



Enhancing Fireground Radio Communications



Customer Profile

Users

- Fire Departments
- Military Fire Departments
- Urban Search & Rescue

Applications

Fireground radio coverage enhancement for in-building coverage and outdoor fringe areas.

One of the biggest challenges faced by both large city fire departments and small urban fire departments is difficulty communicating inside buildings. Hospitals, manufacturing plants and big box stores are just a few of the examples where two-way radio communications can be challenging.



Figure 1: Typical Radio Coverage for Fireground Communications from Network

Motorola Solutions collaborates with Futurecom Systems Group to provide the industry standard DVRS (Digital Vehicular Repeater System) and VRX1000. Over 300 fire departments deploy these solutions as a key component in their radio systems.

The DVRS is 10-watt P25/analog, full duplex vehicle repeater integrated with the Motorola APX™ series mobile radio. The VRX1000 is a scaled down version of the DVRS with 3W transmit power, simplex only operation, with the same operational features of the DVRS. Either unit can be installed in a fire apparatus or battalion chief's vehicle. The DVRS is also available in a deployable suitcase.



DVRS Installed Between Front and Rear Seat of Pumper Cab



DVRS Installed in Protected Box in Pumper Cab



The DVR/VRX1000 connects directly to the APX mobile radio and essentially becomes part of that mobile radio. The APX mobile continues to operate while the DVR/VRX1000 is active. All control of the DVR/VRX1000 is achieved through the mobile control head and DVR/VRX1000 status is displayed on the mobile control head. This status includes: channel, mode, TX/RX and primary/secondary state.

DVRS Activation on Control Head of Mobile Radio

The main benefits of the Futurecom DVRS/VRX1000 on a fireground:

1. Enhanced in-building radio coverage allows users to remain on the network as long as possible so that their communications can be monitored and recorded at dispatch.



Figure 2: Enhanced In-Building Coverage Through use of DVRS or VRX1000

2. The features of trunking with the safety of conventional operation.
3. Highly automated operation allows multiple DVRS/VRX1000 to be activated at a scene. The units will reliably pick a "Primary" unit which will handle the communication between network and users. Other units will go into a standby "Secondary" mode. All DVRS/VRX1000 can be activated by a button on the control head, from a portable radio, from an external switch or

automatically from a combination of emergency lights and setting of the parking brake.



Figure 3: Multi-Unit Algorithm Diagram, Primary Unit Shown in Green

The DVRS/VRX1000 is the only vehicle repeater to offer unique features for the fire service.

- **Direct Fallback:** A potential life-saving feature found in DVRS enabled portables. In the event the portable radio cannot communicate with the DVRS/VRX1000, rather than getting the standard deny tone, it will switch to direct mode and give the user an alternate tone indicating this switch has occurred. This allows firefighters to communicate with other nearby portable users without the need for either transmitter or receiving radios to change channels.
- **Multi-Unit Algorithm:** This sophisticated algorithm handles multiple units at a scene. In addition to the standard fully automatic mode, the DVRS/VRX1000 offers a manual override feature (Permanent Primary) allowing a unit to be selected to provide optimal coverage.
- **Portable Radio ID:** Portable radios affiliate with the P25 system. Their IDs pass on both the push to talk (PTT) and emergency notification.
- **Trunking Tones and Messages:** The users will get the go-ahead tones they are familiar with, network messages get passed to the portable and users can also get out of range tones on the DVRS/VRX1000 (and/or mobile out of network coverage) while on a conventional channel.

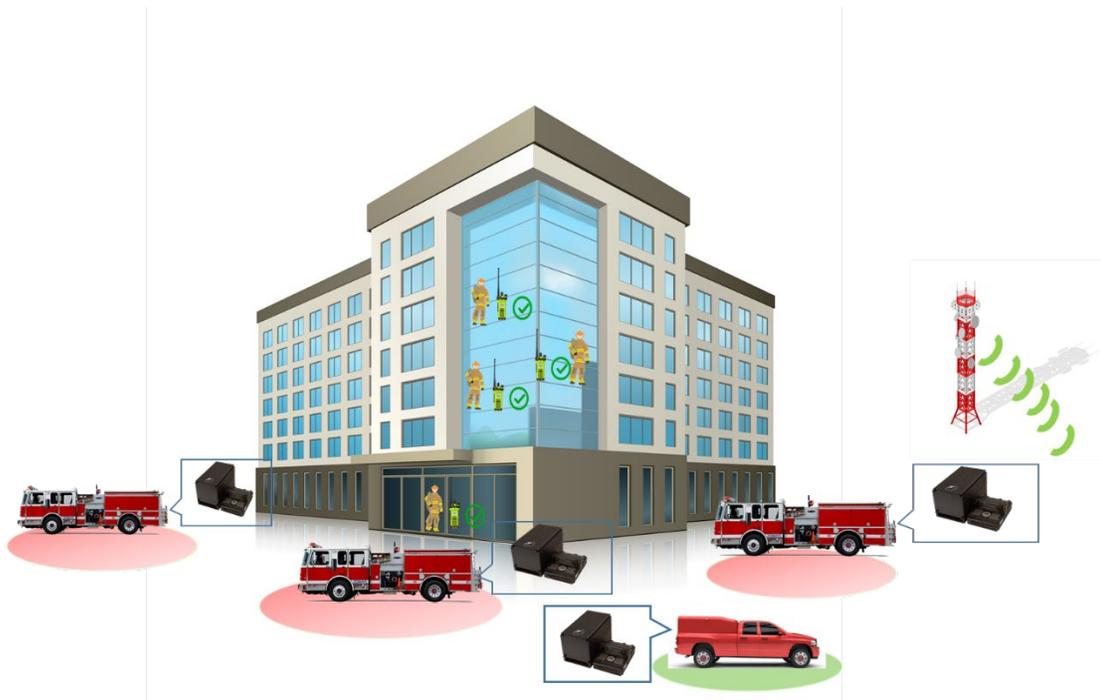


Figure 4 – Multi-Unit Algorithm Diagram, Permanent Primary Taken Over by Arriving Command Truck

- **End-to-End Digital on TDMA Talkgroups:** The DVRS/VRX1000 is the only mobile repeater to offer end-to-end digital operation while keeping the talkgroup TDMA.

Several municipalities are using Vehicular Repeaters as an alternative to Distributed Antennas Systems (DAS). Building owners in these municipalities are also helping to fund Vehicular Repeater purchases by contributing a one-time fee. These fees are calculated by setting a certain dollar amount based on the total square footage of the building.

The benefits of using Vehicular Repeaters over a DAS include:

1. No expensive equipment to design, install and maintain.
2. Noise floor on overall radio system reduced with fewer Bi-Directional Amplifiers (BDAs), reducing building owner and municipalities' liability under federal penalty for any signal interference.



VEHICLE MOUNT DVR

3. DAS can be compromised. For example, power from building disabled, DAS catches fire, multi-day event, structural collapse.
4. Cost reduction in municipalities' time and effort to enact and enforce in-building DAS ordinance.
5. Available for all structures.



VRX1000

To learn more about Futurecom's RF Coverage Solutions please visit www.futurecom.com

[When First Responders Need RF Coverage, They Bring Futurecom](#)