



Emergency Radio Communications in Subway Tunnels Using Multiple DVRS



Customer Profile

Users

Public Safety Personnel, Transit Operations including security and Maintenance. Road Maintenance Crews.

Applications

Public safety radio coverage throughout subway systems, road tunnels, water works tunnels.

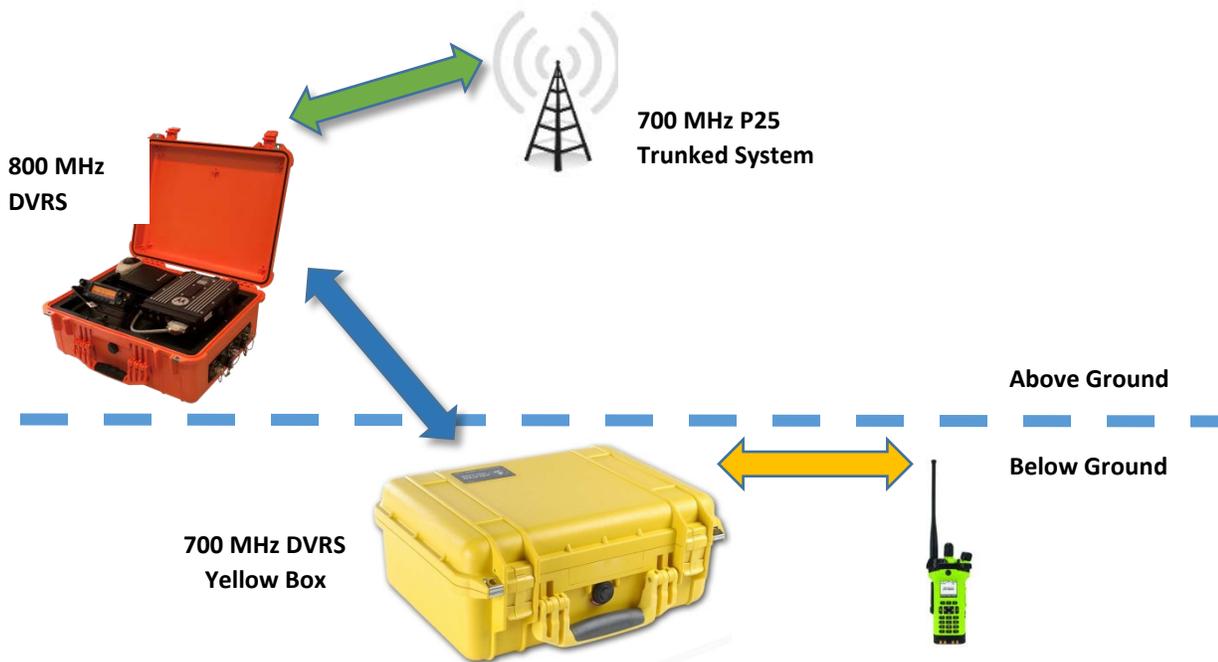
The Magic “Yellow Box” For Rapid Deployment Applications

Most modern subways use a Distributed Antenna System (DAS) to provide radio communications for both transit staff and first responders. However these systems typically are installed late in the construction phase. If radio coverage for first responders is required before this occurs or if a backup system is required for the DAS (in event it is destroyed/damaged as a result of an incident or simply off-line for maintenance) a ‘**double hop**’ DVR is a cost effective solution.

Vehicle repeaters are widely used in the fire service to extend in-building radio coverage. Subways provide a unique challenge due to the single point for the radio signals to enter/exit and the sharp 90 and 180 degree turns on the stairways. The result is that network communications usually stop a few feet down the stairs, and best case (a modern station with wide stairways), the mobile repeater in the vehicle will extend communications to the platform. Communications stop once the user goes a few steps into the tunnels.

A relatively inexpensive solution involves the use of a second mobile repeater and associated mobile radio in a suitcase (called the “Yellow Box” as it is a different colour than other transportable repeaters to stop any confusion). This is used to link users in the tunnels with the mobile repeater in the truck. The portables radios in the tunnel talk to repeater in the yellow case which repeats it locally but also relays the communications via the attached mobile to the mobile repeater in the truck, which in turn relays it to the network.

Using P25, the PTT and emergency IDs of the portables get back to the network in addition to the audio.

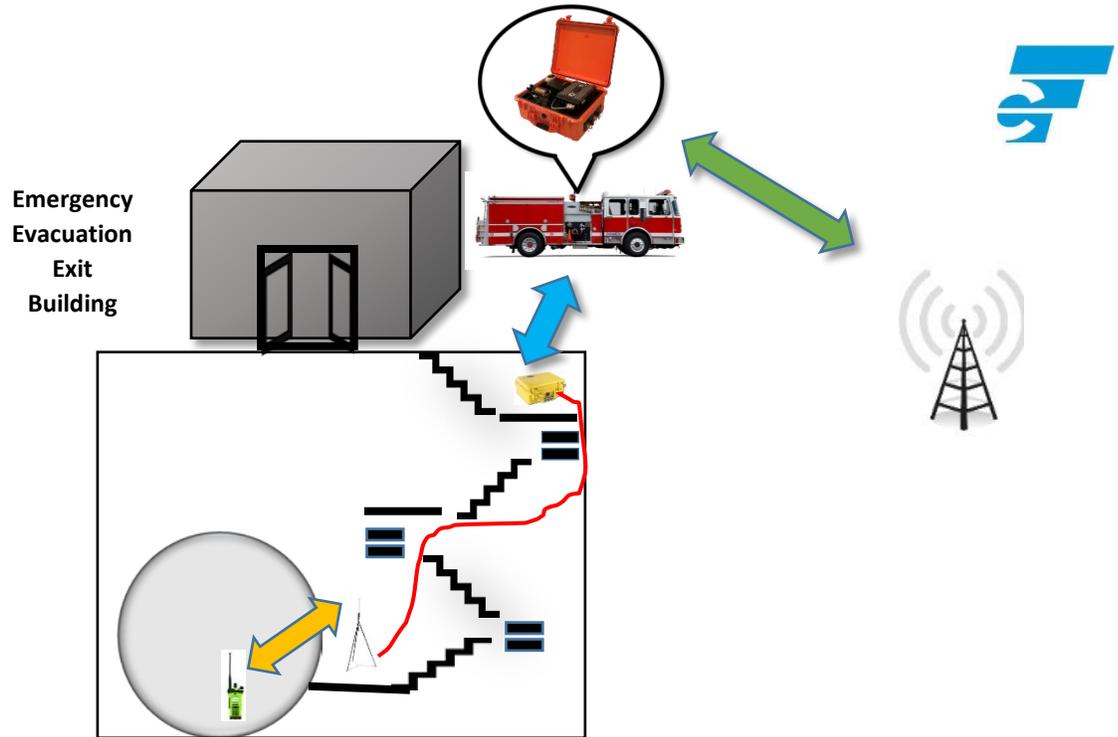


General Overview Diagram

A large fire department recently proved the viability of this operation in a real world environment. The fire department is responsible for underground coverage of a new tunnel extension currently under construction. They have a 700 MHz P25 trunking network and use 800 MHz DVRS for their daily emergency calls.

The test involved accessing the tunnels using an emergency evacuation exit building, between two stations. This is a worst case entry point as the stairways and access ways are narrower than would be found at a station. The emergency evacuation exit building is small and has no windows.

To simulate a repeater mounted in a truck, a standard orange 800 MHz transportable mobile repeater with mag mount antennas was deployed on a command truck.



Emergency Evacuation Exit Building Application Using "Yellow Box" DVR

Coverage from this repeater started to fade once down the first flight of stairs and halfway down the corridor to the main stair case. The **yellow box** was placed here. Approximately 15m (49 Ft.) of antenna was connected to the yellow box repeater and a tripod mounted antenna at track level in one of the tunnels. The section of track has a curves in both directions from this access point. Doors were open to both tunnels. Estimated set up time was 5 minutes.

Users with portable radios walked approximately 1Km (0.62 Miles) southbound (more than halfway to station and did not lose coverage. This test was then repeated going north from the emergency access. Again coverage was 100% all the way to the station, about 1 Km (0.62 Miles) The team then crossed over to the other tunnel. Here coverage was spotty and highly dependent on the proximity to cross overs between the tunnels. To cover both tunnels, two antennas and a splitter is recommended.

These results were consistent with those from previous testing in Washington DC.

Public safety agencies and transit operators looking for an alternate communication solution in sub terrain locations can look at the "Yellow Box" DVRS solution as a vital asset in their radio communications arsenal.

A permanently mounted P25 DVRS unit is another alternative public safety agencies can look at to address tunnel and subway station coverage challenges. Several agencies have installed a Fixed Mount DVR at station level and have a donor antenna above ground and another antenna to provide coverage in the station and portions of the tunnel.



To learn more about the Futurecom P25 DVRS product line please visit www.futurecom.com