Director of Technology Scott Wilder and Officer Katie McCabe of the Brookline Police Department

Photo courtesy Brookline Police Department

7 TRENDS FROM A BROADBAND PILOT

Research findings suggest that a dedicated wireless broadband capability is likely to result in a modest reduction of call clearance times, which constitutes a majority of daily police effort and resources.

By Nancy Merritt, Ph.D.; Frederick Frantz; Jeremy G. Carter, Ph.D.; and Eric Grommon, Ph.D.

Scientific methods can help us better understand the relationship between police practice and technology. Through a research project conducted in Brookline, Massachusetts, scientists from the National Institute of Justice (NIJ) and NIJ's Communications Center for Excellence advanced justice by documenting the ways a dedicated broadband wireless system improved policing operations in Brookline.

Many law enforcement agencies are proactively working to give their officers the capabilities that smartphone users have. As noted in a 2011 White House report, "While maintaining their traditional LMR systems, public-safety agencies are increasingly using commercial broadband systems to support their missions. Such agencies are adopting modern broadband systems in different shapes and forms, including

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using laptop computers in vehicles, as secondary communications devices (e.g., a smartphone) or for remote video monitoring. In many cases, agencies have relied on commercial off-the-shelf services."

The need for broadband wireless data access motivated one of the most significant legislative initiatives for public safety, the Middle Class Tax Relief and Job Creation Act of 2012, which resulted in the allocation of 20 megahertz of spectrum for public-safety wireless broadband communications and created the statutory basis for the First Responder Network Authority (FirstNet).

While there has been significant research on the impact of mobile computing on law enforcement, little research looked specifically at the impact of wireless broadband data access on operations. To address this gap, researchers undertook a project to look at the ways dedicated broadband wireless data access impacts law enforcement operations in Brookline.

Brookline provided a unique opportunity to evaluate the impact of wireless broadband access using a capability analogous to what will be realized nationwide with FirstNet. The police department is a medium-sized agency that serves a jurisdiction with a mix of urban business and suburban residential areas adjacent to Boston. The Brookline Police Department had been using commercial cellular data services through the use of air cards and laptops in patrol cars. Issues with cellular network coverage, however, motivated the agency to pursue alternative solutions. The result? A unique public-private partnership.

Brookline's Broadband Network

The town entered into an agreement with a commercial vendor to build a network designed to provide both wireless commercial Internet services and mobile public-safety access to municipal agencies, such as police and fire. The commercial network leveraged the unlicensed 2.4 GHz band to provide Wi-Fi connectivity for paid subscribers and non-public-safety municipal departments. The network also established free Internet access to public hot spots.

The private public-safety network used licensed 4.9 GHz frequencies to access the shared, unlicensed 5.8 GHz network backbone to provide secure access for police and fire agencies. The vendor raised revenue by charging for commercial mobile Wi-Fi access, while the town provided the sites for locating the network nodes (primarily streetlights) and electricity to power the nodes. Police vehicles were

equipped with radios that operated in the licensed 4.9 GHz public-safety frequency band that allows higher radio frequency power and higher gain antennas compared with unlicensed Wi-Fi technology. The data radios were connected to a laptop computer using standard Ethernet cables, operating over a secure virtual private network (VPN) connection.

Brookline's public-private partnership provided an opportunity to assess the operational impact of dedicated broadband wireless access because the network available via the licensed 4.9 GHz frequency band was used exclusively by public-safety users as opposed to having public-safety users share a commercial service, typically without any special priority. The Brookline Police Department wanted to provide officers in the field the same capabilities, in terms of functionality and data access, they had at their desks.

Call Clearance Times

The research notes that focusing on call clearance times provides one useful measure of a technology impact:

"First, on average, patrol officers spend the majority of their time engaged in directed and self-initiated patrol. If the implementation of a new technology is believed to enhance operations, it is best served targeting the operations to which officers allocate a significant amount of their time. Second, handling calls for service relies on the completion of multiple activities in succession. Generally speaking, during a call for service an officer must go through a variety of checks to clear the call. Each of these actions relies on a previous action to be completed prior to progressing the process closer to completion. If each action, or step in the process, is expedited, the entire process of clearing a call for service is improved upon."

The NIJ research team extracted call clearance times from the Brookline Police Department's CAD system from 2003 – 2009, providing about seven years of data —including three years of data before and three years after implementation of the Brookline 4.9 GHz wireless broadband network. The data were received in aggregated form by year and patrol sector — seven years of data from nine patrol sectors. The team used 63 observations in the statistical analysis of the difference between pre- and post-implementation of broadband access. It is important to note that time allocated to report writing, which can be significant, is not included in the CAD call clearance time, so any efficiency gained in the report writing process is independent of this evaluation.

The data showed that the Brookline Police Department experienced a statistically significant decrease in the call clearance times after using the new system. The decrease ranged from an average of 39 to 45 seconds per call. The overall rate of reduction was not uniform across Brookline's jurisdiction; the volume of calls and clearance times varied among patrol sectors. All but one patrol sector experienced decreases in call clearance times, but sectors bordering the city of Boston had larger, statistically significant reductions compared with all other sectors. These reductions were likely a function of call service types compared with the more rural

and affluent southern part of Brookline.

In addition to the statistical analysis of call clearance times, the research team conducted a Web-based survey and semi-structured interviews of Brookline Police Department personnel. The survey revealed seven trends:

1. The wireless broadband technology was implemented with minimal difficulty.

2. On average, respondents indicated information was easy to access, easy to share and moved more quickly. In their perception, information was more easily managed than in past experiences with commercial cellular air cards.

3. On average, respondents indicated they don't receive too much information, could do a better job with more information and want information from other agencies.

4. Wireless mobile broadband is an improvement on the use of commercial cellular air cards. Respondents, on average, reported that they could observe differences in signal strength when they moved from an optimal coverage sector to a reduced coverage sector. They reported that if they were assigned to a reduced coverage sector, they would change how they complete their tasks.

5. The quality of information personnel receive has improved because information is delivered in real time. Personnel can access information immediately, with no lag time. Respondents who were employed before mobile broadband was implemented indicated that information is of better quality and more quickly accessed than before implementation.

6. Mobile broadband improves how patrol officers perceive an upcoming encounter. Respondents indicated, on average, that mobile broadband allowed them to be more confident and safe when approaching an encounter while also improving the judgment that officers use during an encounter.

7. Implementation was not without challenges. A few weeks of training sessions and ongoing informal bulletin and email disseminations were needed to overcome skepticism about the transition to wireless broadband. Respondents perceived that the transition to wireless broadband increased the amount of data entry fields required to submit reports. Additionally, these reports were perceived to be subjected to increased supervisory surveillance and accountability.

"Some things you cannot equate or document, but you tend to see what the difference is with officers having access to databases they would not have access to, and how the whole work flow changes when officers have access to these databases," says Scott Wilder, Brookline Police Department's director of technology. "This is now our 'norm' for Brookline, my officers expect this, and if they are without it, they tend to be lost."

While these results provide important insights on the impact of dedicated broadband wireless data access, some limitations should also be kept in mind. The study was conducted after the implementation, and the analysis of data was limited to data routinely collected by the CAD system. Because the

survey and semi-structured interviews were conducted after the implementation, responses are subject to changes in perception over time. In addition, the evaluation focused on only one jurisdiction with unique demographic characteristics. Evaluating a larger number of jurisdictions would produce a more generalizable perspective of the impact of broadband wireless data access on operations.

Despite the limitations, the Brookline study is relevant to any law enforcement agency that is exploring the potential impact of procuring wireless broadband data capability. Some technologies are implemented to provide a single function or increase efficiency of a single operation. Wireless broadband, on the other hand, holds promise for enhancing a host of daily police operations ranging from expediting queries to monitoring surveillance cameras in cars.

The Brookline study is the first empirical exploration of how wireless broadband access can impact police operations, and the data indicates that wireless broadband communications can quantifiably improve law enforcement functions. The findings suggest that a dedicated wireless broadband capability, as is planned for the nationwide FirstNet network, is likely to result in a modest reduction of call clearance times — an activity that constitutes a majority of daily police effort and thus resources. ∎

Authors' Note: Points of view and opinions are those of the authors and don't represent the official position of the U.S. Department of Justice.

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