

D.C. INTEROPERABILITY

IT TOOK STRATEGIC FORESIGHT, TECHNICAL INNOVATION, AND POLITICAL WRANGLING TO BRING REAL-WORLD RADIO INTEROP TO THE NATION'S CAPITOL. HOW THEY DID IT — AND WHAT THEY'RE COOKING UP NEXT — IS POINTING THE WAY FOR THE REST OF THE COUNTRY.

By Rick Burke and Joe Ross

As a center of vital government operations, a bustling metropolplex of more than 3 million citizens, and a constant target of anti-American groups worldwide, Washington, D.C., presents arguably the most demanding public safety infrastructure challenges in the world.

That's the bad news. The good news is that our nation's capital is protected by a constantly evolving web of wired and wireless communications systems. Recent enhancements of LMR and broadband data interoperability have generated a giant leap in the sophistication of public safety communications tools, keeping residents, visitors, and emergency personnel safe. The district's work on communication technology can serve as a model for municipalities nationwide, demonstrating that it is possible to deliver much-needed first responder tools rapidly and within budgets.

The district's success so far is based on the strict initial objectives set by the district's Office of the Chief Technology Officer (OCTO), which mandated first responder standards for comprehensive communications in its interoperability program. The strategies had to be developed keeping in mind that the district is one of the most complex public safety environments in the world.

More than 30 law enforcement agencies operating within a

68-square-mile area, along with fire and EMS departments serving the Capitol, the White House, and hundreds of other important public, commercial, and residential buildings make D.C.-area mobile communications complex enough.

Add to that, within a radius of 10 miles outside the metropolis, another 30-plus independent fire, police, emergency management, emergency medical service and other agencies, working frequent, large-scale events such as IMF/World Bank meetings and demonstrations, presidential inaugurations, and dozens of other annual national and international

events. The massive local, regional, and federal public safety agency presence at these events presents unparalleled interoperability challenges.

In 2002, during the early planning stages of OCTO's program that called for a single frequency band/single radio network to be used by all district first responders, officials faced a spectrum shortfall at 700 MHz and 800 MHz — the bands of choice in the National Capital Region (NCR). As is common among municipal, state, and federal radio networks, various agencies operated on disparate technologies and frequencies encompassing VHF, UHF, and 800 MHz. →



Regional Public Safety Wireless

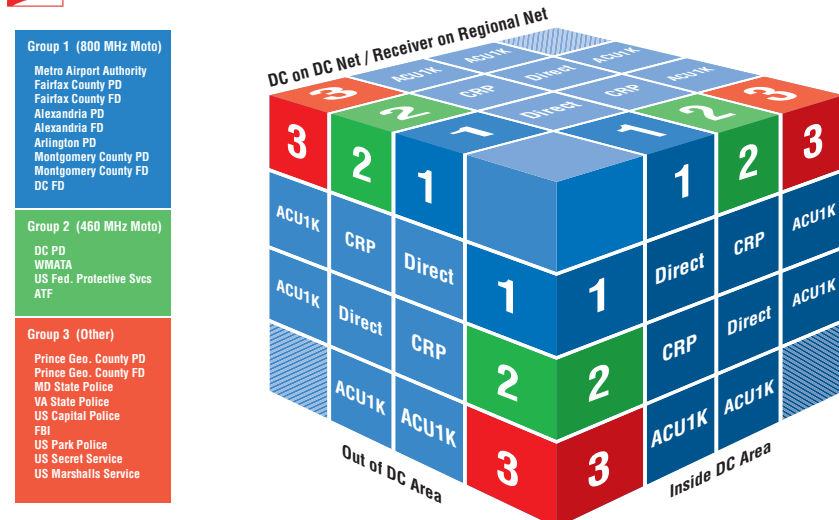


Figure 1: Accommodating the large number and variety of area agencies, as well as their diverse frequency and coverage needs, led to a complex fleet map and the formation of several interoperable talk groups.

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Led by CTO Deputy Robert LeGrande, II, an analysis was performed to find viable, rapid deployment solutions for radio coverage and interoperability. Ultimately an integrated VHF, UHF, and 800 MHz public safety system was developed, providing interoperability to more than 50 local, state, and federal agencies via a common zone controller and integrated ancillary radios.

The district network constitutes more than 8,000 portable and mobile radios for an even larger population of federal and regional users, all requiring reliable interoperability. A new trunked LMR network and cross-connected technologies support all district, regional, and federal public safety radio communications; regional responders collaborated with the district on a comprehensive fleet map and numerous interoperable talk groups. (See Figure 1.)

Can You Hear Me Now?

The most aggressive coverage measures were taken to minimize reliance on “talk around,” considered unsafe by district first responders. Drawing upon lessons learned from 9/11, a dramatic improvement of in-building and subway tunnel coverage for firefighters became an essential component of the radio upgrade program. After an increase from four to 10 base station sites, and the addition of 63 vehicular repeaters, radio connectivity to the core network — and therefore the entirety of public safety resources — is now available even in the densest of granite and marble structures.

By preselecting sites before issuing vendor request for proposals (RFPs), and concurrent construction and LMR vendor selection, the entire project was deployed in 18 months, less than half the time required for

typical deployments. The radio site preselection process also resulted in significant cost savings and completion within the project’s schedule and budget.

Along with the above-ground radio network, the program managed the development of a comprehensive 800 MHz below-ground network within the Metro, the district subway system. This network now provides communications for all talk groups on 800 MHz throughout the entire metro underground system, providing fire and EMS personnel with transparent communications both above and below ground. (See Figure 2) This fiber- and leaky coax- based distribution system has become a model for similar train and subway system deployments.

All Politics are Local

To ensure that ongoing network reliability met its stringent requirements,



Public Safety Wireless Voice and Data

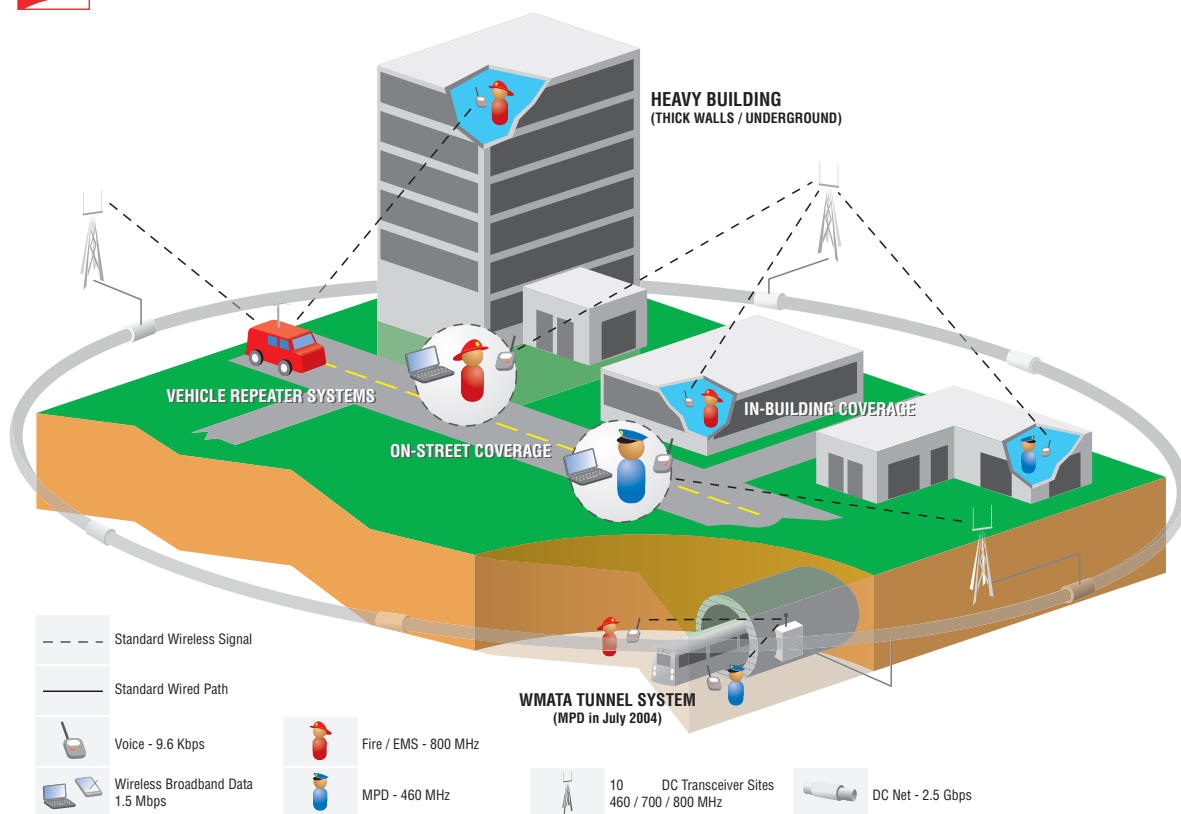


Figure 2: Repeaters on the streets (on towers and in vehicles), in buildings, and below ground throughout the Metro system bring seamless 800 MHz communication to all talk groups, both above and below ground.

D . C . I N T E R O P E R A B I L I T Y

OCTO and the district's Office of Unified Communications (OUC) helped form a unified radio operational team; develop functional standard operational procedures and processes for network maintenance and operation; and train dispatchers, end users, and technicians in all aspects of network operations.

Ultimately, the district's voice interoperability objectives were achieved. Critical coverage and reliability problems were resolved, and a path was created for broadband data interoperability, providing robust mobile video, data, and messaging functionality. The district's new system was deployed on Sept. 30, 2003, less than 18 months after the program's start.

Planners knew that accomplishing so much would require heavy support and acceptance from end-user agencies, including the involvement of each agency's radio division. As part of an outreach program to gain the support and trust of end users, COTO formed a public safety systems steering committee composed of the district's Chief Technology Officer (CTO), the Deputy Mayor for Public Safety, the Chief of Police, and the Fire and EMS Chief. OCTO's LeGrande says the ultimate success of the program was based on the "dedication, support, and cooperation" of the participating officials.

Broadband Voice, Data, and Video

While voice communications needs were the most pressing, OCTO also wanted wireless data solutions for homeland security applications. As first responders presented more

applications and bandwidth-intensive demands were presented, it became impossible to predict where data would be needed, so a citywide broadband solution was required. OCTO eventually secured space and permits for the world's first public safety wide-area broadband network. The group also recognized that the area's broadband needs were hardly unique, and organized the Spectrum Coalition for Public Safety (Web site: www.spectrumcoalition.org) to secure additional 700 MHz spectrum for broadband data coverage over wide areas.

To address the importance of broadband implementations to spectrum decision-makers, the Wireless Accelerated Responder Network (WARN) was formed under a 700 MHz experimental license throughout the district. WARN consists of 12 transceiver sites delivering more than 30 megabits per second (Mbps) in aggregate and more than 1 Mbps to individual users.

To reduce operational costs, 10 of the network's 12 sites were anchored on existing LMR sites, with two additional sites augmenting capacity near the White House and RFK Stadium. Using end-to-end IP, WARN has the capability to rate-limit and prioritize users and applications, managing bandwidth for individual user demands ranging from simple text messaging (at a few kilobits per second) to full-motion video streaming at more than 450 kbps. Both federal and local first responders have used the network extensively since its launch in January; more than 7 gigabytes of data were transmitted on Inauguration Day alone.

The network enables real-time

streaming video, chemical- and biological-agent alerting systems, and remote desktop applications. It also supports imaging, secure Web and LAN database access and retrieval, e-mail, and other usual desktop computer functions. As a pilot project, WARN is providing critical information for the development of wireless video transmission and other broadband applications for first responders, including integrated devices supporting voice, data, and video.

The Future is Now

Interoperability solutions are within our grasp, but significant work remains before data interoperability, especially video, is standardized for mass deployments.

The National Capitol Region program is working to develop comprehensive information-exchange standards, resolve current communications gaps, and implement a regional broadband network (wireless and wireline) and information-exchange portal. But national efforts and coordination are required to ensure regional interoperability. The time is now to integrate regional and local efforts with a focused national program. National interoperability of local, state, and federal networks will significantly enhance the effectiveness of emergency responders, protecting their lives as well as those whose lives they protect. ■

Rick Burke and Joe Ross are senior technical and program managers with Televate, LLC, the technology vendor supporting the District of Columbia on this program. Visit the Web site www.televate.com for more information.

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RadioResource *MissionCritical Communications* is published by the RadioResource Media Group. Pandata Corp., 7108 S. Alton Way, Building H, Centennial, CO 80112, Tel: 303-792-2390, Fax: 303-792-2391, www.rrmediagroup.com.

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