

2006 NASCIO Awards: Information eCommunications Technology (ICT) Innovations
The District of Columbia Wireless Accelerated Responder Network (WARN)

Executive Summary

Project Description

In September 2004, the District deployed the Wireless Accelerated Responder Network (WARN), the nation's first citywide broadband wireless public safety network that allows first responders to use video communication and other tools to enhance public safety. WARN is primarily intended to be a model for building similar data networks across the country rather than a long-term operational network.

Supported and managed by District of Columbia Office of the Chief Technology Officer's (OCTO) Wireless Programs Office (WPO), WARN consists of 12 sites with 36 antenna sectors serving the District. WARN operates under an experimental license approved by the Federal Communications Commission (FCC), which provides safe, broadband wireless service throughout the nation's capital.

Serving a growing contingency of diverse residents, weekday commuters, tourists and federal government employees, District of Columbia first responders use WARN to more effectively communicate, plan and operate with other public safety agencies. First responders have been able to use full-motion, high-resolution video monitoring and other bandwidth-intensive monitoring tools. This capability has enabled agencies to immediately share time-critical information needed to respond to day-to-day incidents, as well as unique and catastrophic emergency events in the Washington, DC metropolitan area.

Significance to the Improvement of the Operation of Government

Deployment of this network has ushered in a new era in public safety communications. This technology can support applications with bandwidth demands that previously could not be distributed wirelessly. In this era of Code Orange warnings, the capacity to rapidly deploy wireless broadband applications such as chemical/biological alarms, remote video monitoring at command sites, video information for officers on patrol, cross-jurisdictional database messaging, and ambulance-hospital video links is absolutely essential to keep the public safe.

Currently, eight District public safety organizations as well as the Washington Metropolitan Transit Authority (WMATA) use WARN. Federal WARN users include the United States Park Police, the United States Secret Service, the Federal Protective Service, and the Department of Homeland Security. These users have employed WARN to support events like the second inauguration of President Bush, the 2005 State of the Union Address, the Fourth of July festivities on the Mall, and law enforcement response during the International Monetary Fund mass demonstrations. According to user survey information, overall satisfaction with WARN has consistently remained within 85 to 90 percent.

Benefits Realized by Service Recipients, Taxpayers, Agency or State

Use of the WARN network by District first responders has minimal cost to participating agencies but provides a wealth of resources that are now available at true broadband speeds of up to 1.5 Megabits per second (Mbps). Once issued a PC card and drivers, any public safety agency with a reasonably modern PC can use this network. There is no requirement for any other hardware. Agencies throughout the city can immediately access applications available on their desktops citywide.

WARN allows these agencies to increase coordination and communication to protect residents, enforce laws, monitor events, reduce criminal activity, prevent loss of life and respond to attacks swiftly and effectively.

Return on Investment, Short-Term/Long-Term Payback

The District's initial investment of \$3 million dollars in WARN has already resulted in the tangible return of over \$15 million Federal Urban Area Security Initiative (UASI) dollars to be used by Emergency Support Function #2 - for communications (ESF #2) in the National Capital Region to build a regional broadband network.

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While WARN has realized a return on investment in terms of dollars, the greatest ROI is in the potential for the system to save lives nationwide. WARN is primarily intended to be a model for building similar data networks across the country. It has already been used in many demonstrations on Capital Hill and before the FCC. In both venues, it has been extremely successful in building support for implementation of similar broadband wireless public safety networks regionally and nationally.

Largely as a result of OCTO's efforts, the FCC issued a (8th) Notice of Proposed Rule Making on this subject, specifically asking for comment on possible plans to permanently change the rules in part 47 of the Code of Federal Regulations to permit aggregation of spectrum already allocated for public safety use in a manner that will permit implementation of broadband networks across the nation.

A. Project Description

The District of Columbia's Office of the Chief Technology Officer (OCTO) has deployed the nation's first citywide 700 MHz broadband wireless public safety network to allow first responders to use video communication and other tools to enhance public safety. The network, called Wireless Accelerated Responder Network (WARN) addresses communication difficulties that hampered the work of first responders on September 11, 2001.

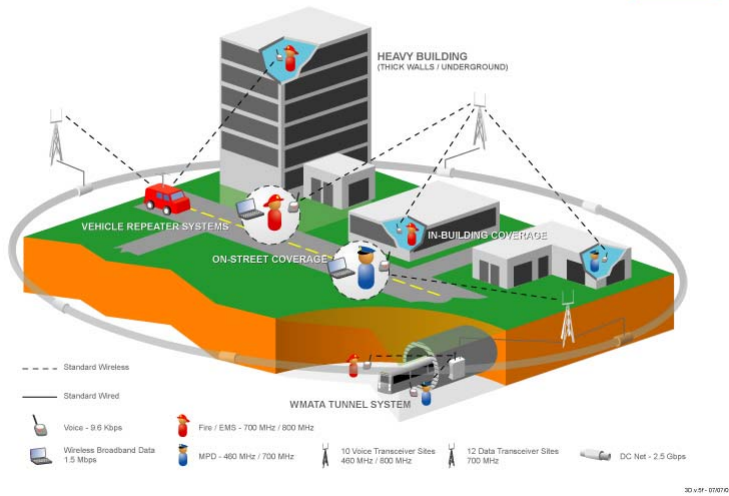
Prior to the implementation of WARN, the District of Columbia had no wireless system for high-speed public safety data communications. While average citizens can purchase commercial high-speed data services, these services are not provided on networks that are designed to meet public safety standards. Therefore, these services cannot be relied upon in times of emergency (when they would be most needed by our first responders), and they are very expensive. Further, service contracts for these services do *not* guarantee service quality, they specifically prohibit use of the types of applications most important to our customers—full motion video. The District of Columbia currently uses commercial wireless services that have key limitations, such as limited data throughput. The amount of spectrum not configured to enable large critical data applications and public safety must compete for access to limited bandwidth—especially in times when they need the most bandwidth.

Within the last three years, Washington, DC has made huge strides in improving the quality and interoperability of its public safety voice communications. It was a natural “next step” for the District to become the focal point of one of the most innovative and influential ongoing public safety technology projects in the nation. WARN consists of 12 sites, with 36 antenna sectors, operating under an experimental license approved by the Federal Communications Commission (FCC), providing secure and dedicated broadband wireless service to multiple public safety agencies throughout the District of Columbia. WARN utilizes a spread spectrum technology, FLASH (Fast Low-latency Access with Seamless Handoff) OFDM® (Orthogonal Frequency Division Multiplexing), to support a wireless broadband network that enables bandwidth intensive data applications and provides a cost-effective, flexible, scalable architecture that is ready to meet present and future data communications needs. Expected public safety outcomes also include more efficient interagency communications and public safety operations. This network provides the wireless “transport layer” for applications to access the following:

- law enforcement and public safety databases
- criminal and motor vehicle queries
- remote surveillance
- chemical and biological weapon detection
- bomb squad support
- helicopter video transmission
- in-ambulance pre-admission screening for emergency patients and other uses critical to preventing attacks and responding to attacks swiftly and effectively

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Public Safety Wireless Voice and
Data Communications



Managed by OCTO, WARN was initially deployed in September 2004 and significantly expanded in 2005. Additionally, OCTO founded the [Spectrum Coalition](#), a group of more than 30 like-minded state, county, and city governments serving as advocates for additional spectrum in the 700 MHz range to support critical public safety wireless applications. The Coalition is asking Congress to enact legislation and to mandate that the FCC perform the following:

- Stop the pending auctions of the upper portion of the 700 MHz band
- Allocate 30 MHz (5 MHz paired) of spectrum in the 700 MHz band to public safety and homeland security use
- Mandate the broadcasters (who must already relocate) do so by a certain date—December 31, 2006 or earlier
- Promote the implementation of technologies that fully satisfy the technical requirements

B. Significance to the Improvement of the Operation of Government

At the invitation of Congress, WARN was initially used to demonstrate the potential for interoperable delivery of data and full-motion video between District and the US Park Police first responders. Coverage of this event, including a video depicting the network in action, can be found at www.spectrumcoalition.org. Since its inception in 2004, WARN has made numerous contributions to first responder communication on a daily basis. The network has also been used to support the second inauguration of President Bush, the 2005 State of the Union Address, the Fourth of July festivities on the Mall, and law enforcement response during the International Monetary Fund mass demonstrations.

Public safety organizations currently using WARN include eight District agencies: the Metropolitan Police Department (MPDC), the Fire and Emergency Medical Services Department (FEMS), the Emergency Management Agency (DCEMA), the Office of the Chief Medical Examiner (OCME), the Department of Corrections (DOC), the Department of Youth Rehabilitation Services (DYRS), the Department of Health's Addiction Prevention and Recovery Administration (APRA), and the Office of the Chief Technology Officer (OCTO). Federal WARN users include the United States Park Police, the United States Secret Service, the Federal Protective Service, and the Department of Homeland Security. WARN is also used by the Washington Metropolitan Transit Authority (WMATA).

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By the end of April 2006, over 174 emergency personnel were using WARN Data that have been collected on network performance (e.g., data throughput, coverage, and latency), application requirements, and public safety operations improvements. In April total traffic amounted to 79,542 megabytes, which consisted of 46,384 megabytes of uplink traffic and 33,158 megabytes of downlink traffic. While traffic volumes vary because of events triggering use (or the lack of same), generally overall use (and commensurate understanding of the value of the network) is growing so, no trouble tickets were opened during this reporting period.

OCTO holds a WARN user group meeting every other month to help educate WARN users on what is available with the system, and to gather feedback to be incorporated into network improvements. OCTO collects user survey information on a monthly basis and the measure of overall user satisfaction has consistently remained within 85 to 90 percent.

C. Benefits Realized by Service Recipients, Taxpayers, Agency or State

The approach and results have been shared with the national public safety community, researchers, policymakers, and the public through newsletters distributed via public safety organizations, presentations at public safety organization meetings, research trade papers, press conferences, and Capitol Hill briefings. A demonstration of the network, jointly staged by Spectrum Coalition members, US Park Police, and the Office of the Chief Technology Officer, with support from the City of Alexandria Police Department, appeared on NBC's WRC TV4 as a news story about safety and security preparations for the 2005 Fourth of July holiday. These demonstrations now stand as a model to other regions that seek enhanced and scalable public safety wireless systems.

With WARN, first responders have been able to use full-motion, high-resolution video monitoring and other bandwidth-intensive monitoring tools to immediately share time-critical information needed to respond to day-to-day incidents, as well as unique and catastrophic emergency events in the Washington DC metropolitan area. For example on-demand wireless access to large, centralized databases, coupled with the capability to integrate real-time ground and/or air video feeds at an event with stored pre-plan data has yielded significant incident command and control capabilities. This network also supports distributed Command and Control. For example, it allows Battalion Chiefs in the Fire Department to manage assets from the periphery of an event, having all the live and stored information about any event location available in their vehicle anywhere in the District.

Deployment of this network has ushered in a new era in public safety communications, as this technology can support applications with bandwidth demands that could not previously be distributed wirelessly. In this era of Code Orange warnings, the capacity to rapidly deploy wireless broadband applications such as chemical/biological alarms, remote video monitoring at command sites, video information for officers on patrol, cross-jurisdictional database messaging, and ambulance-hospital video links is absolutely essential to keep the public safe.

The following are direct quotes from emergency personnel currently using WARN within the District of Columbia, including federal WARN users.

“WARN has had a tremendous impact on our ability to access and transfer critical information to and from our mobile command center. It has provided our mobile units with a fast, simple, and reliable means through which to send and receive digital information. The ability to transmit live streaming video or access our GIS server from the field, has proven invaluable to senior management in their decision making process. We look forward to the day (when) WARN has expanded throughout the NCR (National Capital Region).”—*DC Emergency Management Agency*

“For F/EMS users, it should be expanded to all EMS Operations Supervisors.” —*DC Fire and Emergency Medical Services*

“This system continues to be an asset to our agency. Without it, there are times we would be much less efficient in our operations.” —*DC Fire and Emergency Medical Services*

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“Mobile Command HQ used/relied on our WARN connection HEAVILY during the recent IMF/World Bank and Anti-War Demonstrations. The system worked flawlessly in spite of our “difficult” location (adjacent to the West Wing).” —
US Park Police

“I have also used the WARN network on multiple National Security Events, special events, and emergency responses to track unit status information in real time, to access the (CBRN Detection) System, to compile data, and access the Internet and send and receive emails.” —*DC Fire and Emergency Services*

“The WARN system has provided video feedback to our Fire Operations Center and Field Command Unit during many simulated emergencies and terrorist drills over the past year. This allows our senior staff and command officers to get a live view of the incident and operations, which enhances our capabilities to respond effectively to emergency incidents. It also allows us to quickly obtain valuable information and to reduce our reaction time tremendously.” —*DC Fire and Emergency Services*

“In August of 2005 while working an RFK stadium event, MPD had 32 officers spread out over three miles of property on security posts. At approximately 1800 hours the weather looked clear and sunny, but in the distance I heard a rumble of thunder. I went to my laptop and over the WARN system access (sic) the FAA radar out of Manassas Virginia. A very fast moving storm was approaching with hundreds of lightning strikes. In seeing the danger of the coming storm on the radar and having officers out in the open in loud places not being able to hear the radio, I again went to the laptop for help. I paged the officers in the field to take cover. All of the officers were contacted and within five minutes a severe storm was upon us. The WARN system helped me contact these officers in a timely fashion to get them out of harms way.” —*DC Metropolitan Police Department*

In summary it is important to remember that while District first responders are being provided with the most advanced public safety data network, it is only an important tool to them and the ultimate beneficiaries are the residents of, and more than 18 million annual visitors to, our nation’s capital who are made demonstrably safer as a result of this capability.

D. Realized Return on Investment, Short-term/long term Payback (include summary calculations).

Use of the WARN network by District first responders has minimal cost to participating agencies but provides a wealth of resources that are now available at true broadband speeds of 1.5 megabits per second. When issued a PCM card and drivers, this network can be used by *any* public safety agency on a reasonably modern PC, and there is no requirement for any other hardware with the immediate benefits of more efficient interagency communications and public safety operations.

The District’s initial investment of \$3 million dollars in WARN has already resulted in the tangible return of over \$15 million Federal Urban Area Security Initiative (UASI) dollars to be used by ESF #2 in the District and the surrounding National Capital Region to build a similar network.

WARN is primarily intended to be a model for building similar data networks across the country rather than a long-term operational network. While WARN has realized a return on investment in terms of dollars, the greatest ROI is in the potential for the system to save lives nationwide. It has already been used in many demonstrations on Capital Hill and before the Federal Communications Commission. In both venues, it has been extremely successful in building support for implementation of similar broadband wireless public safety networks regionally and nationally.

The OCTO Wireless Programs Group and the Spectrum Coalition for Public Safety, are nationally recognized subject matter experts in high-speed public safety networks. DC Deputy Chief Technology Officer Robert LeGrande has testified on numerous occasions about public safety wireless communications before committees in both Houses of Congress. A significant part of the District of Columbia’s credibility emanates from WARN’s live demonstrations of potential public safety applications. WARN provides a dynamic model for building similar data networks across the country.

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