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Final Copy of Case Study

LOCATION:
Bowling Green, KY, United States

ORGANIZATION:
City of Bowling Green, KY

YEAR:
2008

ORGANIZATION URL:
<http://www.bgky.org/>

STATUS:
Nominee

PROJECT NAME:
Mobile Wireless Technology for Public Safety and Citizen Services

CATEGORY:
Government

Technology Area:
Mobile wireless broadband technology

Introductory Overview

Situated in the heart of south-central Kentucky, the burgeoning city of Bowling Green serves as the business, industrial, educational and healthcare hub for a 10-county area. The city hosts such industrial giants as General Motors, Fruit of the Loom, Camping World and Holley Performance Products, and it is the home of Western Kentucky University. With an estimated population of more than 53,000 in 2006, Bowling Green is the fourth-most populous city in Kentucky.

A few years ago, the city's fire department recognized a need to update its communication system -- especially the way fire fighters communicated with headquarters, and with each other. At the time, they were using an outdated audio radio network to talk to each other from their trucks. Outside of the fire station, they had no way to share pertinent visual information, such as roadmaps or blueprints of burning buildings.

Meanwhile, police officers in Bowling Green were spending far too much time at headquarters, filling out paperwork instead of working their street beats.

First responders knew they could do their jobs more effectively and better service the community with

constant access to the network to obtain information such as outstanding arrest warrants, police records, maps of burning buildings, license plate information, and simple driving directions.

To that end, Bowling Green decided to install a massive outdoor, broadband wireless network, which lets public safety workers maintain a connection to the city's public safety database, from any location in the 35-square-mile city. The network is due for completion by spring.

Outfitted with mobile computers in their cars, police officers will have constant access to information such as outstanding arrest warrants, police records, and license plate information. In lieu of returning to the office to fill out paperwork, they can file reports from their cars, via the wireless network.

The city also plans to install video recorders at several major traffic intersections. The cameras will be connected to the network. And in case of an accident, police officers can re-play a recording of the crash on their in-car computers, relying on actual events rather than the drivers' biased accident reports.

Plans also call for networked cameras in banks, school hallways, and other public buildings where safety might be a factor. In case of any criminal activity, police officers will be better informed when responding to a reported incident.

Meanwhile, fire fighters will have access to graphical information such as building maps, traffic information, and driving routes. The network will help them to determine which trucks are closest to a fire.

While Bowling Green initially planned the wireless network to aid first responders, city officials also want to use the city-wide Wi-Fi for other municipal applications. For example, Housing and Community Development workers will file building inspection information from the field, and completed inspections will be transferred automatically to a main database. They'll also receive inspection requests from the field.

The city also plans to use the network to mitigate

paperwork for pawnshops. Currently, pawnshop owners must submit paper forms detailing every item they sell in their shops – from wedding bands to handguns. The city receives hundreds of these forms each day, and the paperwork tends to pile up. Many of these shops don't have a wired Internet connection, but the wireless network will allow owners to file electronic tickets from their shops – mitigating paperwork for themselves and for the municipal workers whose job it is to process the information.

Finally, Bowling Green will open select sections of the outdoor wireless network to the public, allowing residents and visitors to have free Wi-Fi access from city parks.

The Importance of Technology

How did the technology you used contribute to this project and why was it important?

Bowling Green's network is an outdoor wireless mesh solution, comprising outdoor Wi-Fi access points (APs) and centralized network controllers from Cisco Systems. The

Cisco Aironet 1520 Series Lightweight Outdoor Mesh Access Points are equipped with radios that support the 802.11a/b/g wireless LAN standard, which offers data transmissions of up to 54 megabits per second; They provide more than enough bandwidth for data communications and video feeds, according to Steve Milam, manager of network operations for Bowling Green. When the multi-phase project is completed in the spring, the network will include some 800 outdoor wireless access points, spread across 35 square miles. The mobile computers and cameras that connect to the network also support 802.11g.

Standardizing on a single wireless technology ensures that all the public safety departments can communicate with each other. This is extremely important. Incompatibility of radio systems is a common problem among rescue workers. In fact, it is the problem that led to the deaths of more than 100 New York firefighters during the terrorist attacks of September 11, 2001; they failed to receive vital instructions from dispatchers because of failed radio transmissions.

In a wireless mesh, the network dynamically routes packets of information from access point to access point. A few APs have to be connected directly to the wired network, but the rest share a connection with one another over the air. Meshes are ideal for outdoor networks where a fiber connection is not always available. In Bowling Green, the majority of the access points will be attached to the city's electrical poles, with the blessing of the local utility company.

Cisco's Aironet 1520 Series wireless APs offer both a fiber connector and the option of running on battery power, which is crucial if there's an electrical outage at any time. They're also surprisingly hearty, which is important in cases of bad weather (Kentucky is prone to tornadoes) or bad drivers. While the network is still in its pilot phase, in a small section of the city, the access points have already proven their toughness, according to Milam.

"We had a drunk guy drive into one of the poles recently; the impact broke the pole in two, and knocked an access point onto the ground," says Milam. "The AP fell 32 feet, and it kept working, running on battery. It had a couple of scratches on it, but it worked just fine."

The access points also support Power over Ethernet (PoE) technology, which allows the transmission of electricity (along with data) over an Ethernet cable. To that end, network administrators can power the cameras on the network simply by plugging them into the PoE ports on the access points.

The wireless controller lets network administrators centrally manage all the APs on the network, troubleshooting potential problems and delivering software updates remotely. Mitigating the need for manual fixes is a boon for any network administrator, but it is especially important in an outdoor mesh network – where most of the access points sit 30 feet off the ground and out of easy reach.

The network also sports sophisticated security software that keeps hackers from gaining access to sensitive information.

Benefits

Has your project helped those it was designed to help? Yes

Has your project fundamentally changed how tasks are performed? Yes

What new advantage or opportunity does your project provide to people?

In multitudinous ways, Bowling Green's wireless network will help municipal workers do their jobs more efficiently, more effectively, and most importantly, more safely.

Police officers will communicate via instant messaging. "It's just a lot more efficient than having to call the dispatch over the radio," Milam says. "No longer will a dispatcher have to hear, 'One Adam 12.'" Text-based communication will keep interlopers from listening in on police scanners from their amateur radios.

During traffic stops, police officers will look up license plates almost instantly – a process that took a few minutes in the days before the wireless network installation.

Once cameras are installed in school hallways and banks, police officers will be able to assess a situation before they enter the buildings. By monitoring criminal activity from their laptops, they will be able to gauge the best way to deal with a situation – possibly saving lives in cases where the criminals are carrying weapons.

By the same token, the network will allow firefighters to gain situational awareness through access to crucial information en route to a fire. Armed with detailed driving instructions and building maps, they can respond to a fire as quickly as possible – and maneuver a burning building as safely as possible.

For both police officers and housing officials, the ability to file reports from the field means less time in the office. And avoiding multiple car trips to the office provides the environmental benefit of saving both gasoline and paper.

For pawnshops, the ability to send purchase information electronically will give the city faster access to potential

information about stolen goods.

For the general public: "Citizens get to have Internet access from a relaxing setting, like a park," Milam says.

If possible, include an example of how the project has benefited a specific individual, enterprise or organization. Please include personal quotes from individuals who have directly benefited from your work.

see above

Originality

Is it the first, the only, the best or the most effective application of its kind? Most effective

What are the exceptional aspects of your project?

Other cities have deployed wireless networks for public safety, but Bowling Green sets itself apart with its plans to incorporate in-building cameras.

"I haven't heard of other cities allowing visibility into a bank or a school via a police car," Milam says.

The city also distinguishes itself with the pawnshop application, which is also unique.

Difficulty

What were the most important obstacles that had to be overcome in order for your work to be successful?

Technical problems? Resources? Expertise?

Organizational problems?

Historically, many cities have faced logistical and political headaches when deploying a municipal Wi-Fi network.

In some cases, cities have attempted to lead their wireless efforts with the promise of ubiquitous Web access for the public. In many of these efforts, cities made deals with Internet service providers; the ISP would foot the bill for building a city-wide Wi-Fi network infrastructure -- in exchange for the right to sell Wi-Fi services to the city's residents. But these efforts have flailed because not enough residents are willing to pay for them.

In other cases, cities have attempted to build their own networks, only to find that the utility company did not want to allow the city to mount access points on its electrical poles.

Lack of funding is another common thwarting factor for cities that want to deploy a municipal wireless network; because cities often have several, vague plans for their networks, it's not clear which municipal departments should foot the bill.

Bowling Green avoided all of these headaches. First of all, the city made it clear that public safety was its top priority – and it's hard for anyone to argue against increasing public safety. Second, the city had an outstanding relationship with the city's utility company, so securing the pole space and the fiber connection was no problem.

“We'd done some work for them in the past,” Milam says. “There's a lot of good will that's there between parties.”

“At this point things have gone so smoothly, you kind of wonder when things are going to go wrong,” Milam jokes.

Often the most innovative projects encounter the greatest resistance when they are originally proposed. If you had to fight for approval or funding, please provide a summary of the objections you faced and how you overcame them.

see above

Success

Has your project achieved or exceeded its goals?

Achieved

Is it fully operational? Yes

How do you see your project's innovation benefiting other applications, organizations, or global communities?

Early on in their planning process, Bowling Green

officials traveled around the United States, studying existing municipal Wi-Fi networks in bigger cities. These days, officials from other cities are visiting Bowling Green in order to learn how best to take advantage of a wireless network.

And the success of the public safety applications has led the city to consider municipal applications that will allow city residents to interact better with the city government.

For example: “We’re looking at wireless kiosks for citizens to pay their taxes,” Milam says.

How quickly has your targeted audience of users embraced your innovation? Or, how rapidly do you predict they will? (In 300 words or less)

Bowling Green’s public safety workers were eager for the wireless network, which was deployed with their jobs and their safety in mind. In fact, the fire department paid for 50 percent of the initial phase of the project.

“They wanted it bad,” Milam says. “If you want to sell a city on wireless technology, you want to start with the public safety department.”

How quickly has your targeted audience of users embraced your innovation? Or, how rapidly do you predict they will?

see above

Digital/Visual Materials

The Program welcomes nominees to submit digital and visual images with their Case Study. We are currently only accepting .gif, .jpg and .xls files that are 1MB or smaller. The submission of these materials is not required; however, please note that a maximum of three files will be accepted per nominee. These files will be added to the end of your Case Study and will be labeled as "Appendix 1", "Appendix 2" or "Appendix 3." Finally, feel free to reference these images in the text of your Case Study by specifically referring to them as "Appendix 1", "Appendix 2" or "Appendix 3."

Currently Uploaded Appendices:

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