discussing the end user requirements with the London emergency services and in late 2005 London Underground reached a point in their project (CONNECT – installing a Tetra train radio system) that they could sensibly consider working with NPIA to get a service installed for the emergency services. Radio engineers from all parties had agreed that it was technically feasible for Airwave to 'piggy-back' on the CONNECT infrastructure, in particular the radiating 'leaky feeder' that had been installed in all stations and throughout the 180km of tunnels. This offered a major saving in both time and money to the Airwave project, in cash terms it saved an estimated £400 million.

"The introduction of the Airwave network to the Underground has brought about a major change to policing enabling Metropolitan and City officers easier access and a safer environment as they remain in contact with their control rooms. Airwave has been live in 75 stations since March 2008 and the last (of 125 stations) went live on 1 October 2008, five months ahead of schedule. The advantages are clear to see; the Metropolitan and City of London forces whose officers generally had no radio system that worked on the underground are now the biggest user and have benefitted at events such as Notting Hill carnival, New Year's Eve and at operations policing football events as well as day-to-day roles when they respond to calls to support BTP. This also means BTP officers no longer have to carry a second radio system for use on the Underground.

"Ambulance staff also have access to Airwave and, for the first time, have a radio system that works below ground and keeps them in contact with colleagues and control rooms on the surface. Time savings have been recorded and ambulance crews have reported that effective communication has saved time in getting specialist equipment to accident scenes, with consequent savings in time in getting patients removed to hospital."

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Why networks enhance options for field teams, by Iain Clarke, Sales Director, Government & Public Safety, Motorola.

As networks mature, organisations are increasingly taking advantage of the data capabilities of the technology with TETRA rapidly evolving to an integrated voice and data communications network.

This transition can be traced to three factors: greater interest in data services generated by the success of existing technology, the potential of new devices and the availability of faster data services.

An increasing number of terminals are being shipped with GPS and WAP capabilities. Technologies like GPS have been widely deployed to track field personnel and enhance the operation of dispatch teams while ensuring that officers can be quickly located and supported if they encounter an incident. The benefits of GPS in particular, have ensured that, very quickly, it has become a mission critical service.

Developments at the device level will extend the range of mobile services available to field users. The products will still be exceptionally robust to provide resilient operation, but they will also include faster processors, larger coloured screens and new ways to interact with services.

The availability of faster data rates across networks will provide the foundation for more advanced applications to be accessed by field teams. Two technical advances are important here: Firstly, TETRA Enhanced Data Services (TEDS), an infrastructure enhancement to TETRA networks, will increase data speeds. The first TEDS networks will become operational in 2010 and we are developing new video compression technology that will enable video to be sent across TEDS networks to compatible devices. Applications include providing dispatch teams with access to CCTV images that can be grabbed and sent to incident commanders on the ground. Secondly, complementary wireless networks based on technologies including mesh and WiMAX can be used to provide faster data rates.

Mesh networks in particular can be built quickly to flood an area with broadband coverage. This can be used to throw video surveillance over vulnerable areas and locations and provide monitoring to aid dispatch officers in controlling specific events including sports fixtures, concerts and major conferences. The systems are backed by powerful software to deliver real-time situational analysis for faster problem recognition and enhanced resolution of safety and security issues.

Delivering video to Abu Dhabi Police

Motorola is delivering real-time video capabilities to Abu Dhabi's police using its wireless broadband technologies. The system will enable control room operators to interact with the video collated via real-time streaming from police vehicles and personnel and will provide local recording of high-resolution video.

The videos can also be presented as evidence in a court of law. Videos sent from vehicles and personnel will be made available to the five command and control centres throughout the Abu Dhabi area. To aid the police further, mobile command and control will also be provided. The service, which also shows all the force vehicles on a map, will enable control room operators and management to have real-time knowledge of what is happening in the field and allow them to respond quickly.

"Negating the need to carry two radios makes communication more efficient and means officers can carry fewer items. The system also brings far greater communication quality and is securely encrypted too, providing officers with a vastly improved system."

Superintendent Phil Short, British Transport Police.

Superintendent Phil Short from the British Transport Police (BTP)

"The implementation of Airwave is already having major benefits. Negating the need to carry two radios makes communication more efficient and means officers can carry fewer items. The system also brings far greater communication quality and is securely encrypted too, providing officers with a vastly improved system.

"We worked alongside Airwave and NPIA, and with other London forces including the Met and City of London Police to ensure the system would have the necessary functionality and had the resources to work as necessary. This involved a process of joint testing on stations across the underground where Airwave was being to ensure there were no "black spots" that could hamper communications.

"The real policing benefits this new system provides are fantastic – for example, policing the movements of football fans across the network is now far safer and effective for our officers as they are able to communicate instantly with their colleagues about any incidents that occur, where previously they had to wait to pass into an area where the radios would work. Not only this the system is open to all emergency services too so communication between all the emergency services is now far simpler and seamless, both above and below ground, on a single operating platform."