GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE CHIEF TECHNOLOGY OFFICER

Suzanne J. Peck
Chief Technology Officer

August 20, 2006

Federal Communications Commission
Experimental Licensing Branch
MS 1300E1
445 12th Street, S.W.
Washington, DC 20554

Re. Experimental Radio Station Construction Permit And License
Call Sign WD2XHO
Fifth Progress Report

Dear Madam/Sir:

Pursuant to the special conditions included in the grant of the experimental radio station and construction permit and license for WD2XHO (FCC File 0042-EX-ML-2004), please find attached the Fifth Progress Report of this experiment.

Should any clarification be necessary, please do not hesitate to contact Guy Jouannelle at 202-442-9817.

Sincerely,

Robert LeGrande, II
Deputy Chief Technology Officer

The Office of the Chief Technology Officer
of the
District of Columbia (OCTO/DC)

Fifth PROGRESS REPORT

on the

Construction and Operation

of the

Experimental Wireless Accelerated Responders' Network

Experimental Radio Station License
Call Sign WD2XHO

Table of Contents

Figures

Background

The District of Columbia has recently completed an analysis of its public safety wireless data network deployment options and has determined that the spectrum and technologies on which they are based do not fulfill the pressing need of first responders today, much less the increasingly complex environment envisioned for the near future.

In order to demonstrate that affordable technologies exist today to support the critical public safety applications, the District has decided to deploy a wide area (within Washington DC city limits) broadband wireless data network that will serve as a pilot for next generation of public safety applications. The intent is to specify technology and features that best suit public safety applications' requirements. To this end, the District has filed for an experimental license in January 2004. The FCC has granted this experimental license (Call sign WD2XHO) in February 2004.

The Office of the Chief Technology Officer of the District of Columbia (OCTO) selected Motorola and Flarion Technologies to provide, install and support a 12-site Flash OFDM broadband wireless network, WARN (Wireless Accelerated Responders' Network).

In order to allow the vendors to deliver the equipment on an expedited fashion, a modification of the experiment license was filed and granted in August 2004. The modification did result in swapping uplink and downlink frequencies.

In March 2005, the District filed for the licensing of two additional sites to enhance the coverage and capacity of the network. The FCC granted those licenses as well as an extension of the experimental license to September 1, 2006.

Network Infrastructure

The network includes 12 transceiver sites, interconnected to two redundant data centers via an independent District operated fiber ring. This interconnection at the data centers provides access through the District's private WAN to other District agencies and the Internet for WARN users. Applications servers are either located in the WARN network or in the agencies' WAN. Proper security policies, appropriate firewalls' configurations, and dedicated links limit the access of those applications to the relevant end-users.

A detailed description of the network architecture is included in the second Progress Report of Experimental Radio Station Construction Permit And License (Call Sign WD2XHO) filed in February 2005.

Network Performance

Various tools have developed to monitor the performance of the network, and the activities it supports.

Those tools use the performance data recorded at each base station as well as using the traffic logs on both AAA servers. Those tools have allowed us to produce the reports and graphs below, and derive network usage trends.

This analysis show that although the number of users was still very limited (about 200 users), more than 217 Giga Bytes of data were transmitted on the uplink, and more than 154 Giga Bytes of data was transmitted on the downlink (see table below), a significant incease since the last report filed in February 2006.

	DOWNlink Traffic Volume (Bytes)	UPlink Traffic Volume (Bytes)
Agency 1	46,707	39,093
Agency 2	4,389,496	21,639,668
Agency 3	64,319,575	359,885,393
Agency 4	54,334,658	492,349,012
Agency 5	7,333,871	79,332,860
Agency 6	29,616,764	113,360,230
Agency 7	10,322,050,395	18,004,811,063
Agency 8	16,385,885	64,920,208
Agency 9	330,447,400	370,502,954
Agency 10	440,426,044	990,517,899
Agency 11	2,550,833,152	1,466,373,201
Agency 12	1,227,628,372	3,752,861,649
Agency 13	98,820,559	1,175,322,388
Agency 14	1,324,700,210	5,351,136,091
Agency 15	10,558,383,614	96,839,374,102

Agency 16	45,857,976	591,062,043
Agency 17	18,513,193	93,920,178
Agency 18	6,102,540	65,521,524
Agency 19	10,773,353	286,832,841
Agency 20	23,173,416,025	12,218,751,852
Agency 21	825,500,939	1,031,243,179
Agency 22	91,130,055	717,891,387
Agency 23	73,703,350,430	48,413,425,193
Agency 24	287,819,280	3,960,793,400
Agency 25	717,082,912	3,874,212,355
Agency 26	1,606,722,271	3,972,830,712
Agency 27	692,242,007	1,797,746,038
Agency 28	25,498,000,294	644,515,212
Agency 29	1,035,486,441	10,837,131,705
Agency 30	23,586,123	97,313,476
Agency 31	26,658,409	205,935,288
TOTAL	**154,791,958,950**	**217,891,552,194**

Table 1: Volume of traffic transmitted between Jan 20 2005 and August 15 2006.

Moreover, Figure 1 below depicting the evolution of the traffic volume shows that the daily usage of the network is increasing consistently. The deployment of additional video cameras by the Metropolitan Police Department, and the consistent daily usage of video applications by the DC Fire Department and the US park Police are the main drivers of the traffic increase.

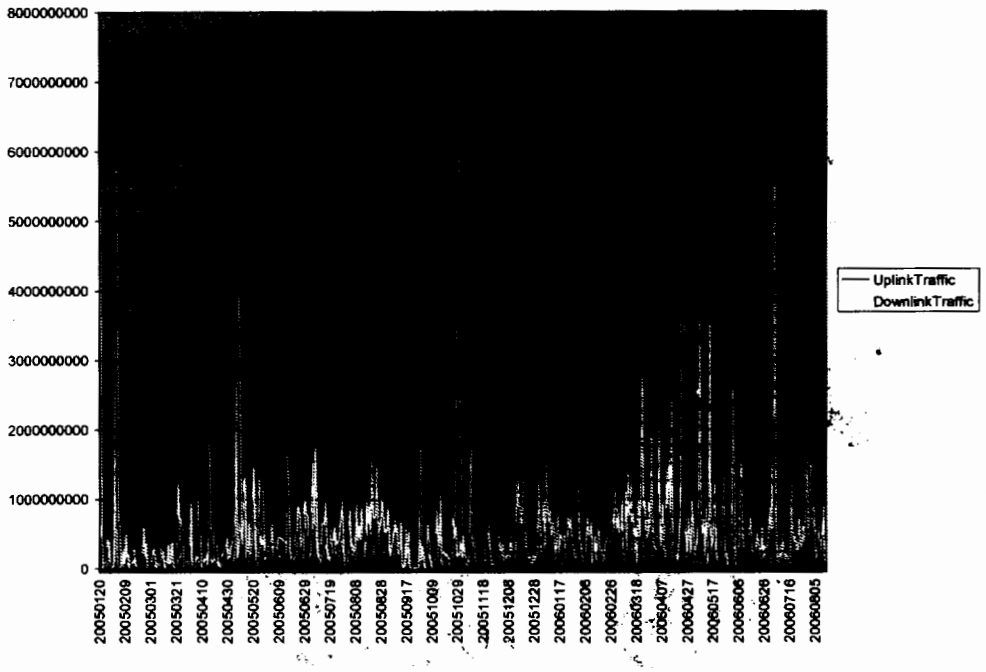
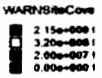


Figure 1 - Daily Traffic volume (Bytes), January 20, 2005 to August 15, 2006

The following graphs depict the geographical distribution of traffic between July 3rd and July 5th 2006 which was one of the heaviest traffic periods during the last 6 months.. The coverage of each cell is colored based on the traffic it carries. Those maps demonstrate again that, although only 12 sites are deployed, the network can carry several significant events simultaneously in the city.



WARN: July 3rd to July 5th Downlink Traffic

Figure 2: Downlink Data (Bytes) transmitted -10/27/05-10/29/05

The geographical distribution between uplink and downlink are also different as the requirements of various events across the city require the deployment of different applications with different communications needs and associated bandwidth requirements.

WARN: July 3rd to July 5th Uplink Traffic

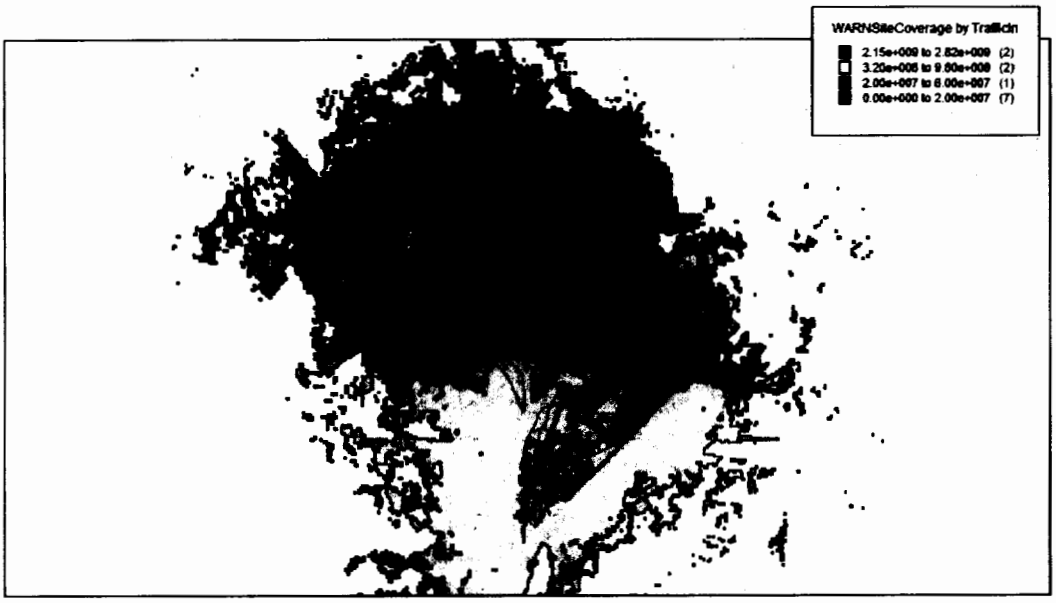


Figure 3: Uplink Data (Bytes) transmitted 10/27/05-10/29/05

The following graphs depict the load on the system, and the total throughput experienced on daily basis on the system. It is clear from those graphs that not only the daily traffic is increased as a whole, but its geographic distribution expands as the number of sectors heavily loaded increases. As agencies expand the usage of the network, traffic, load and throughput are expected to grow accordingly.

It is also confirmed that unlike the traditional internet traffic, those public safety applications require equivalent traffic capacity on the uplink and downlink.

In particular, the uplink traffic is principally generated by mobile cameras streaming high resolution video to remote command centers and/or other mobile first responders. Several agencies (DC-FEMS, DC-EMA, USSS) are operating such uplink video applications. As most cellular technologies, the link budget of the Flash-OFDM is uplink limited and the

growing usage of uplink streaming high resolution video drives the need to improve that end of the link.

The implementation of a video application enabling uplink multicast has significantly improved the efficiency of the network: the load on the system, i.e. the number of radio resources necessary to carry the demand, stayed stationary although -as previously noted - the uplink traffic has significantly increased due to new cameras deployments.
Minor improvements of the RF configurations also marginally improved the uplink coverage.

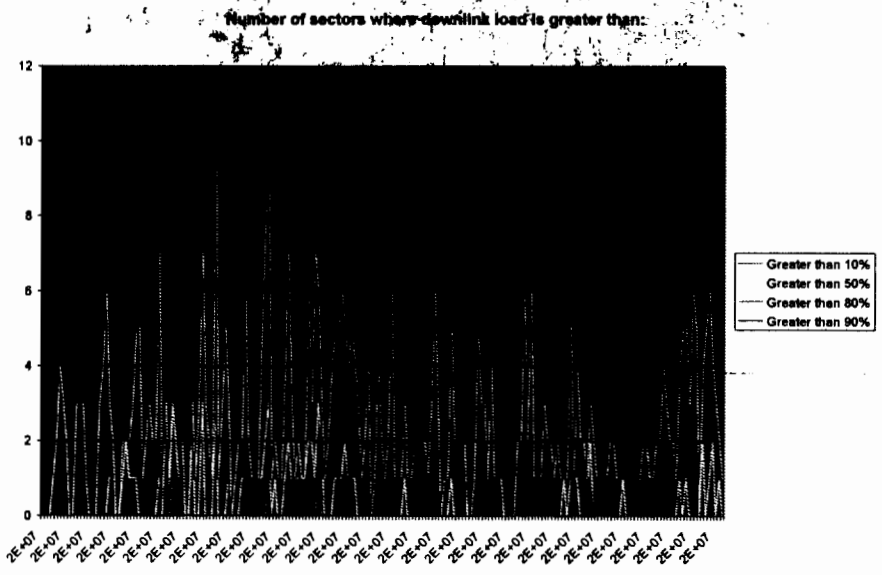


Figure 4: Uplink Load

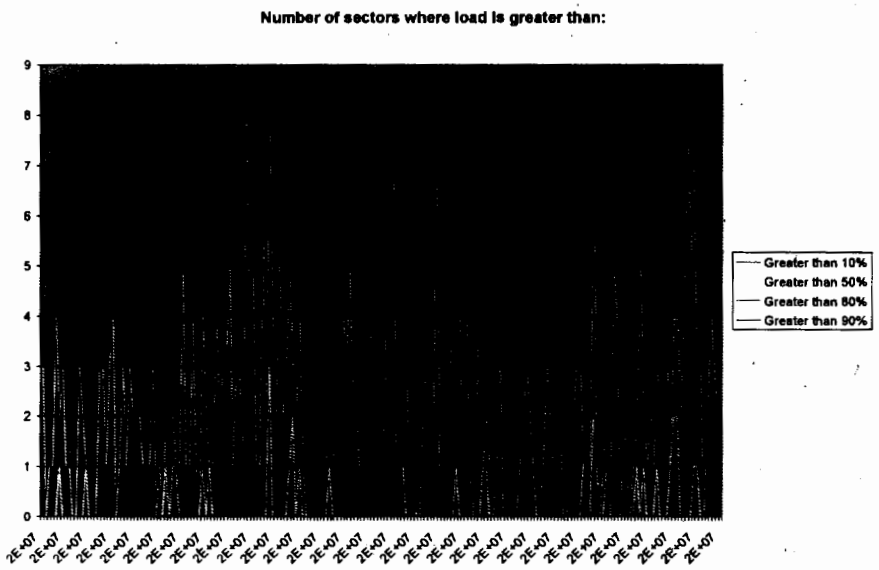


Figure 5: Downlink Load

Network Operational Experiment

This section describes the operations of the WARN network from a user prospective.

Usage of WARN

Over the past six months, the WARN network was heavily used to support the National Capital first responders.

In particular, during the 2006 July 4th celebration, the US Park Police hosted a Multi-Agency Communication Center (MACC) at their Anacostia facility. Beside OCTO, there were representatives from the National Park Service (in charge of the operation), the US Park Police, the Red Cross, the Smithsonian, the Washington Metropolitan Area Transport Authority (WMATA), the WMATA Police, the DC Department of Transportation, the DC Fire and Emergency Medical Services, the DC Emergency Management Agency, the National Weather Service, and the Public Health Service.

The MACC was set up with five large plasma displays. One was dedicated to the air traffic control radar, one for the National Weather Service, two for TV (CNN/ESPN/FOX), and one for WARN and Greenhouse video.

On Monday, USPP gave permission for DC F/EMS to view their helicopter video over WARN (using Greenhouse). OCTO modified the Greenhouse installation on the F/EMS command bus to allow them to sign in as part of the USPP domain. The DC F/EMS command bus at 15th and Constitution and transmitted pictures from its mast camera using Greenhouse. That view was looked at all day by the MACC users to observe crowd size, distribution, look at the parade and observe the effect of the severe thunderstorm that moved through at 5:30 PM. The DC F/EMS command bus would be occasionally be requested to move and zoom the camera for various views of the area. In addition, prior to the storm arriving, DC DOT asked for views of various traffic cameras on the plasma, again using WARN. This was helpful to determine the progress of the storm before it hit the National Mall. After the storm, DDOT looked at various cameras to determine traffic flow.

In addition to the PC with a WARN card used by the on-site OCTO support representative at the MACC, there was a WARN PAD connected to a router that provided internet access to half of the computers in the MACC. Beside the National Weather Service radar, the most viewed plasma (except during the shuttle launch) was the one showing the Greenhouse video of the mall from the DC F/EMS command bus.

The most recent new use of WARN has been in support of DC MPD's new emergency crime initiative. Four video cameras have been deployed around the city in areas of interest to the police department. WARN is used to transmit the video from these ad hoc locations back to the MPD Joint Operations Command Center. Operators can remotely pan/tilt/zoom the cameras to look at areas of interest in order to further reduce the likelihood of criminal activity. A fifth camera will soon be added.
Since they are not permanent installations, WARN is an ideal way to move these cameras around the city to provide connectivity back to the MPD Joint Operations Control Center.

User Survey Results

Monthly user surveys have been conducted since August, 2005. A graphical representation of the feedback is shown below in Figure 6 for the month of June 2006. While the lowest rated element has consistently been antenna reliability (the PC card uses a small snap-in, easy to disconnect paddle antenna), users' perception of system benefit has been rated very high.

The second lowest rated element has been consistent coverage. Due to the limited budget available for the pilot WARN network, more towers have not been deployed. Note the lack of capacity of the system can be perceived as a lack of coverage and improving the efficient use of this capacity (through QoS and/or multicasting) can

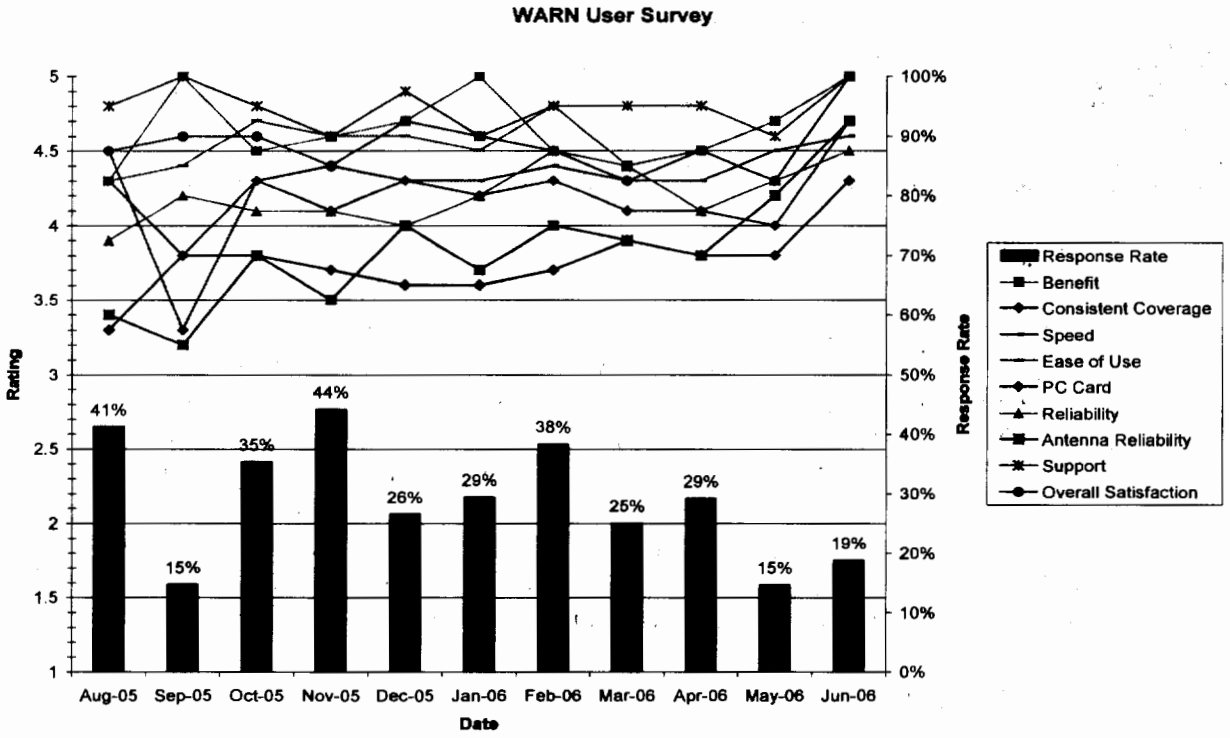


Figure 6: User Survey Results

WARN survey response rate of 19% for June. Users are encouraged by email follow-up to submit the surveys.

Two "Suggested Improvements" comments were received in June.

- Perhaps more antenna strength—MPD
- Low signal quality—MPD

There were no "General" comments received:

- Great asset to have while performing daily law enforcement activities—USPP
- Awesome product :)—F/EMS
- We used it during the 4th of July and it worked great. We monitored CapWIN and Trafficland—USPP
- Used for USPP command center during 4th of July--multiple computers at command center were on WARN with no degradation of bandwidth. Very pleased with the performance!!!!—USPP

The individual item scores for June are summarized in the table below. The numerical score of 5 is the best rating available. The arrows after the numbers indicate how this month's average compares to last month's average.

	Benefit	Consistent Coverage	Speed	Ease of Use	PC Card	Reliability	Antenna Reliability	Support	Overall Satisfaction
Overall Average	5.0↑	4.3↑	4.7↑	5.0↑	4.7↑	4.5↑	4.7↑	5.0↑	5.0↑

Applications

The District of Columbia, in response to legislation recently passed by the City Council, has deployed four portable cameras. Two different video vendors are being used for this effort. One, LiveWave, was used by the U.S. Secret Service for the first operational use of WARN during the January 2005 inauguration. DC Metropolitan Police Department (MPD) purchased two LiveWave systems several months ago. In addition to LiveWave, Total Recall is being used by DC MPD to upgrade their existing network of nineteen fixed video surveillance cameras. Total Recall has also provided two mobile units to be used for ad hoc situations. The two LiveWave cameras and two Total Recall cameras are deployed by MPD to locations deemed to be "high crime" prospects.

Next milestones

As the users' feedback demonstrates, the overall outcome of this pilot network is overly positive. Its success led the National Capital Region (NCR), an organization of nineteen local jurisdictions around the District of Columbia, to develop and implement a regional program addressing public safety data interoperability.

This program embraces a set of projects aiming at providing first responders data interoperability and includes: the interconnection of the NCR 's jurisdictions' private fiber networks, the development of a data exchange hub enabling the NCR's jurisdictions' applications seamless access and interface, and the deployment of a Regional Wireless Broadband Network (RWBN) in the 700 MHz band allocated to public Safety, extending therefore the capabilities of WARN beyond the District of Columbia limits.

Those efforts are supported by Department of Homeland Security grants.

In order to deploy the Regional Wireless Broadband Network in a schedule compatible with its Federal grant's funding requirements, the NCR filed a waiver to the current FCC rules in the 700 MHz band to enable the deployment of broadband technologies in a very short term. The solution detailed in the waiver takes into account the thoughts deliberated in the current FCC proceeding (WT Docket 96-86) "in the Matter of the development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010", that actually aims at modifying the rules in the 700 MHz public safety band to enable broadband services.

The technical data included in the waiver are also compatible with the draft of the 700 MHz plan of the Region 20 Regional Planning Committee (RPC). This plan is currently under review by neighboring RPCs. All NCR jurisdictions belong to the Region 20 RPC.

Also, local TV broadcasters have been approached to ensure a timely clearance of the necessary spectrum.

The technology to be deployed by the NCR will be determined by the outcome of an RFP issued on August 9, 2006. The implementation of the first phase of the resulting network is expected to be completed at the end of Q1 2007. The network optimization task is expected to be running during the following months. The coverage of this first deployment phase includes the District of Columbia. Once the network is optimized, users of the WARN pilot network will be transferred to the new operational Regional Wireless Broadband Network (RWBN).

Up to the conclusion of this transition, both WARN and RWBN need to run concurrently. This is why the District filed on August 16, 2006 for an extension of the current WARN experimental license.