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Municipal Wireless Snapshot Report™

**Muni Wireless Mobile Applications:
A View from the Field**

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All views, opinions and recommendations expressed in this report are solely those of the author and the individuals interviewed.

Introduction

2007 is going to be a good year for municipal wireless. By summer's end dozens of cities should coming online with their networks. We will prove out where the benefits lie, and how these translate into dollars and cents. Assumptions will be verified – or not, critics mollified [some, anyway] and plenty of surprises are sure to emerge.

I'm going to step out on a limb and say that by the end of 2007, general public access (excluding business subscribers) will be widely viewed as financially the weakest pillar in the business case for municipal wireless. Enabling mobile workforce applications will be the muni networks' big ROI generator, whether local governments are an anchor tenant, own the networks in partnership with private companies or own the networks outright through municipal public utilities. Public wireless access is good political sound-bite marketing, but the beef is mighty hard to round up.

In this report 10 local government executives present a wide array of mobile applications muni networks will enable and their impact on government operations. You receive tips on executing departmental needs analysis and implementing pilot projects those who have implemented successful applications and others in the planning stages.

Reading these individuals' comments may lead you to re-think some of your assumptions regarding business models, cost justification and which departments can benefit. Local governments shortchange themselves when they limit the discussion to public safety and automated meter reading. Why leave money on the table from all the other departments?

You also may want to re-think your government's role in the network's management, particularly with regard to actions you take and contractual obligations you specify to ensure quality of service. Reading people's visions for their applications reinforces the importance of building the right network for the job and not leaving this solely in the hands of third parties.

*This is one of a series of qualitative research and analysis reports that provide a snapshot of major issues impacting municipalities' pursuit of broadband wireless networks. Each report expands on a theme presented in **Fighting the Good Fight for Municipal Wireless**, my book that helps readers understand the business and political issues that should be addressed when developing and deploying these networks.*

I. Show me the money – it's in mobile workforce apps

Two things muddy the ROI (return on investment) waters when people ask what's the business case for municipal wireless: too much emphasis on public wireless access and too narrow a view of who the network benefits within local government. Both lead to undervaluing the financial impact of applications that governments can run on the network.

Providing public access – especially “free” - to the network is the clarion call to politicians everywhere as this declaration of free muni wireless guaranteed mayors of even the smallest hamlets 15 minutes of national fame in 2006. Selling cheap access services to consumers is wildly popular but a tough business for anyone to make profitable, and giving away access is crazier unless you cost justify the network in other ways.

Bringing in a private third party just further diverts discussion from the value of the network to local government because the network is then “their responsibility.” Cities that bring in a third party to build and operate the network at providers' expense, then fail to make the city a guaranteed paying anchor tenant, have removed a lot of incentive for providers to build a carrier-class quality. Neither government nor the general public benefits.

On the flip side, many in the past year who have explored getting the network for mobile workforce applications seem to confine their focus to public safety and automated meter reading. However, 50% or more of municipal workers are mobile according to a source from Intel, and they're in every aspect of government, even dog catching. The ROI from these less talked about departments can be sizeable.

Governments are seeing the light

As RFPs are being awarded to build muni networks, those driving these projects are bringing all of the department managers together to explore what they can do with inexpensive city- or region-wide wireless access. Brain cells start percolating and all kinds of wonderful ideas pour out, many with great potential ROI impact.

I contend that you should conduct needs assessments of your departments, including office staff who work with mobile workers, before the RFP is written or at least before it's awarded. This input defines network specs and influences vendor selection. The short- or long-term benefits of mobile workforce applications (financial and intangible) can justify much of the network building cost and influence who pays for it.

For example, “some cities are looking at opening the network to social workers because they have so much paperwork,” states EarthLink's President of Municipal Networks, Donald Berryman. “Studies show there's 30% more productivity when they can complete reports in the field. Fire departments are sending building blue prints wirelessly to fire trucks which can now leave the station 90 seconds faster. Can you take

out the middle people? We have seen some SCADA apps that monitor environmental data in government buildings, so if heat gets beyond certain temp or the air conditioning stays on too long, an alert goes directly to workers' devices."

Don't let the images of free public access drive the discussion. These projects need to make elected officials look good, but a popular idea such as free public access that's fiscally unsound isn't going to do your pols' or your career much good in the long run. Isn't it better for citizens to have mobile workers spending an extra hour delivering better government services thanks to the network? My earlier report explains why free is a dicey gamble (www.successful.com/Snapshot-2-06.doc).

In this report some of the applications discussed that governments have implemented or plan to implement include, in addition to the "usual suspects," are those for:

- ▶ building inspectors and code enforcement staff;
- ▶ health services and social services;
- ▶ tax assessors;
- ▶ parks and recreation;
- ▶ animal control
- ▶ vehicle maintenance
- ▶ traffic control
- ▶ department managers and government officials

Public safety and public works are vitally important, and may comprise the two largest segments of your mobile workforce. But the other departments collectively represent significant operating costs that can be reduced, and some of these departments influence revenue generation. It pays to look at this big picture view.

II. Report participants

This report's participants are actively engaged in their governments' municipal wireless projects, and have experience and expertise to deliver a snapshot of what mobile workforce applications make sense for local government. These are city and county officials along with two vendor representatives who bring a different perspective to the discussion.

PARTICIPANT	ORGANIZATION
Merton Auger City Administrator	Buffalo, MN
Paul Butcher Marketing Manager, State and Local Governments	Intel (report co-sponsor) Chip manufacturer and early proponent of municipal wireless.
Carl Dresher IT Director	Tucson, AZ
Don Fitzgerald Executive Director Team Fredericton	Fredericton, New Brunswick Canada
Maurice Gallant CIO	
Charles Hewitt CIO	Providence, RI
Bill Marion Information Services Director	Milpitas, CA
Dana McDaniel Deputy City Manager	Dublin, OH
Bill Oates CIO	Boston, MA
Ron Puccinelli Director Information Technology	Concord, CA
Leonard Scott Business Unit Manager	Corpus Christi, TX
Angela Singhal Director Municipal Wireless Solutions	Nortel (report co- sponsor) End to end solution vendor to include infrastructure, applications, partnerships, and services.
Cindy Zerkowski IT Director	Macomb County, MI

III. Question responses

For this report, I not only wanted people to outline their respective plans for workforce applications, but also describe a little of the logistics surrounding the projects. Having a good vision of where this technology can take you is essential, but the mechanics of implementation are equally important. I asked survey participants the following questions.

1. What mobile workforce applications do you have in place or foresee deploying?
2. What financial and intangible benefits do you see resulting from the use of these applications?
3. Would these applications be possible without the municipal network?
4. What type of needs analysis did you conduct within the various departments to determine which applications make sense, and to gauge the impact these applications will have?
5. Briefly, how do you plan to pilot test these applications? Can these pilots be done before or during the network deployment?

1. What mobile workforce applications do you have in place or foresee deploying?

McDaniel (Dublin): Primarily for police and public safety at this time. As a test, we did use it for vendors and electronic ticketing for our Irish Festival held in one of our public parks. We tracked ticket sales and vendors used it to process credit card sales.

Scott (Corpus Christi): There are 30 applications so far that we've done pilot tests for or have received funding to deploy, including one that facilitates meter reading with WiFi. As part of our Health e-Cities program first responders and ER personnel can access individuals' data if they're unable to speak. If a doctor's records aren't digitally available, the data is on medic alert-type bracelets that people carry to be scanned and wirelessly sent to hospitals. Treatment begins before an injured person is even put in an ambulance.

For building inspections, contractors bring their paperwork to City Hall, we assign inspectors to go to the sites, they bring back inspection results for their boss to approve and then go back out to the site. Public Safety people are excited about the video technology they can use to look into banks or schools to see what's going on if there's a problem. We're testing unmanned helicopters with video and other equipment controlled through the network that can fly over potentially dangerous areas to better assess what people are about to encounter.

Auger (Buffalo, MN): We have a service orders application for meter reading. People who move in or out, or feel the meter was misread, contact a clerk who enters details and addresses into the system. It automatically creates and sends service orders to the right utility and a

worker's tablet PC. Workers enter data onsite that goes into the billing software. Before, we created paper order slips that workers picked up and then returned to the office when completed.

Another beneficial application is SCADA [Supervisory Control and Data Acquisition]. If there's an alarm at a plant or wherever it's deployed, software e-mails a person on duty to show them exactly what's wrong and where. Field engineering techs mapping items such as switches, manhole covers and hydrants send GPS coordinates back to immediately databases that various departments such as police and fire use.

Office collaboration and messaging in real time with mobile workers has become critical. Before, there was often a disconnect between staff in the field and those in the office who needed to do meetings and collaborate on operations.

Butcher (Intel): One category of applications government workforces need consists of those that allow workers to pull in information from the Internet, access databases, or capture data while out in the field. Look at your main desktop applications to find many that you can mobilize to increase the ROI to the city. The other category uses this fast broadband pipe to push data to mobile workers, such as rich media content to first responders. Workers who don't need rich data still need information pushed out to them about new and changing situations.

Managers and senior government officials who often aren't in their offices need mobile applications. This can be anyone who provides executive oversight, whether it's for constituent services, HR, accounting or inventory management.

In many areas you have multiple departments working together, both within local government and those from the state and county. These entities may have the same technology needs, so you can have similar applications from five different vendors running in one area. As one program gets mobilized, different departments pick up on it as people default to the mobile app. We saw this happen in Cleveland.

Fitzgerald, Gallant (Fredericton): We're looking at things from the inside out here. My job is to resist more applications. Every application that we run is now mobile because we can sit in a parking lot, coffee shop and we're connected to our servers. Before WiFi arrived in 2003, mobile workers used a variety of laptops, PDAs and lots of paper. Now, they still use various devices but little or no paper though we are equipping some specifically for remote access.

We have an environmental control system so we can centrally manage temperature, monitor devices and so on within various buildings. WiFi freed Property Services folks from having to be in the office. They were using the application before WiFi came in, but the staff uses it differently now because they can do tasks such as change settings on equipment while in the field.

Marion (Milpitas): Code Enforcement workers who respond to various complaints, including barking dogs, can determine from a site 'have we

issued a notice here before,' or 'have there been other complaints?' They can enter details onsite and print violations, correction notices and notes on mobile printers. Everything goes directly into the permitting system.

Automated meter reading is valuable. In many new homes the meter is embedded in driveways and workers often can't get to it because a car is parked over it. We have a 911 system in place to find vehicles closest to incoming calls. A few weeks ago, a call came in about a child choking. In 90 seconds a police officer was on the scene beginning CPR. 30 seconds later paramedics arrived. We had used a grid-driven system that assigned responders based on where people are supposed to be, but there was no way to know for sure. Paramedics expect to use tablet PCs to send data straight into our system as well as to the hospital.

Hewitt (Providence): We're now online with our public safety applications. All of our mobile government workers will eventually be running applications on the network as the departments are saying that it's creating some good possibilities. We have about 300 mobile devices for public safety and 150 for our other departments combined.

Public Works would love to have work orders dispatched to vehicles without having people come back to their offices. Also, this group is very busy clearing snow or tree branches during heavy storms. The network's access points and GPS gather data and tell workers – or even citizens via our Web site - which streets are cleared or still need work.

Another area we plan to serve with mobile dispatch and work order management is the Parks Department, including Forestry. Right now orders are relayed by phone. It sometimes gets complicated when they arrive somewhere and find they need other equipment.

Zerkowski (Macomb County): We have fiber providing highspeed access to the principle county buildings which we can extend to mobile staff working from there. Public Works' does a lot of code enforcement related to soil erosion, proper drainage of wetlands, rainwater runoff that goes into lakes and checking for contamination. They're considering moving their applications onto the network.

Environmental Health inspects septic tanks, restaurants and other facilities. They'll be able to send data back immediately over the network. It can also benefit Public Health's mobile staff which conducts water inspections to collect data and samples.

Staff workers visit senior citizens to deliver various services such as helping them resolve social security issues. Our people have laptops, but many seniors don't have Internet access. Since we're going to offer low-end access services, workers could tap into the network while onsite to have even more productive visits and seniors could access our online services between staff visits.

Dresher (Tucson): The network will allow us to monitor and control traffic signals from the office. People won't have to go out on false alarms and we'll be able to fix things remotely. We also won't have to lease data lines to support video cameras. We want workers in the

equipment bays repairing vehicles to have network access to use our work order management system to order parts.

I've heard interest in possibly using WiFi instead of the radio system to communicate with garbage truck and other public service drivers. Parks & Rec staff use the cellular network to remotely monitor fields to make sure maintenance happens at scheduled times. However, they go out to the smaller parks because we can't afford the data services costs to add them. Once the parks are on the WiFi network, access costs will drop plus field workers won't have to go to those small parks.

Singhal (Nortel): Social services workers who assess that a child is being abused want to input the necessary details in real time rather than take three weeks to process all of the paperwork. Likewise in health services, if you're visiting senior citizens at home to assess their health and determine if they need a nurse to come in or they have to go into rest homes, workers can report their feedback right away.

If each building inspector does more in a day using mobile applications, the city collects more money from fees and fines. Tax assessors can use a mobile application to do analysis in the field, immediately send an appraisal back to the office and e-mail property owners their appraisals. Speeding up the process can generate revenue faster.

These workflow automation applications also speed up the delivery of citizen services. This may not always produce clear monetary benefits but it's still a big deal because it provides high levels of customer service. In election years, this is extremely important.

Puccinelli (Concord, CA): We are consolidating cell phones, radios and desk phone functions into one mobile device for building inspectors, code enforcement staff and engineering construction inspectors. They will have one device working across the city's network regardless of where they are within Concord, with the capability to switch to cellular networks when they go outside the city limits.

Parts Maintenance workers who service vehicles, equipment for tree trimmers, maintenance crews and so on will have voice plus wireless access to e-mail, scheduling and time card applications. Our camera and video production crews who cover activities throughout the city for our government TV channel will be able to produce shows while out in the field and send them immediately over the network

Oates (Boston): We're coordinating our efforts to determine where there are existing wireless applications, and how we might use the network to improve or reduce their costs. We are keeping public safety separated because its requirements are greater and we want to drive more types of information, data and multimedia to these workers.

Public Works potentially is making its applications' engineering functions location aware. GPS capabilities on their devices identify where they are and automatically present relevant information from various databases. The Public Health Commission is working on information platforms to deliver proper data to those out working with kids.

2. What financial and intangible benefits do you see resulting from the use of these applications?

Auger (Buffalo, MN): We did business planning for public works and public safety and determined that we'd have a 5-year payback on the network. These included time savings from not having to drive back and forth from the field to the office all day, and instant information access so mobile workers resolve problems sooner. Part of this payback also was from gas saving since these workers drive gas-hungry vehicles.

Constituents support our citizen-aided dispatch system because they love the response times and having things done at their convenience. We're doing business the way they do business with their banks and Amazon. As a government we're changing the relationship with citizens. They trust us more and feel we're more relevant to their lives.

Scott (Corpus Christi): We estimated our automated meter reading system to save over \$1.6 Million over the 20-year life of the application. Taking a week out of the building inspection process saves contractors huge amounts of money, and the City expects to save about \$85,000 per year. We spend \$500,000 a year in cellular phone bills, so new WiFi-enabled handsets VoIP means we won't have to pay for minutes because a lot of voice communication will happen over the City network.

The traffic signal control system is expected to cut costs and save time. 25% of traffic lights that were not universally managed because of the expense are now monitored, workers remotely fix problems and staff monitor traffic patterns to better resolve constituents' calls. There are significant intangible benefits as well. The Health e-Cities application is so far reaching its goal of producing better health outcomes for people.

Marion (Milpitas): We'll gain an hour per day our inspectors won't travel back and forth to the office. They'll be more efficient since they'll have everything on digital check lists to walk them through all the tasks. They want to take and send pictures back to the office immediately if they need to get an engineer's input. Right now, you have to take the picture, bring it back to print and then everyone reviews it in the office.

As the city expands, our application should allow us to read more meters with the same number of staff. We'll get a similar benefit with the 911 tracking and dispatch system increasing efficiency and officers' productivity. With one area planned for 4,000 new houses, these capabilities are significant. The Traffic Department expects to save the time people spend driving back and forth across town. They'll fix problems quicker and move traffic through the city faster.

Oates (Boston): As we go down the path of defining technology requirements, we're doing parallel efforts to assess costs for each department's current systems and operations, and the potential impact on different city services from applications on the network. There's measurable benefit just in reducing the costs of workers current data communications. In some cases the benefits will be the intangible soft dollars of productivity improvement, but this is nevertheless significant.

We'll see an improvement in terms of data throughput and the types of data we can exchange between departments. We can deliver more content rich applications into the hands of mobile workers.

Dresher (Tucson): Transportation Department repair workers will make better use of their time and also get parts faster because they can place orders before the cut off time by doing it in the field. Vehicles are out of service for less time and there's better inventory management.

The Water Department monitors water wells. Some are in remote locations that take a long time to reach and we can't afford to run lease circuits out there. With the network we can deploy affordable monitoring equipment, to check on situations before sending someone out. The office gets details faster about decisions made in the field. Those responding to code violations will handle complaints faster which helps citizens. Once you put something in place you'll see opportunities that you never thought of before.

Butcher (Intel): Revenue and savings. When you increase either, that's good. The goal of these networks is – or should be - to receive positive results in both areas. Take automated meter reading. Anyone we've seen doing this is enjoying labor savings, usually cutting costs in the field by 20% - 25% and moving to a point where you won't need people going out to read meters.

They're also saving costs on 'leaks and peeks' services. Suppose your water main breaks while you're on vacation. If you send a reader out just once a month, this leak and its damage won't be detected unless neighbors happen to catch it. But, if you're monitoring everyone several times a day, you can send someone out immediately. There are alerting systems you can build in as well. This minimizes constituents' damages, saving them and the utility extensive clean up and repair costs.

Zerkowski (Macomb County): Maybe this means one more inspection a day because they eliminate unnecessary travel. We have growing communities but can't easily afford new staff, so this network can help us increase inspections with same number of staff. Getting information back to the office immediately is also valuable. For those who work with seniors, they could answer questions in people's homes rather than go back to office, find the answers, call back or whatever else they need to do to resolve clients' issues.

There could come a point where a program can assess data as it's collected in the field and recommend options to workers. However, the whole workforce's understanding of technology has to evolve before they start making demands that require new applications. The immediate efficiencies create financial and service-delivery benefits that justify the network. But once it's in place, it will inspire ideas to enhance services. So the biggest intangible benefit, really, is that people will come up with ideas we haven't thought of once they experience the network.

Fitzgerald, Gallant (Fredericton): There have been financial benefits, but it's very difficult to measure because it centers on the productivity of

our staff. We can do a lot more without adding people. We've had five years of increased growth that have set new records, but maybe only three or four additional people were hired in the past five years.

When you look at the intangible benefits, wireless has put Fredericton on the map. We recently won the top Canadian innovation award, and press coverage has exceeded the value of project. We have some firms that do business worldwide and they no longer have to justify being located here. Customers see them as being leading edge because they're using the network. Some people have set up offices here because they feel this is an innovative, forward-thinking progressive place.

McDaniel (Dublin): WiFi allows us to "roam" seamlessly into and out of the network coverage area. When officers are outside of this area, their mobile devices will access the Sprint EVDO network. The city's WiFi network will reduce costs overall, the data speed will be faster and we'll have better security and less latency.

Puccinelli (Concord, CA): By consolidating all of our communication functions into one mobile device, we expect to save \$180,000 based on our formal cost benefit analysis. These costs we're eliminating include hardware and service provisioning for multiple devices and eliminating recurring cell phone costs. If we can increase daily building inspections per worker from four to six or eight, for example, we would double revenue for the day by processing more building permit fees.

There are some hard-to-quantify benefits. For instance, the government TV station we run allows us to highlight government activities that we're currently unable to publicize heavily in other ways. This way we show the community what we're doing. If we increase enrollment in life-long learning classes through this TV coverage for instance, then the City gets more money from a grant source.

Hewitt (Providence): Officers can file reports, run license checks, do surveillance and conduct lineups in the field. This meets criteria established by the Justice Department's Office of Community Oriented Policing Service, from which we got a grant for our network. Firefighters can get building plans to command cars before these arrive at a fire.

We'd eliminate an hour at the beginning of each day and the hour and a half before quitting time that building inspectors have to come into the office. The bigger impact is that we would complete inspections on building projects sooner and get those up faster. This helps the tax base, attracts new business and increases the velocity of investments because you finish projects faster and with fewer mistakes.

For our Forestry staff, someone can be at one job, learn about another one and change plans on the fly. You get the same benefits in public works, plus you can send photos of a site along with the data. Decision making in the field will be improved.

3. Would these applications be possible without the municipal network?

Fitzgerald, Gallant (Fredericton): We could have a private company build the network, but this would have limited us in the types of services they could price and make a return on. Our mission is not to earn a positive return. We do things that no one else could do because they can't make money doing it. There are certain applications I'm sure we could get, but we might have limited options, less efficient integration and higher prices. Companies cheery pick the high profit areas.

Hewitt (Providence): I can't even imagine these applications without the network. We tried using cellular networks for some of them. There was a low-speed data network in public safety for 12 years. When it was first brought in, it was oversold – our police expected to be able to see mug shots in their cars, which you can do if you're willing to wait several minutes for each shot. People soon gave up on that idea.

One of first things we did with the new network was put in an application that allows a suspect lineup for victims to view right on the spot when officers respond to their calls. When officers saw this they realized it isn't something you can do without a broadband network.

Zerkowski (Macomb County): We're using a commercial cellular carrier, so we're doing some of these mobile workforce applications already. However, the service is expensive so departments really have to have a strong need for the application before they can get it authorized. For example, it's better to use carrier service at \$60 a month per worker rather than to have them needlessly drive back and forth. But people are looking forward to the municipal network because we would have more workers using the applications if access was cheaper.

Singhal (Nortel): Not really. If you're using leased land lines for highspeed access, you don't have mobility. You can use cellular networks for data, but you're limited in the types of applications you can run because of their relatively slow speed. But if you have a municipal wireless network you can run all of these high-bandwidth consuming applications and still provide general access services to citizens.

Marion (Milpitas): The 911 system would not function the way it does if we didn't have the network's speed and capacity to pull the amount of data that we do. 70% of the data that traffic dispatchers need is going over WiFi. Location data for all of our public safety personnel in the field is broadcast back every 20 seconds. There's no way we could do this with the previous system we had. We couldn't do meter reading and run the building inspection application.

Auger (Buffalo, MN): We had a vision and with some of the applications we didn't see a way to run them effectively without having this network. The system integrator we rely on came in to talk to us one day and had a demo of an outdoor mesh network. This showed us how we could implement the various application we were contemplating.

Oates (Boston): It's hard to tell. Our whole thought process around wireless is still fairly new. Previously there wasn't a lot of focus on trying to exploit wireless within the city before this. Maybe some of that was because the on-going cost of other data services was prohibitive, so people figured why pursue it. The excitement around the current low-cost wireless initiative has driven us to start thinking about this a little more aggressively.

Puccinelli (Concord, CA): Without highspeed wireless infrastructure, you can't do it. We looked for three years at building a city network. When we analyzed these applications, taking everything into account and looking at where it would drive out costs, building and maintaining our own network would cost \$40,000 more per year than we would save. The benefits over time might have made up this difference, but the City didn't want to take on the short-term loss. When MetroFi offered to build the network for us, we were then looking at a \$180,000 savings.

We were not looking at using the network for general public access, just for government use. If we had planned for public access, then costs for service and guarantee of availability would have driven the whole project costs higher. An interesting thing we discovered is that outsourcing the network's operations would have been more costly than operating the network ourselves.

Dresher (Tucson): These apps are really needed, and we'd figured out ways to implement them using current network options. So this is really a question of who can use the city network to do things for less money and use the savings for other areas of improvement or gain other efficiencies. For example, our traffic lights. That department is paying monthly fees for circuits to monitor them. We could be using this money to repave streets or fill more potholes.

4. What type of needs analysis should municipalities conduct within the various departments to determine which applications make sense, and to gauge the impact they will have?

Singhal (Nortel): Up front you need to get in there with the various departmental stakeholders. Who better understand the intricacies of their departments' operations? We advise working with a consultant who is objective, can see the big picture and can help others see it. A big challenge to getting support can be managers who want to protect jobs. But maybe workers displaced by the technology need to be re-classified.

As soon as you give managers the basics of what mobile can do, have them come up with a mobility game plan. Start with the key business drivers within each department. If you're trying to drive down costs for operational services, for example, go through every task to see how many processes and what steps workers go through to do a building inspection. Then do a cost analysis. Can mobile applications get you to your goal? Will it reduce the speed of information access and delivery?

Oates (Boston): We're trying to get everyone to think about it first of all and generate ideas, which has been productive because we've had a

lot of good exposure in the media. Discussions have moved forward in departments just because they know we're getting the infrastructure. IT is going to the departments to organize discussions and ask what are the new business applications for the technology. We're going to see new opportunities and they will be sustainable because of low cost access.

Some departments tried proactively to find wireless applications on their own before this, and those that found appropriate software are implementing some things. We want to raise this needs analysis to an enterprise level so we leverage applications across departments. We hope to coral all of these requirements the departments are identifying so we can prioritize and execute.

Auger (Buffalo, MN): Our operating philosophy was that we want to be Internet-enabled so we can communicate better with our citizens. We want to be able to say to them that 'everything we have is yours.' So given this belief, it was easy to determine that we wanted to use this network to improve any application we could, to make everything an extension of our philosophy.

Puccinelli (Concord, CA): We put together a task force to identify ways to save money in the budget. They found savings through initial analysis. Then we brought the department managers together and asked if we had this access, what are the benefits? The Finance Department helped the department managers, and the City's Finance Manager did the overall cost/benefit analysis. Everyone put together a long list, then the task force asked what can we do first that will have the biggest impact. From this process we defined the initial set of benefits.

McDaniel (Dublin): We didn't formally conduct a needs assessment. We focused first on developing a WiFi infrastructure to provide wireless bandwidth with the intent of owning it. We knew, as we discovered by owning conduit and fiber optics, that this "infrastructure" must be in place first. Once in place, especially if we owned the network and tied it into our Dublin fiber system for backhaul, the possibilities would be limitless as technology evolves. The needs would develop as people saw the possibilities.

Fitzgerald, Gallant (Fredericton): We certainly did a needs analysis when we started building fiber [to the premises] in 1999. Connectivity costs were high and increasing compared to other jurisdictions, which we needed to address. That started us on the path to wireless. We see wireless and rest of the network as infrastructure similar to sidewalks. We didn't ask the departments whether they would use the network because, similar to how their people use sidewalks, they will use the connectivity.

Scott (Corpus Christi): We described an outdoor wireless network and what it does for the department managers. 'Imagine you can go anywhere in the city and access the Net at high speed. Where is the low hanging fruit to make us more effective?' It was like opening the heavens. Everyone had ideas. Vendors even came in wanting to test

ideas and develop proof-of-concept applications which we could then buy at reduced prices.

Most of the software that municipalities currently run has a Web-based element. When you start looking at wireless, you realize this is what you need to extend to the field. A big issue is tailoring software to those who work in field. You need Web tools that walk users through tasks in an organized fashion: what are the steps the constituent needs to take; here's the store from where you can order product. It's all comes down to a simple front-end interface. We worked with the Public Technology Institute to help us quantify benefits of the applications.

Dresher (Tucson): The departments handle this in their own unique way, coming at things from different angles. We work with them and, generally speaking, we all follow the same script. IT plays a big role in doing the actual needs analysis, but the departments take the lead on how this is done.

Butcher (Intel): Remember in City Slickers when Jack Palance tells Billy Crystal 'the secret to life is just one thing?' The success in muni wireless comes when you start off with just one thing, one major application that has a clear ROI. That's because the biggest liability is not the financial risk but the political risk of the people in power and constituents not understanding what you're up to. Cities that try to promote everything can develop a communications problem. Their message gets lost and subsequently they don't get enough buy in from the power brokers within the various stakeholder groups. This leads to delays and failures.

Zerkowski (Macomb County): The interest in wireless applications evolved from the new technology plan we developed for the county as a whole. We were using a mainframe that was on its way out, so we had to replace the software applications. IT met with the departments and reviewed the business processes they had in place.

Everything wasn't about 'we want wireless.' We don't buy technology for technology's sake. We do a business analysis to determine what needs technology can fulfill or enhance. In doing our master plan, mobile technology fell out of the process as a viable solution. 'We're out in the field a lot. Couldn't we have an app that does this, or makes it easier for us to do that?' We spent five years replacing that mainframe system.

Marion (Milpitas): It's not like we did an analysis to see if people needed wireless. People came in with operational needs and we looked at how we could tie wireless into the solutions we considered. As you do this, people start probing what they can do with it. It's the people using hardware in the field who come up with the best ideas.

The big driver for this network project was public safety. They looked at what applications made sense and determined these needed more bandwidth than we had. WiFi this was only network fast enough. Building Inspection was also looking for a new application. When we evaluated responses to an RFP, we tried to figure out if vendors could

take advantage of the network to get better results. We used to view functionality as independent from technology infrastructure. Now it's all about how can we use infrastructure to make an application even better.

Hewitt (Providence): There's no procedures manual, but we have a process to go through for acquiring any capital equipment. Part of this is to test technical and financial feasibility. We've had to shoot down some neat projects. Some departments were a little starry eyed and hadn't explored the full technical implications of what they wanted to do. We work hard to really understand the impact on union relations and other things that have nothing to do with technology, but everything to do with the impact on citizens and making government work.

In the financial analysis, the City tries to look at the dollar payback for projects. However, it's not nearly as rigorous as the analysis in private industry because of the representative nature of government. A lot of the ROI depends on whether I can deliver services better. It's up to the senior managers to determine if the city can afford a particular application, is there political value in using it and can we do so while keeping the tax rate at an affordable level.

5. Briefly, what guidelines would you give local governments for planning their pilot projects for these applications? Can these pilots be done before or during the network deployment?

Dresher (Tucson): We will create a pilot process for having some of the workers in the appropriate department use the software. Before we accept it, the application must meet some per-defined criteria that's usually set by IT and the department. Prospective users will have spec'd things they're interested in from an operations standpoint, and we have things we're interested in from a technology perspective.

We're doing some of the pilots already even though network deployment hasn't started. The ER application that's actually the big driver for initiating this network project is an example. The pilot is already in place and generating a lot of constituent and political support for the network. The building inspectors are going to use cellular network cards in the interim to pilot their application, and then migrate to the City's network. Other applications are waiting until the network is built.

Zerkowski (Macomb County): There are two types of testing for us. The first is an application that you want to experiment with, but aren't necessarily committed to. You try something on a prototype basic. This is not an actual project. But when someone makes a commitment to purchase and you select a vendor, this is a formal pilot project. For the municipal network, for example, we selected a vendor to facilitate the build out and ran a pilot to verify that the vendor could do the job.

IT is centralized and manages all projects. In conjunction with the departments and vendors, we select people to try a particular application. A test plan typically calls for us to load up 'x' number of laptops, identify the participants, train them on the software and send them to the field. There are criteria to be met, so they complete

evaluations. We want to be sure people stay connected while they move around, network response time is good and overall coverage is good. If things meet expectations, we expand the deployment.

Scott (Corpus Christi): We use standard pilot processes. Managers and IT meet as group to determine what resources we need to effectively pilot the proposed application. We also want to anticipate what impact it will have on operations, is it something that we'd be hung out to dry for if we didn't do it. Manpower is the big expense, so we want to know if we can make the people we have more effective rather than hire more.

Political foresight has to be tapped during the pilot. You have to read the political realities. The application may not be what's best, but is it the way constituents want to go? You have to see what they're demanding and what you have to respond to. Bureaucrats are not elected, but we have to be in touch with what gets politicians elected. We keep in close contact with officials and so they see that what we're doing is no different than developing roads and adding street lights.

Marion (Milpitas): The departments work through us to set up pilot projects. The utility group, for example, came to us and said here's the problem we want to address. We assigned staff to work with them to develop a plan. In larger government organizations IT may be decentralized. On one hand, this is problematic because there's duplication of effort and it's difficult to get basic things such as e-mail or timesheet management to work across the organization when everyone has their own application. However, each department has complete control and doesn't have to contend with centralized constraints and compete with other departments for resources.

If IT is providing the wireless network infrastructure, they should structure the pilot and other deployment processes so the departments have to work with IT. Then applications are guaranteed to run on the network. When I worked at 3M we came up with a way to consolidate purchasing as well as establish and enforce technology standards.

Singhal (Nortel): Once a municipality identifies the applications it wants to pilot test, identify a limited area of the city to conduct a trial that is representative of the much larger deployment planned. For example, target a residential area to put up a pilot network to test automated meter reading. Then evaluate the installation, operations, performance and concerns such as the application's ability to reliably and accurately collect data, measure how long it takes to install the devices on meters as well as understand the cost implications. Make sure the pilot objectives are clear and identify what the success metrics are.

In all cases, the pilot project should evaluate not only the technical QoS [Quality of Service] of the application and the network but also evaluate the QoE [Quality of Experience] that has a great bearing on end user satisfaction and acceptance. Not doing so may introduce unique artifacts of the trial that may color your test results. Strongly consider working with a solutions partner who can undertake such a pilot project with a

get-started or trial kit that can demonstrate a path to scale up the solution for citywide deployment. The partner should also bring design and implementation as well as tested applications experience to the project so that the required QoS is met and you get the QoE essential for the applications performance and stakeholders' acceptance.

McDaniel (Dublin): We have done some piloting such as the Irish Festival I mentioned earlier. Our safety forces have begun to assess applications. The first phase of our buildout will be complete and running in a four square mile area by mid-January. We are meeting in early January with our private party to discuss future phases. As to other pilots, our Communications Administrator is developing the possibilities for pilots and testing. Any pilots or tests will be done on the builtout system as we will own 25% of all available bandwidth, no matter where it is built out in the City.

Hewitt (Providence): There's certainly no template. I have good relationships with department heads, so everything's pretty much a team effort. If it's an application that other cities or companies have done, we're likely to just go with it. If it's a new or risky application, we'll spend a lot of time testing it. With the network for public safety, we didn't do a pilot. For one thing, this particular application is not valuable unless it's deployed border to border. But also, the underlying technology was quite old and I had worked with it in private industry.

So we had a proven application, we had a work force that was used to accessing data in the field and the senior brass was in tune with what we're trying to do. We did do some due diligence by going to Buffalo, MN to experience their network and talk to their people. It turned out that the main problem for us came in trying to find building sites where we wanted to deploy the infrastructure.

Oates (Boston): We're talking to folks and soliciting ideas for projects to implement as pilots. We're asking if there are applications that make sense to deploy in a neighborhood while we're building the rest of the network. By the time we have network in place citywide, we'll have processes in place for piloting and evaluating the pilots.

We view the department staffs as subject matter experts who are knowledgeable about their data, and expect them to drive us to the importance of something. We'll help them frame what a pilot is, set criteria for its success and put some discipline into the execution. One of the things I find is that lots of people talk about pilots and betas, but then don't bring them to an effective conclusion. Either it works and we move to make the product ready for everyone, or maybe we decide to terminate the project and move on to something else.

Puccinelli (Concord, CA): Because of our size, IT works with each department and manages the project with a counterpart from each business unit. We'll set up pilot applications or a testing lab so people can come in and put them through the paces. We can pilot without the network being fully built out since we have the two-mile area downtown set up. This use of a partial network build outs, pilot demos and labs is

very much how the private sector does it, but I don't know if this is the way other governments run their pilot projects.

Butcher (Intel): Cleveland was interesting. Their water department inspectors were given PDAs with productivity software. The city put up several access points in a high density area with the idea of involving just a handful of people in the pilot. They made sure everything worked, and developed a training plan for about 50 people. Right away folks started complaining about having to learn the program and doing things on PDAs. They were also agitated because management could see how unproductive some people were.

Your pilot project planning should take this into account. As soon as you put in automated capabilities, realize that it exposes a department's inefficiencies in many ways. 'I see you spent a day here. Why didn't you go there and there?' Some people are incredibly innovative at how to be lazy, and they are not happy to have this uncovered. You need contingencies for how to resolve the potential push back from workers.

Auger (Buffalo, MN): We've tested many things. We set up these pilots in the various departments with help from IT, and we involve whoever's going to use an application because if they don't like it they won't touch it. You can pilot without the network being ready, for example, by putting up one or two radios in an area. Workers can drive into that area and use the software, download data and so on. It wouldn't be all encompassing, and you may not see the full benefit of having wireless access everywhere, but you would see basically how it works and get the mechanics down. Since so many applications are Web-based, or have a Web component, you don't have to host the applications during a pilot if the vendors do this.

Fitzgerald, Gallant (Fredericton): We did some testing initially, but we started with small pockets of WiFi in targeted areas. Then the light went on and we figured this could be good for everyone. For every application that we roll out now, we test how we can use it from the field. We're piloting how much of an application can use WiFi, not whether we need a WiFi application. Since people still use a variety of devices, we're continually learning in this area. As the smaller devices become more popular, we're dealing with factors such as problems using them with gloves, dust and how weather impacts devices' operations.

IV. In the final analysis

As you see, there's a lot you can do with these muni networks to improve government operations. It's also clear to those who are tapping departments for ideas that once networks come online, applications are going to start bubbling up that no one could foresee. To be fair, there will likely be some negative developments and unforeseen challenges too that create a spike in Tylenol sales.

As one of my favorite pulp fiction detectives is fond of saying, "readiness is all." So here are some insights and tips to help you be ready for this new world you're creating for government workers.

Should you re-think the business model?

As you read how the participants in this report plan to use applications to transform their mobile workforces, you see many benefits resulting from "putting workers' desktops in their pockets." There's potentially large cost savings, revenue increases, and the ability to deliver more government services with the same number of people. New technology will inspire yet more mobile workforce automation.

To achieve these benefits you need hefty, bandwidth intensive apps running on mobile devices, access to huge databases, complex video feeds, voice communication, instant feedback and data processing capabilities and inter-agency collaboration. And all of these tasks require massive bandwidth, highspeed, security and guaranteed high service quality 24/7.

I find it difficult – ok, almost impossible - to believe you can get this kind of network with the requisite service and support if a provider is relying on ads to survive and grow. When the service provider is carrying full responsibility to build and run the network, but selling subscriptions, you have a better chance of success – if you're paying for government workers' access. To believe that swapping pole rights for free government access is good financial strategy is a risky assumption since the increased pressure on the provider's ROI can hurt them and you.

Given the network's potential upside, a number governments, including some of those represented here, downplay the public access/free discussion and make improved local government the main driver in their business cases. Quantify your anticipated government-wide benefits to determine how much this offsets the network's cost. Take a long-term view of the cost/benefits because it's going to take a few years for some aspects of the network to pay for itself.

Once you develop the big financial picture, re-evaluate the network business model. You can pay for and manage a network for government workers that is separate from the general public's network. You can have one city- or countywide network for everyone and pay the provider to set aside a portion of the network for government use. Consider the

Boston option and create a nonprofit that funds the entire building and operation of the network. They have the benefit of controlling the network without owning the building and operations headaches.

Whichever way you pursue it, the government has to have skin (money) in the game. Otherwise you risk getting a network unfit to reap the full benefits of transforming government operations.

Get your vision checked

Helen Keller once remarked that "worse than being blind is being able to see and not having any vision." So it is with using muni wireless to transform local government. Law and order is ok as a re-election campaign theme, but it's an extremely limited vision for a technology that can do so much to change how a government's business gets done.

I agree with Intel's Butcher that you need to have your initial message to stakeholders focus on one application, but managers' planning should include the overall transformation of government. A common theme in this report is that once people see the potential of the network, you get an endless stream of ideas.

Here's how you expand your vision. As you evaluate each department probe at great length ALL of the following questions:

- ▶ Where can we eliminate paper and paperwork processing;
- ▶ What if we give workers access to more data;
- ▶ What can new functionality such as wireless video and VoIP do for us;
- ▶ Can we change the relationship between constituents and workers;

Processing paper is the bane of local government workers. It costs a lot, limits data capture, wastes time coming and going (literally), kills creativity and generally aggravates the heck of out everyone involved. Eliminating this paperwork enables those in the field to do more, obtain more, think more, and create better ways of doing their jobs.

Put a world of information at mobile workers' fingertips, and they'll make better decisions, become proactive and be more effective. Go one step beyond and use WiFi-enabled transmitters and sensors plus GPS to make even more data accessible so mobile workers can remotely monitor and manage vast resources to greater effect.

View the world of wireless through the eyes of a teenager and take government service delivery to the next level. Mobile instant messaging becomes real time inter-agency collaboration. Mobile YouTube video uploading becomes mobile code enforcement. Web-cam teen chat becomes remote traffic control. Many of today's teen tech toys are tomorrow's standard business equipment, so who says you can't foresee the future?

Workers with mobile devices can change the dynamic of their relationships with citizens, businesses and tourists. Everything from forms processing to getting directions to finding the nearest worker who's capable and available to solve my problem becomes easier, less

frustrating and more productive. Re-define what it means to be a responsive government.

Needs analysis has to push the envelope

The various people interviewed for this report have slightly different approaches to needs analysis, as I'm sure many cities and counties do. But you can sum up their approach through a few guidelines.

As you explore the benefits of municipal wireless, go to other municipalities to see what their departments are doing with mobile workforce applications. As one example, EarthLink's Berryman states "when you look at Milpitas, they have a proactive CIO, City Manager and government overall. They have every vehicle identified and on desktop screens in dispatch centers. They now can have the same data pop up on screens inside vehicles. The result is that they aren't wasting on a lot of extra people, so they can put more feet on street."

Bring people together for a little Show & Tell. Look at how many of those interviewed here talk about the numerous ideas they got for the network by giving people just a sampling of what the technology can do. Push the creative limits. Encourage all ideas to be put on the table. You can reign in the list based on budget and practicality later. Make sure end users are part of brainstorming. Someone who hasn't been in the field in 10 years has probably lost touch with day-to-day operations issues.

Send people away from the initial brainstorming meeting to do the business and political due diligence required to make sound technology decisions. Prioritize ideas according to profitability (financial and political), the level of visibility that the ideas can get and the time required to implement them with reasonable expectations of success.

Define and align network requirements based on application requirements so the network actually supports the apps. When you look closely at people's comments, you see there's a direct dependency on a network's capacity and capabilities in order to achieve the benefits of mobile workforce applications.

Lay good groundwork for your pilots projects

"I wouldn't think that there's anything different than pilots for other applications," comments John Davies, Toronto's CIO. "There's a significant focus on security, availability and reliability with wireless, so you're testing to make sure workers can always get a connection when they need it, it's secure and coverage is consistent."

Here are a few critical guidelines.

Budget issues

Don't be cheap to the detriment of long-term benefits. Resist going for all the bells and whistles, particularly with hardware. Selecting the cheapest products often has the highest costs because the devices won't

survive the rough handling in the field for long. Rely heavily on end user feedback regarding durability, applicability and reliability.

Similarly, keep your gadget freaks in check. The pilot should first be about proving the viability of a particular application or device to meet a business need. The original BlackBerry was the homely stepchild compared with sleek PDAs and offered few bells, no whistles. But you couldn't pry BlackBerries from their owners with dynamite because it did one task – transport e-mail - extremely well.

Management issues

Workers may not take this seriously because it's a pilot, but once they start accessing and carrying around sensitive data, managers must play an active role in managing data and network security. IT may set security procedures and policies, but managers have to create an environment that encourages or forces employees to comply.

Senior managers need to communicate directly with workers about security. Establishing rules such as making employees pay for lost devices is one way to enforce the message. A more effective way may be to tie performance evaluation ratings to keeping data and devices secure during the pilot and beyond.

A few good participants

Get the right people as pilot participants. Don't take only the lowest performing workers because you don't want to lose the productivity of the best people. This approach is likely to give you poor results. Underachievers often are slow to learn the application, inept using it or give you inadequate feedback on how to improve it.

Pick a cross section of workers so you get a better picture of real results to expect when the entire workforce gets the application. Make sure managers don't take over and drive all of the feedback and adjustments. Rank-and-file employee input is key to the success of the pilot.

Identify potential barriers to acceptance and use the pilot to get to their root cause. It's less expensive to overcome these challenges in a pilot rather than after organization-wide implementation. Work with IT and vendors to ensure that applications conform to how people really work, and recruit a few application champions from among mobile workers.

Measuring results

At the end of the pilot project take full stock of what the project has taught you, starting with the question "how real is the technology's business potential? This question is answered most accurately if you take the time before the pilot starts to define what it is you want the pilot - and eventually the full deployment - to accomplish.

For some managers, this final assessment might take the form of spreadsheets and financial analysis reports. For others, it may be a consensus drawn during a gathering of participants and key stakeholders. Whichever method you use, assess and map out how to

extend the benefits proven in the pilot to the entire mobile workforce, and/or how problem issues can be resolved before full deployment.

Death, taxes and change

While the only things guaranteed in life are death and taxes, it's almost a certain bet that when you deploy mobile applications to your mobile workforce, things are going to change. This takes even the most prepared governments by surprise.

Some changes are good. A building inspection application opens up new revenue streams. Howard White, a deputy building official for St. John's County, FL observes that things definitely changed for them.

"This new awareness of the role we play in the big picture of delivering homes that are code-compliant and safe has led to a great sense of accountability throughout the department. For years this department was viewed a big abyss where no one cared, no one liked you and nothing got done. People would rather have taken a beating than go to 'the Buildings Department.' Today everyone in the field and in the office operates more professionally. They take a lot of pride in their job and being part of an organization that constituents appreciate and respect."

Other changes can have a negative impact. A work order dispatch application that eliminates the need to come into the office causes a backlash because workers miss that opportunity for bonding, comparing notes, and building a social support network that they don't get riding alone all day. Increased efficiency in the field causes a breakdown in the office because staff isn't prepared for the big increase in client reports.

Even the best planning doesn't ensure you can contain the resulting changes. Rather than controlling change, make plans to address it. Austin, TX CIO Peter Collins states "Change management is extremely important because any new application is going to cause a cultural shift among employees and there are people who will fight you on this. 'We did things this way for 20 years, why are we changing?'

Before launching a pilot, managers need to meet with people from each group that is influenced by the actions of the mobile workers receiving the application, such as data entry or billing staff. Do aggressive "what if" brainstorming with them on possible changes, good and bad. Be sure the pilot tests for potential changes that could have the greatest impact.

Two possibly significant changes for IT are 1) providing technology training to workers who have never used technology in their professional lives, and 2) providing on-going support to workers who are rarely in the office. There is also the possibility of making IT's life easier. "This municipal network allows the CIO to think in broader terms about applications that can be used across the city, though maybe customized for some departments as opposed to them creating technology silos," suggests Pam Reeves, CEO of Boston Wireless Initiative. "With these different applications, support and maintenance alone is more costly than if you create a more rational network and application strategy."

V. Conclusion

Municipal highspeed network deployments have become virtually an unstoppable trend. 2007 will see the good, the bad and the ugly in terms of network projects. How well your city or county fares in this area by the time we sing Auld Lang Syne again rests heavily on the answer to the question "where's the beef?"

As I see it, you're going to justify your network by enhancing government operations, enticing a lot of general consumers onto the network, bringing underserved constituents into the digital fold, and/or boosting the economic development of your local business community. Of these four possibilities, making your government better through aggressive pursuit of mobile workforce applications will give you the financial and political capital to achieve the other three goals.

We saw a lot of hype in 2006, some questionable business assumptions and a fair amount of putting carts before horses. This year, let's hope more people stop, take a second (or third) look at where they're going and why, and realign their priorities if necessary. Opportunity rarely knocks twice, particularly in the political realm. Make the best of your muni wireless opportunity.

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For 20 years Craig Settles' consulting services, books and workshops have helped organizations worldwide understand how to use technology to make money, save money and run a better business. He currently focuses on developing strategies and tactics to effectively use wireless technologies. Mr. Settles authored *Fighting the Good Fight for Municipal Wireless*, several reports and articles to help local governments better plan muni networks. His next book tackles piloting and deploying government and business mobile workforce applications.

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