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Municipal Wireless Snapshot Report™

Making the Case for AMI and ROI: Taking automated meter reading (AMR) to the next great level

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

Introduction

People will one day view 2007 as the watershed year for municipal wireless because this is when most local governments shake off the intoxicating effects of ill-conceived business models that made for great sound bites, but reflected lousy fiscal policy. While chickens will continually come home to roost for the remainder of the year, other cities will reap the fruits that practical muni network applications deliver.

This report examines an oft-touted application that financially justifies a number of muni wireless initiatives, advanced meter infrastructure – AMI. You are probably familiar with the more commonly used term, AMR – automated meter reading. AMR is used a lot to describe anything related to reading a meter without having to walk up and eyeball it. AMI is different in that it more accurately describes the application that muni wireless is enabling.

With AMR, you put workers on the streets with mobile devices, or in vehicles with data capturing equipment, to go block by block capturing how much water, gas and electricity customers have used since the last reading. AMI not only captures data without human intervention but also can do it as frequently as needed, lets you slice and dice this data as granularly as you wish and enables communication from the office to the meters. The frequency, the granularity of the data capture and the two-way communication helps utilities cut costs, increase revenue and run better business operations.

As you read the interviews here, there are numerous financial and improved customer service benefits you can derive from these capabilities. However, AMI requires a data network to bridge communication between all of the utility meters and the home office. Bringing mobile utility workers into the loop is the bonus bucks benefit.

Of course, as with all things wireless, there are challenges, from significant equipment costs to the relative “newness” of AMI technology. You must come to grips with these challenges early when deciding to pursue AMI because even though they are surmountable, it requires patience, good planning, persistence and some willingness to take risks to overcome these challenges.

*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 they should be addressed when developing and deploying these networks.*

II. Snapshot Participants

This report's participants from municipalities have a range of objectives, opportunities and potential obstacles, and they are at various stages between technology due diligence and final vendor selection. Two of the participants are vendor representatives and another is a consultant in this sector of the municipal wireless industry.

PARTICIPANT	ORGANIZATION	OVERVIEW
James Bagley Utilities Director	Rock Hill, S.C.	Utility has 100 square-mile service area, 30,000 water and 34,000 electric meters. Network is 70% complete.
Greg Black Asst. Dir. Cust. Service for Field Operations	Los Angeles Dept. of Power & Water	Responsible for 700,000 water and 1.2 million electric meters. AMI being installed in phases.
Brian Bolling VP, Customer Service	Bristol Virginia Utilities	Deployed citywide FTTH network. Is currently planning for an AMI deployment.
John Cooper CEO	MetroNetIQ	Consultant specializing in municipal wireless and AMI technology.
Craig Herman IS Administrator	Glendale [CA] Water & Power	Has 84,000 electric, 32,500 water meters. Did a pilot for 3,500 meters, planning possible full deployment.
Mark Hulsizer COO	Information Intellect (Report co-sponsor)	Vendor of asset management applications, specializes in AMI.
Tom Roinoitis Director Bill Ewer Customer Service, Marketing Mgr	Longmont, CO	Citywide muni wireless network is 90% complete. Still in evaluation stage for AMI.
Tony Salinas Water Distribution Manager	San Marcos, TX Water and Waste Water Utilities	Has 9,500 meters that serve a population of 50,000. Currently evaluating AMI vendors.
Angela Singhal Director Municipal Wireless Solutions	Nortel (Report co-sponsor)	End-to-end solution vendor to include infrastructure, applications, partnerships, and services
Russell Thompson City Planner	Milledgeville, GA	Currently using pen and paper to take meter readings. Developing an RFP for AMI.

III. Question responses

The questions presented to participants address AMI primarily, but also probe into a couple of related areas.

1. What are the benefits you're getting (hoping to get) from your investment in AMI? Is it reasonable to expect other cities to generate the same benefits?
2. What role can muni wireless play in helping you get a return on your investment in AMI? Do you think there are challenges in using muni wireless to facilitate AMI apps?
3. What were (are) the steps in doing proper technology due diligence of the network for AMI use?
4. How did (will) you go about finding and selecting vendors for this project?
5. How is the project being financed?
6. Are there mobile workforce applications that can run on this same network? What would be the impact of having low-cost (\$20/worker) access at 1Mbps or more?
7. Does it make sense for the city to own this network?

1. What are the benefits you're getting (hoping to get) from your investment in AMI? Is it reasonable to expect other cities to generate the same benefits?

Black (Los Angeles): We want to leverage this new technology to reduce the need to have folks in the field so we can re-direct them elsewhere. From an operational standpoint that's the greatest benefit. Besides minimizing some of the labor intensity of the job, there is an issue of meter access since customers want to secure their properties. When meters are behind locked gates this is difficult for our workers, plus it increases the threat to employees' safety.

AMI offers benefits for customers as well, such as facilitating timely billing. We'll be able to respond to customer service orders faster and more efficiently, including having the ability to remotely read meters and determine customers' bill-to-date while on the phone with them, or set up for the next tenant moving in. Currently we read our services every 30 days for businesses, every 60 for residents.

Bolling (Bristol Valley): One of the things that we looked at is the real time communication between the meters and the office. Right now, meters are read once a month. On a typical meter, you don't have memory capability, so the only data I can view from the last reading

until today is what you've used. In theory, every day you could pull data from smart meters that provides consumption history. This helps if a customer develops a problem recently. We could determine if, say, a flap on the toilet pipe broke and call the customer to tell them they have a leak. Or we could do a similar analysis regarding a spike in electricity use.

Some vendors have meters that you can send messages to remotely shut off electricity meters. This represents big savings in personnel. The meters also detect usage if someone turns it back on illegally, and flags the office.

People often want to know if you can greatly reduce operating costs. Right now, the soft-dollar benefits are not enough for some to justify the costs and the quantifiable benefits are difficult to uncover. Bristol Valley is in a transition point, so as the technology improves and costs come down, we can make a stronger case. But there are cities with meter reading costs going through the roof, so soft-dollar benefits are enough.

Hulsizer (Information Intellect): What we're seeing across the board as technologies improve is that the municipalities and IOUs [investor owned utilities] realize there's a lot more data they can get from the wireless infrastructure to help them better manage resources. Also, there are judicial rulings coming down about carbon dioxide and reducing greenhouse gases at generation facilities. So they need a customer-managed innovative pricing structure, which happens by having real time data so consumers can make qualified decisions. Demand-side management then is effective. AMI is a practical solution in both areas.

Some cities have different reasons, such as suburban areas that want to be more competitive with large nearby cities because people want to move to where prices are better. Also some may do it to reduce the liability of workers getting injured. For a small town that's self insured, this liability increases the burden on its budget.

Ewer, Roiniotis (Longmont): First, we want to reduce meter reading time and costs. Then there are enhanced customer service benefits we can deliver by gathering real-time information from them, such as monitoring energy consumption on an individual or aggregated customer basis. Customers in turn can view these readings on the Web to check what current prices are and self-regulate their energy usage. Commercial and industrial customers are billed more if they use utilities during peak demand, and these capabilities enable them to make decisions about how to use electricity or when they shouldn't use it.

Another major benefit we're expecting is to enable demand-side management. The network would use the utility meter as portals into the customers. In this role a customer signs up to allow us to control their air conditioners during peak periods, for example, or monitor thermostat and water heater settings so we can alert them when to reduce energy consumption during peak periods. The network also could enable customers to choose their billing cycles, mainly for their convenience.

Right now, where they fall in the cycle depends on the meter reading operations.

Singhal (Nortel): A lot of the benefits center around operational efficiency. You can reduce or re-assign the labor force that reads meters and the support staff to manage all of them. Reading legacy meters is very time consuming, plus safety issues for meter readers are a big concern. Then you have financial savings since with AMI you get more accurate and timely meter reads, plus more accurate billing. Over time, standard meters degrade in favor of the consumer. Fraud prevention is also a big driver of AMI. Utilities lose a lot of money due to tampering. About \$1.6 million can be recouped with a 20,000-meter deployment.

Herman (Glendale): With smart meters you can do more effective leak detection within building plumbing using 15-minute reads and special algorithms that analyze consumption patterns. You're able to send out repair crews before customers even know there is a problem. After doing tests for over a year we found that 10% –15% of customers have leaks, often without their knowledge.

Bagley (Rock Hill): We're looking at a holistic approach so we get the biggest bang for the buck. We'd like customers to be able to access their information anytime and see what the bill is, or be able to shut off their service, close the account and settle the bill.

A side benefit is that we're going to touch all of the meters to evaluate them and see if any need replacing before implementing AMI. Meters slow down with age and may only show 80% of what the real usage is.

We're being very aggressive, but a lot of other cities don't have a staff that can develop this kind of a plan. People are doing part of an AMI application, but not everything. We can justify the cost savings and I think many of them could too. The increased revenue is a big part of justifying the network, but obviously that's not all. For example, 20 or so utility vehicles are part of city's group of 150 that have mobile access points. They can create a backup network in case a section of the network goes down in a disaster.

Thompson (Milledgeville): We expect to increase efficiency and save money. Currently all of our meters are read by pen and paper, so the AMI system will allow us to take people out of field and save on gas. This is typical of other cities in our area. We didn't put a dollar figure on the benefits. We were already going to be buying new meters, so money was already set aside for this. Then we got money for the municipal network from the GTA [Georgia Technology Authority]. It would cost more money to bring someone in to do a financial analysis than the benefit we'd get. We just know it's a better bet to be automated.

Salinas (San Marcos): Our biggest objective is to get more accurate reading since we currently have to estimate the monthly bills for a lot of customers. We're also hoping we'll be able to bill larger sections of the city at a time to help us predict production based on current numbers of units of water being sold. When we bill for June, for example, we may

actually be billing for April's usage data that our worker collected in May. But since we have to produce in the beginning of the month, our predictions are skewed.

We'd also like to have a system that uses the meters to detect leaks at customer premises and automatically notifies us. If from midnight to 6:00 a.m. we see certain high consumption levels, we can call the resident and ask if they used a lot of water during those hours.

2. What role can muni wireless play in helping you get a return on your investment in AMI? Do you think there are challenges in using muni wireless to facilitate AMI apps?

Cooper (MetroNetIQ): There are two ways to look at this question. On the one hand, AMI is an application that can help a citywide wireless project break even sooner. Cities, especially smaller ones, need to look at a full range of applications including AMI and their potential benefits when considering a muni wireless system. On the other hand, a WiFi system is a substitute for the "backhaul" network that an AMI application needs. Rather than spend money on leased or owned wired lines, a city can use a municipal wireless network.

As for challenges, the concentration of wireless network nodes that may be needed to link the AMI meters directly with the municipal network can add considerable cost to the project. For this reason, most networks that rely on WiFi use it to backhaul aggregated data from a central point, not to read the meters directly. In this network design, the meters communicate with a data aggregator (usually about one per square mile), and the aggregation point talks to the WiFi mesh system.

Bolling (Bristol Valley): When AMR started out, you'd have a reading that bubbled up out of the meter and a handheld device read it if you were between 700 and 1500 feet away. The next wave was to put antennas on trucks. Then the industry moved to fixed-based collection points on towers or light poles, that can pick up the AMR signals. Now we have fiber optics in lots of communities, so why not leverage this? Each house can be a collection point.

In rural areas, we have two-thirds of the population covered with fiber. But you'll have customers that you can't afford to provide with fiber. We may have to decide we'll send a meter reader in there. Or it may be possible you can put a collection point on individual houses. The technology can make the meter a long distance reporting unit. In a subdivision one of these meters could probably cover every house when you factor in the hops on a mesh network. RF towers alone on buildings for talking to trucks have limited range.

Herman (Glendale): One of the things is that regardless of which vendor you go with, you always end up with data collectors in the field and you have to backhaul that data into your central office's software. Providers say they can accommodate this using cellular or Ethernet technology. The city network, however, would be a lower cost option. If you use Ethernet or phone lines you have to run lines to the collectors.

For Glendale, we'd need between 60 and 80 of these. Some type of cellular card is easier, but much more costly in the end.

Thompson (Milledgeville): Hopefully we can tie into the network so it automatically sends readings back to our office in City Hall instead of doing walk-by and drive-by readings. We're not looking at other AMI features because we want to focus on getting the basic system up. But as we get it in place, we expect to move into other areas of AMI.

I'm sure there'll be some challenges to getting the right transmissions and other operational issues such as getting wireless connections with the meters in the ground that will need to be worked out, but we're not at that point yet. Hopefully the company coming in that we award the bid to will have a good idea of what we need.

Black (Los Angeles): I think there's value in terms of providing customers with information in a more timely fashion for them. Billing is currently held hostage by the reading cycles. For people owning multiple properties, this can be a problem. With wireless we can bill at one time for all of our services.

One factor we'll have to account for is that in a municipal environment, you may have a political structure that weighs in heavily on rate changes, how you package bills frequency of billing and so forth. Subsequently the Board of Commissioners appointed by the Mayor has an impact because they want to be hands-on. When you touch everyone who casts a vote, you always need to know what you're doing and its effect on customers. This makes our department more responsive to the public. However, we have to deal with oversight that wasn't a factor as recently as 2001. Subsequently, how wireless will be used will come under some amount of political scrutiny.

Ewer, Roiniotis (Longmont): As we're doing our research, it seems that many vendors require a proprietary network talking to groups of meters through RF collectors. We see these collectors tying into the muni wireless network to use it as a backhaul. We already have access to the city's network, so why not leverage it.

The main challenge is that since there are few cities that have deployed a wireless network, a lot of vendors aren't really building systems that take advantage of this technology. They're trying to sell proprietary systems. We need IP-enabled meters. Also, some vendors require replacing the meters, while others just need to add a card to their existing meters. But how well these options work depends on the vendors' variables. We don't want to be stuck without options in the future. Open architecture is key.

Singhal (Nortel): The municipalities really have to understand smart meters and the requirements associated with operating them over the network. There's a lot of education that has to happen around this. I've seen situations in which the utility and a city aren't friends. So this becomes a challenge. How are you going to bridge that gap? Don't

expect the network to be free, so subsequently both the city and the utility have to agree to what the network is going to be.

Bagley (Rock Hill): When we started looking at AMI we figured we could use a powerline carrier, but this kind of network is slow and it doesn't allow you to be mobile because it operates over a physical power source. Cellular networks are an option, but they can't download information fast enough for the mobile apps we want to run. So we let the WiFi drive the decision because it opened all other kinds of options. We have fiber already in place to use as backhaul along with other radio technology to fill in some of the dead space and transfer signals to the fiber network's access points. AMI by itself is very expensive, but we couldn't let this fact drive the discussion.

WiFi can be limiting because so many AMI systems can't support this. A few vendors are getting close and may have something by time our RFP is out. But they have to show us something that's working in another city. This is unfortunate since we saw features we liked from some vendors that are up and running, but not everything we need.

Hulsizer (Information Intellect): Muni wireless networks are a strong foundation for benefits such as demand side management. It's a solid backhaul for the fixed network at the meter level. A muni network's concentration of nodes is well suited to the fixed AMI network. We can embed our infrastructure on the poles with access points and provide a direct link to the Internet.

We do 96 reading every 15 minutes to capture important information such as voltage data and consumption data. The voltage data is important because a utility provides a set amount of voltage to each residence. If for some reason a house is getting less, appliances don't run as efficiently and thus need more power. Or a tree might be causing a short. Because AMI tells the utility what's up at each house, the utility can rifle shot fixes rather than shotgunning solutions. Most utilities are 90 – 92% efficient. Any recovery of this 8% goes to benefit the utility, which in turn benefits the consumer.

3. What are the steps in doing proper technology due diligence to make sure the network can support AMI use?

Singhal (Nortel): You have to concentrate on interoperability of the network and AMI technologies. You have to test extensively to make sure you get this. The meters have a transmission unit. There is a collector network, the LAN in this case, that picks up data from the meters in a given area. The municipal network itself brings data from the LAN to the NOC. There are meters that are WiFi-enabled, but you still need to make sure during the pilot testing that they work with your specific municipal network. Verify the accurate reading of meters, their impact on RF interference, how you upgrade meters, and what happens when a node fails. Work with vendors who have tested and integrated this type of network.

Bagley (Rock Hill): We started researching this about two years ago. Last summer our staff went to four or five cities to see what they are doing. We did some things in tandem with WiFi and AMI, setting up network pilot projects that ran for four months. Then we looked at a couple of AMI vendors and had them bring in their applications to see their stuff work with the different WiFi networks. Once we settle on our final WiFi network we'll bring in the top AMI vendors to see their demos on the network.

Herman (Glendale): We're revisiting this. A while ago we did a pilot with a limited deployment of 3,000 – 4,000 meters for electric and water. We wanted to address access problems (workers not being able to get to meters), safety problems and customer issues. We limited our efforts because there was little management interest in AMI.

Now that's changed due to legislation, the Energy Policy Act of 2005, which covers municipal- and investor-owned utilities. This, along with regional outages and real-pricing issues, dictates that we need to have hearings to get input that we provide to our governing body. The input helps us determine what technology we evaluate. The original cost study we did looked at a \$10 million investment. Now we're estimating \$12 million for a fixed network, and as a result we're taking a harder look at the technology - data relays, data collectors, backhaul. Upwards of 10% of the 84,000 electric and 32,500 water meters have access or logistical problems. Comparing muni wireless to this option, we see a city network reducing on-going month-to-month operating costs.

Hulsizer (Information Intellect): There's very little you have to do from a muni wireless perspective. You have to make sure that with whichever AMI provider you select, you have a clear understanding of their data requirements. You're going to use the network to transmit a lot of data. If you commit to 100 megs per second to citizens and AMI needs half of that, then the price of the network goes up because you have to add capacity to the network to support this.

In addition, you want to test the technology interoperability. AMI vendors should give you an opportunity to pilot test their products. For example, they may send out 12 –15 meters that connect to the network and post data on the Web to validate that the system functions as specified. Have the vendor show you cities where their solution is implemented.

Bolling (Bristol Valley): One of the great concerns is that you can go to the Web and search for AMR or AMI and get 24 companies, and many you've never heard of before. These can be 'research' firms looking for someone to be their guinea pig. So for us, what's important is not only can they deliver what we need, but also will they be around in several years. Because their systems are proprietary, once you commit to them you're in it for the long haul. One thing folks say they want is standard technologies but I don't see standards coming soon enough since no one is pushing this enough.

I want to go somewhere where I can see the technology work and talk to people. There are many vendors who say they can do it, but there are very few places where you can go see it, particularly the newer two-way communication systems. We bought a couple of meters to test out. But the company went bankrupt and no one's going to pick these up. This is unfortunate because often the ones with the best products are new companies and the older established ones aren't keeping up.

A lot of start-ups began with smart electric meters but don't have experience in water. You're now seeing a lot of partnering between vendors with electricity typically as the driver of the partnership. With partners, you have to see the combined solution in action. But again, someone has to be the guinea pig. If you're going to spend x-million dollars for a one-way system, then you'll spend a little more for two-way communication. You don't want to install a one-way and have to replace it later.

Salinas (San Marcos): We've done some of that. We looked at six or seven vendors and had demonstrations done where they put their equipment on meters. We determined we'd need help from someone who's done this before. On the electric side, vendors are more advanced and have more neat features, such as the ability to turn off meters remotely. On the water side however, most AMI solutions can only read meters and don't do anything fancy except leak detection. It's hard to find a company strong on both sides.

You have to consider the replacement factor as well. We're hoping our meters can be retrofitted rather than have to be replaced. Also, some AMI systems are proprietary and we're hoping to steer away from those.

Thompson (Milledgeville): There are some bandwidth issues that we have to work through. It's mandated what type of frequencies we can use – 802.11, 24 MHz. We think we've done a good job defining our needs and now we're asking potential vendors 'what are the ways in which they will respond to this in order to meet those needs?' Our Financial Director took over the lead in the project now, and had people come in to talk about their technology. As we get closer to the network becoming reality, we may go to other cities for site visits to see what they've done.

Ewer, Roiniotis (Longmont): We're still learning how to do this. We're putting out an RFP as well as contacting other utilities to learn from them. We see the technology changing rapidly and this is the most important thing to consider. It's one of the main reasons why we haven't done the deployment yet.

Cooper (MetroNetIQ): Put together a complete database on current meter inventory. This is helpful to vendors considering your RFP and entices a greater number of them to participate, plus you get more complete responses, fewer questions and a smoother RFP process. Define your meter inventory by type, age and location. Ideally, a geo-coded file should be attached to the RFP where meter locations are

noted using GPS coordinates, but street addresses can be used instead. This data helps vendor candidates plan the network.

Determine which meters to replace first, which meters can be retrofitted, and which ones should be replaced. The age and quality of the meter help determine these answers. Replacing old water meters in particular offers a good return on investment because it is typical for old water meters to run slower, thus reducing revenue on a regular basis. Also, the cost of automated meters is declining.

4. How did (will) you go about finding and selecting vendors for this project?

Herman (Glendale): Analyzing vendors comes down to using the utility specs that result from the legislation I mentioned earlier. We've been Itron customers for years, but their communication is just one-way. You're just bringing in meter reads to the office. Smart metering, a key component of the new legislation, requires two-way communication. So the first step in vendor analysis is to determine what are the specs we have to follow and the data the system must produce. Once you decide that you need two-way, this starts to weed out vendors immediately. Since this stuff is expensive, you next want to find a system you can go look at that's already functioning and doing what you want to do.

Salinas (San Marcos): The consultant we're working with has experience. He knows what has worked for cities our size and what didn't, and can give us an objective opinion. This helps us see the real difference between vendors and will lead to getting a product that we like. At the start, we didn't realize what we were getting into, the expenses and so forth. Some vendors were just in infant stages with their wireless products. Maybe we can have two vendors' products working together over the same repeaters and collectors.

Bagley (Rock Hill): What's important is who can do it well and do it across both electric and water meters. We're looking for real time communication, yet many vendors are batching data. However, AMI is more than yesterday's news. It doesn't have to support gas, but it will be good if they can. The gas utility covers areas outside of our jurisdiction, but we'll have to work something out eventually.

Hulsizer (Information Intellect): Cities don't want to buy two different systems, which is possible since many vendors built business strategies based on their own technology. Look for a multi-service AMI vendor than can support WiFi. This should narrow options down to the four or five vendors capable of doing that. There are probably 30 vendors overall in space.

A walk-by or drive-by data collection solution is not AMI, nor is a fixed data collection network that limits the amount of data you can gather. To take advantage of what AMI technology offers, you have to deal with smaller vendors. Some cities are writing contracts with vendors that put the technology in escrow accounts so if the vendors go away, cities still have access to the application and data necessary to do business.

Those governments that are going to be innovative will take chance with the smaller vendors. If you're moving with municipal wireless, you're already stepping out on the edge of technology. Most of the companies in the WiFi space are younger than AMI vendors. In 10 years we'll have 60% – 70% AMI penetration because we did it incrementally over the years.

Bolling (Bristol Valley): Other cities have to take the plunge. We were first in the U.S. with fiber to the home, we were a true beta site. We had pains and are glad that we went through it. But with AMI, cities may not feel like being a beta site because they think they can find a better option. The best is yet to come in AMI.

Cooper (MetroNetIQ): A key consideration will be a vendor's flexibility to work with and take advantage of the citywide WiFi mesh network and/or any WiMAX or point-to-point network options. Not all AMI vendors have this inclination.

Outline specific standards for system test acceptance. 99% performance reliability is a standard advocated by most AMI vendors, while utilities seek 99.5% for average billing read accuracy per month. The provider has a three-to-five-day window to ensure billing accuracy in one typical service contract. Also be specific about what defines unacceptable performance, such as insufficient network coverage, false data reads and gaps in data reads.

Another major consideration is whether or not to do an RFP. The number and quality of options revealed after preliminary conversations with vendors will help answer this question. If one vendor stands out from the crowd and is willing to work with your team, I'd encourage a sole source proposal. The team can always retain the option of an RFP to find a vendor if the proposal is inadequate or unacceptable, or you want the RFP process to drive down costs and gain potential vendor concessions during negotiations.

Thompson: There will be an RFP in which we outline the specs of what we're looking for, and then we'll have potential vendors bid on the job. I've just lately been brought in to help define those needs and to help select vendors.

Ewer, Roiniotis (Longmont): The RFP is the first step. We issued ours in January of this year, so we're still early in process. We may not go with any of the responses we have so far. We may put out another RFP or RFI. If someone seems to meet our needs and have the technology, then we might do a pilot. We haven't found one vendor to work with that does both electric and water. We don't know if that's six months down the road, or it could be six more years.

5. How are these projects involving muni wireless and AMI being financed?

Ewer, Roiniotis (Longmont): We would include this project in capital budgets and get it approved by city council. There were things complicating the city financing the general network.

Salinas (San Marcos): The money is coming from the capital improvement part of the budget.

Singhal (Nortel): In many cases the utilities will fund this. Utilities in Canada have done the ROI analysis and found they can get a payback from this investment, so they go to their boards to ask for money. Some of these places don't have a choice; they have to implement some type of AMI technology. In Ontario, there's legislation that all meters have to be automated, so funding for new meters is set aside and cost recovery formulas need to be agreed upon. In this case they may bring the city in as an anchor tenant and together fund or kick-start the municipal network. If a city is doing muni wireless initiative already and the utility is the anchor tenant, then maybe city can get the utility to take care of some cap-ex [capital expenditure] in exchange for good pricing on service fees.

Thompson (Milledgeville): We have a Special Purpose Local Option Sales Tax fund and the money for AMI technology is set aside from this. We're looking at a lease purchase option as a way to acquire the wireless technology. The RFP will ask vendors for best proposal, but if they can come up with another financing mechanism, we'll look at it.

Herman (Glendale): Generally, based on our past experiences, we'll take this money out of our cash reserves.

Bagley (Rock Hill): We looking at a lease-purchase program using the infrastructure as collateral, which taps mainly into our cap-ex budget, and a little from the operating budget. There'll also be some bonds involved that are justified by our analysis showing that more accurate meter reading and eliminating human factors such as errors and sending out vehicles will cut operating costs. It's worth money to have the extra data, or not having to send out trucks. Overall we're projecting ROI in about 10 years.

Cooper (MetroNetIQ): One thing I'd say about financing is that I'd check out options on rolling the two projects together [municipal wireless and AMI]. Some packages will let the WiFi system be bundled in with the AMI system, which could be a huge advantage.

Bolling (Bristol Valley): If you have a lot of capital, then you can pay for this even if it's not a cheap solution. One thought is to take two-to-three years and build out the entire system. There's another philosophy that says start with a pilot consisting of 5% - 10% of the eventual system, then build the rest as time goes along. One of the values of the pilot if you're doing 500 or 1000 meters is that, should it turn into a big mess, there isn't a major capital loss. That said, there are significant costs on the front end, but for us we would still move forward.

A lot depends on circumstances. Cities make decisions based on specific requirements. If you look at muni wireless and the ways to leverage the infrastructure to make it more useful, you may see AMI as one piece of the big puzzle. Also, it's better to share costs. You may not want to build wireless, but if you already have fiber that can fit into the solution, then sharing costs with other departments may make this more favorable. This could inspire additional pilots.

6. Are there mobile workforce applications for utility workers that can run on this same network?

Black (Los Angeles): Our field service operation is obviously mobile, plus our collection department has people in the field collecting on delinquent bills. Meter readers currently use handheld devices. Routes are downloaded overnight and things are programmed to load data onto handhelds in the morning, then at end of day accumulated information is uploaded. To address these areas we're working on a wireless application, the Mobile Data Dispatch System, to dispatch orders overnight and throughout the day.

This is real-time data delivery. The office staff can pull up information about workers and their locations while on the phone with customers. With traditional cellular wireless, field workers finding or staying within coverage areas can be difficult.

Ewer, Roiniotis (Longmont): We're planning to develop a wireless service order dispatch application plus put mobile data gear inside vehicles to help field workers respond to outages faster. Real time dispatch is important because without it workers go out with just handwritten service tags that don't have a lot of information. With the wireless system, dispatchers have the location of all field personnel and all of the customer data. When requests come in there's more efficient staff assignment and they have the most current information about the call. Public works and the water departments likely will tie into these applications as well.

Cooper (MetroNetIQ): The neat thing about AMI is that it's what we call a "narrow-band application" – the data signals take up very little available bandwidth, leaving room for a full complement of other applications. All utilities have a staff of field workers who will be able to take advantage of voice and data applications over the new network. These workers can access data to locate maps for routine tasks, as well as for emergency situations, or in outage or leak situations. Clearly, there would be a huge impact by having these applications.

Bagley (Rock Hill): Once the network's in place, workers will have mobile access to the mapping system, billing data and permits, plus we can push digital work orders to them. We find that because of this, we'll change how we do business such as having workers do more tasks in the field, and writing custom apps to give people viewing rights to various documents. People are starting to see the benefits and as they do, new application requests start coming in.

Singhal (Nortel): When utility workers have to go out and service meters, they could use VoIP as well as access databases from the same mobile devices. They can open a laptop and get remote access to the home office to take direction and make better decisions, or upload information from the site. With VoIP, this requires higher bandwidth.

Salinas (San Marcos): The municipal network will help us because we have laptops in the field and users can get work orders from wherever they are. This is one reason we're going with WiFi. There should be greater productivity since they're not sitting here in the office punching data, or spending a lot of time going back and forth between the field and the office. On the water side we have 30 repair people and linemen. On the electric side, there are 40.

Bolling (Bristol Valley): It would be great if we had a laptop and printer in every truck so our people could receive service orders and document them as they are completed. This saves time by not having to come back to the office. Also, sheets of paper can get lost. Wireless dispatch removes the reliance on paper maps and receiving verbal instructions in which someone in the office could say 'Road' instead of 'Street.'

Hulsizer (Information Intellect): Two of the larger expenses that utilities have is re-read jobs or rolling trucks for disconnect or connect jobs. Every time you do one of these there is a charge associated with people and vehicles, anywhere \$25-to-\$125 per roll.

If an AMI system can be added to automatically perform these tasks remotely, this has benefits above saving time and gas. You take away some of the mundane tasks so people can be decision makers rather than data collections. And when you do have to send workers out, you can more effectively dispatch people because AMI does a better job identifying problems. You're not usually reducing people, but you're not replacing them either when they retire or move on. Where you might have had 200 engineers 15 years ago, today's technology lets you do the same jobs with 25.

Herman (Glendale): We're buying another 12 laptops with wireless cards and eventually we'll have 40 cards at \$50/month. Our workforce is growing as we find more tasks for field personnel. Field service reps on the electric side already are using several mobile applications, foremen are viewing maps and sending data from the field and we're expanding these applications to those on the water side. Overall we'd be looking to reduce monthly operating costs associated with our mobile workforce.

7. Does it make sense for the city to own this network if there is to be a heavy focus on AMI use?

Bolling (Bristol Valley): It obviously does for us because we're doing it. Infrastructure is costly and it takes effort to build fiber to the home. You'll discover that competitive businesses that have to satisfy stockholders and capital expenses don't have the incentive or available capital to put highspeed everywhere you want it. The realities for

communities like Bristol is that there's no saying how long we would have had to wait for the incumbents.

We have some infrastructure that major cities don't have and would give their eyeteeth for, and it's here because of the commitment we have to customers. They are our stockholders. We have to make enough money to pay for it since you have to make money to stay in business, but profit isn't our goal. It's more likely a municipality will bite the bullet to pay for these things. With the incumbent, it's 'why do we want to do this since we're already making our money.' If you look at some of the municipalities and ask what their citizens think, a lot of local utilities are trusted. We've been around since forever.

Hulsizer (Information Intellect): We're an ancillary product. A municipality making the decision to do wireless is looking to earn revenue or some other return on investment on the services they can offer. Improving public safety services, for example, benefits the community as a whole. So the value behind wireless is much greater than just being an AMI backbone. The byproduct of AMI is the added value the city gets in terms of what they can use network for, so AMI could become the fallback reason/benefit of having the network.

Black (Los Angeles): If you own a network who would be responsible for its operation and maintenance? That said, if LADWP owns the network, we have a touch point into every building.

Thompson (Milledgeville): No, not for us. One reason is that the city geography is only 20 square miles. Then you look at population density, the fact that the city doesn't have an IT department and that a business like this probably won't see a profit until year three or four, plus there has to be technology refreshes. The case for city ownership doesn't look quite so strong.

However, we view the \$900,000 GTA grant we're contributing as an enticement to ISPs. They'll only have to pick up the other two-thirds. We identified other anchor tenants who agreed to buy services, including several colleges, a large prison system that want this for its mobile workforce and a regional medical center. In turn, all the City wants is 50 free accounts for a computer aided dispatch application for public works and inspectors. With this package we can influence how the network is built before any money is turned over. We wanted a business case where we influence the buildout process, reduce risk to the city and create a win-win for everyone involved.

Bagley (Rock Hill): We own this. We went to the local telco and asked them if they could do something for us in fiber optics. They said no, so we put in our own fiber network. When we contacted them later and said we're interested in WiFi, at first they said 'you're trying to get into our business.' Then we asked them to bid. They came back with a cellular solution and the greatest speed they could offer was 384K average and two Mbps max at a cost of what we're going to spend anyway. But at that price our network will average a speed of 4 or 5 Mbps and get up to 54 Mbps.

Salinas (San Marcos): The city won't own the network, but it does get free use of network. I'm not sure there'd be much benefit in ownership, but our staff is not involved directly with that project.

Singhal (Nortel): This really depends on the city. For tier two and three cities, operating this kind of network isn't their core competency. However, for a city to own but outsource the running of the network, this makes a lot of sense. Even when the main driver for a municipal network is to run government workforce apps, you have to ask in what situation does city want to own that network – public safety, mainly general government workers, AMI?

Herman (Glendale): Depends on what it would cost and what type of cost benefits there are to be derived. The city hasn't done a complete analysis yet.

Ewer, Roiniotis (Longmont): Things are simplified when the city owns the network. We have a fiber optic system that could be used as backhaul. But Kite offered to build and run the wireless network in a non-exclusive deal, so we didn't feel need to build this part of network ourselves.

Cooper (MetroNetIQ): This is a general question that will depend on any number of factors, including budget, access to capital, private sector partnering options, political support, etc.

IV. In the final analysis

It is clear that AMI promises to deliver many benefits for those municipalities that have a good vision, set reasonable expectations and take the long-term view. Here are some guidelines to help move you forward.

Being first, by itself, is not always a winning strategy

There are two types of "firsts" in muni wireless. You have the loud, chest-thumping firsts. A lot of 2006 news coverage of municipal wireless was dominated by cities claiming the mantle of being first: first in the nation with wireless, first small town east of the Pecos, the first second-largest city, etc., etc. ad nauseam. Now, the summer of 2007 is being overshadowed by cities that are among the first to have their networks go live, but with less than glowing reports in the many news articles coming out.

The other type of "firsts" are cities such as Corpus Christi, TX and Merion, MN (covered in my January 2007 Snapshot Report – www.successful.com/Snapshot-1-07.doc) which are success stories with their AMI and other applications running over the municipal networks. Rather than making a big fuss in public, these cities did some effective needs assessment, technology due diligence and financial planning several years ago. They piloted and then fully deployed AMI applications that cost justify their existence. Now Corpus Christi is the poster child for successful muni wireless deployments, and Merion benefits from a full range of AMI-related applications that the cities you just read about hope to put in place.

As you can tell from participants' comments, the road to AMI ROI holds a few challenges. AMI can be the big driver of muni wireless initiatives, or muni wireless can be the catalyst for getting AMI off the ground. But either way, the key to becoming the next poster child lies not with speed, but deliberate methodical legwork.

Know where the money lies

AMI is not particularly sexy, it's probably a weak re-election campaign plank and most constituents may never realize you have it once it goes live. However, there are operating costs to be slashed and revenues to be increased through improved data collection that make AMI well worth the effort. You just have to be shrewd in how you do the financial analysis.

Don't limit your analysis to the time and gas you save by not having to send meter readers door to door. Data, once accumulated, is a profit-generating commodity, a customer satisfaction bonanza, a new business opportunity-generator. All of these things hold financial and political return on investment. It's important that you and the people around you

see the big picture. AMI is not just about meters, it's about data and market intelligence you've never been able to capture before.

It's also important to realize that payback for AMI may take a decade or more. Rock Hill is looking at an ROI in 10 years. Corpus Christi projects a 20-year payback. Some people I tried to interview had no interest in AMI because they couldn't see any kind of payback in just a couple of years, a view which isn't helped by the fact that in politics time is measured in election cycles. To be able to cost justify AMI, you must take both a broad and a long-term financial view.

Realize the true value of utilities in the muni network equation

The same way you want to look beyond meter data collection to find the full ROI potential of AMI technology, you want to look beyond meter readers as the sum total of your utility company's participation in muni broadband. Utilities are potentially bigger customers and stronger partners for the network initiative. Consider this story from my book, *Fighting the Good Fight for Municipal Wireless*.

Before going wireless, field service people for Northeast Utilities (supplying electricity in Connecticut, Massachusetts and New Hampshire) used to haul around 12,000 printed maps that pinpointed the locations of buried electrical lines and equipment. The costs? The price of 37 tons of paper. Since these maps had to be frequently updated, there was an additional annual cost for 1,800 computer printer cartridges. Adding to the expense were vans that had to be customized to increase storage space for the maps, plus equipped with special heavy-duty springs to carry the extra weight.

The ROI for laptops with wireless modems to store maps and receive updates while in the field? For a \$40,000 investment, Northeast Utilities saved \$383,000. It eliminated the bulk of the paper, the cartridges and the need for the specialized vans. Field service people are more productive because they access maps instantly rather than having to paw through piles of paper maps, plus updates are immediate which guarantees that the staff will find the problem the first time out. The staff is also more efficient because they can go where they are needed rather than be restricted to areas covered by the limited number of printed maps each van could carry.

Of all the city departments and government agencies, utilities are probably the most similar to corporate entities in terms of their business operations. They have product production and distribution, field service, customer service, packaging and pricing, mobile workforces and asset management. As such, they have far-reaching highspeed communication needs. By addressing the full range of needs, you will get better results from the AMI part of the equation.

The partnership role of utilities is potentially of equal or greater value than their role as a customer. Simply stated, utility poles are often the backbone of muni network infrastructure. Without access to them, a position several cities find themselves in, muni network projects may

never get started. Showing utilities the value that muni wireless offers them as customers goes a long ways towards creating the best partners local governments can have to ensure expedient access to the one resource muni wireless can't survive without.

Move past the "chicken and egg" dilemma

There's a general feeling in some cities that we can't move forward with AMI until there are individual vendors that offer meter technology to support both water and electric meters. Or we can't pull the trigger until more cities have muni networks, which will inspire more vendors to support WiFi. Or several other good reasons why the stars haven't fully aligned to everyone's satisfaction.

You can't wait much longer to get started! You don't need to run out today and buy 30,000 new meters. But you really should start evaluating vendors and setting up some serious pilots projects today if you haven't done so already.

For one thing, an increasing number of cities are getting on board with the idea that one of the main values of muni broadband is its ability to improve government operations, and that it behooves cities to be an anchor tenant on the network. However, to make that case, they need strong evidence from departments such as the public utilities as to the network's potential value. That evidence comes by way of your technology and financial due diligence.

Aside from helping the city make its business case, the use of AMI technology over the muni network influences quality of service and service level agreements that need to be put in place for that network. Your utility department or company may not be ready to deploy AMI for a year or two, but it's much easier to build the network initially with this use in mind than to retrofit the network after it's built in order to accommodate AMI.

If you're already planning to replace meters, this is probably a great time to swap some of those out for meters for a pilot test. Also if you're using pen and paper to collect meter data as Milledgeville is doing. Even if they have to replace smart meters in a few years for something more advanced, the leap in productivity improvements even in the short-term could financially offset the price of the initial meters.

The learning curve for AMI is not trivial, so you want to take this next six-to-twelve months to get your education through well thought out pilot projects. Then, as your muni network is coming online, vendors are on their second- or third-generation products and some of these early pioneering cities have a track record to show off, you'll be ready to start reaping the AMI benefits sooner rather than later.

Don't forget the little things

There will always be 101 little things with these projects to keep you on your toes. John Cooper from MetroNetIQ provides a few for consideration.

- ▶ Business Relationships. Be sure the RFP for an AMI vendor spells out the main business relationship issues: vendor responsibilities, vendor capabilities, vendor's ability to integrate with WiFi technology, transition period issues, etc.
- ▶ Muni Network Operator/Service Provider. What is the operator's role - management of the wireless network, application integration, assistance where appropriate?
- ▶ Neighboring Utilities. What can neighbor utility organizations offer regarding collaboration, resources, advice, etc?
- ▶ Billing System Vendors. Will a new billing system be needed? Will integration with the current billing system be required and how will this happen?
- ▶ Meter Data Management Plan. How will the data propagated by the AMI system be managed? How will it be stored? How will the data integrate with or feed the billing system?
- ▶ Transition Plan. Such a plan will provide for route conversion and phasing out of manual reads as the automated system comes on line.
- ▶ Zone reduction. Zones should be reduced gradually over the entire service territory rather than a zone-by-zone retirement, and meter readers should be provided alternative activities to keep them busy during times they're not needed for meter reading. One way to manage this is to map the transition on distribution substation zones and accommodate access to mounting zones.
- ▶ Vendor Transition. Keep the equipment vendor on for some period after the purchase to ensure smooth operations and to have a resource available for training and answering questions.

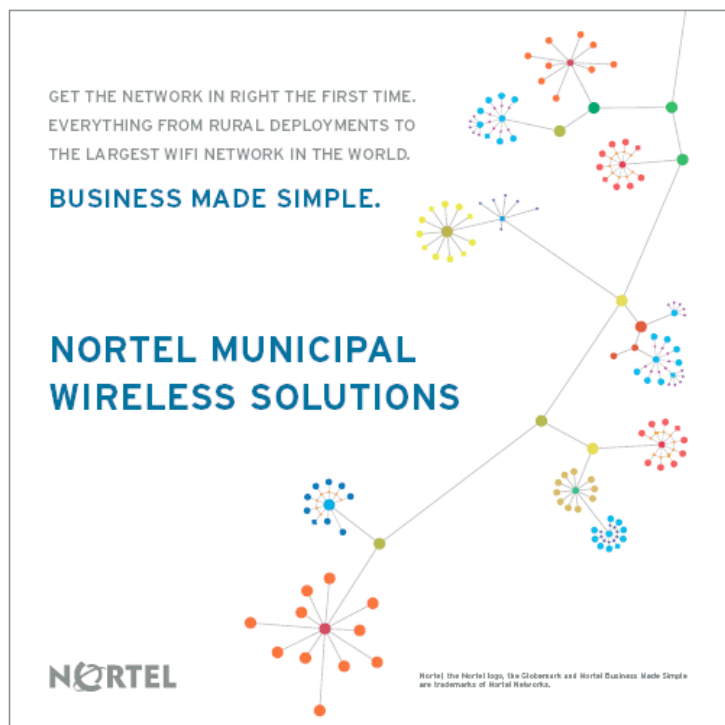
V. Conclusion

In one of my books on effective wireless deployment strategies, I tell readers that if they want to deploy an application that generates a huge ROI, use just a few features to meet a simple need for many people. Case in point, the original BlackBerry was viewed by some as the village idiot of mobile devices. It only let you receive or send e-mail automatically from anywhere at any time. Ever try to take a CrackBerry from its owner?

So too shall it be with muni wireless. This technology will be most effective at generating a financial and political ROI when it is used to meet a few basic business operation needs of a lot of cities. Asset management, such as with AMI, is the BlackBerry of municipal wireless applications.

Every city has utility meters and most are not used or managed to their greatest potential. Start with automating basic data collection via the wireless network, and there will be a significant return on investment. Implement two-way data communication to enable new applications and services, you'll see additional ROI. Maximize 24/7 data collection plus the ability to slice and dice data every which way possible, and realize even greater ROI.

The path to AMI success can be difficult in spots, but it is fairly straightforward. Cities need to do more than treat AMI as an item on their tick-list of the Top 10 Things We Want to Do with Muni Wireless. Utilities need to be brought into the network discussion early to clearly define their needs or validate the lack thereof. Then, of course, the hard work starts.



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For more information

About the author

For over 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 broadband 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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Information Intellect

This Dallas-Fort Worth based company has developed a low cost, wireless automated meter reading ("AMR") technology "MeterMesh", that supports bi-directional communications and almost continuous data collection for electric, water, gas, and steam meters. MeterMesh supports a selection of Wide Area Network technologies including WiFi, and fiber. MeterMesh enables utilities to see and manage their entire distribution system down to discrete meters in near real time.

For more information, please go to www.infointellect.com.

Partnering with Craig Settles on this project is MetroNetIQ, a niche consulting firm based in central Texas. MetroNetIQ specializes in helping smaller cities and towns launch municipal broadband initiatives.

For more information, please go to www.metronetiq.com.

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