

Case Study

Rock Hill, South Carolina

Innovation improves efficiency and quality of municipal services



Photo credit: Chris Yunker

Customer highlights

Challenges

- Inefficient manual utility meter reading and inaccuracies due to human error
- High-speed access to critical data by mobile public safety workers

Solution

- Reliable, secure and cost-effective citywide network used for multiple applications
- Public safety has high-speed access to critical information in the field improving efficiencies
- Free public Internet access at community parks

Results

- Fast installation: Initial 15 square miles of Tropos network deployed and operational in one week
- Each police officer spends 2 hours more in the field daily with ability to file reports from their vehicles
- Fire personnel have access to critical data in minutes, enabling them to be more responsive and effective in fighting fires
- Power and water AMI is expected to reduce mobile meter reader staff and increase accuracies; application payback, 7-8 years

Systems and services

- Tropos 7320, Tropos 5210, Tropos 4310, and Tropos 4210 mesh routers
- Landis + Gyr Focus AL power meters with Aclara MTU
- Neptune water meters
- New World Systems computer-aided dispatch
- System integration by CSG Data Networks

Rock Hill, South Carolina has evolved from its industrial roots in textile manufacturing to a diverse and modern city with a population of more than 67,000 residents. The city's vision for the future is on its way to becoming reality. Part of realizing this vision has been installing a wireless broadband IP network based on technology and products from ABB Tropos Wireless Communication Systems. The network has led to improvements in police officer and fire fighter efficiency. It has also enabled the city's utility department's ambitious plan is to modernize its water and electric utility operations with automated metering, grid automation, disaster recovery and mobile workforce productivity improvement.

Challenge

- The city-owned utility of Rock Hill employs meter readers who inspect water and electric meters at homes and business to track usage for billing purposes. Rock Hill investigated automated meter reading (AMR) systems as a means to control meter reading costs, improve billing accuracy, and reduce employee injuries. This data could also be used by the city's existing outage management system (OMS) to speed detection of outages, dispatch repair crews, and improve customer service around these events. However, the city found it difficult to justify an AMR project without a cost-effective network infrastructure to connect meters to the city's central billing and management systems.

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- Another challenge faced by the city was difficulty in providing mobile police officers and fire fighters high-speed access to critical data in the field. An existing radio system was already in use to download mug shots onto police laptops, but the aging system was very slow and typically it took several minutes to download a single image. City officials believed public safety workers could improve efficiencies as well as provide better service to the community if they were given mobile access to the same applications and databases that were available in the office.
- More recently, the city has also been looking to implement automated fault detection, isolation, and recovery (FDIR) in their electric distribution network. Communications back to centralized control elements are a key part of any such application, and the city is planning to make use of their existing wireless network to enable communications between DA elements and back to municipal utility's operations center.

Results

According to Rock Hill City Manager David Vehaun, the implementation of the citywide wireless broadband network has fundamentally improved processes and efficiencies. "Wireless Broadband has direct implications for the daily workflow in almost every department of the City" said Vehaun. "For example, the fact that our inspectors in the field have real time access to the network means that they can turn around inspections information to the development community instantaneously. That level of customer service is an important tool for our City in a competitive development market like the Charlotte region."

At the beginning of the project in 2006, then-CIO, and current assistant city manager of Rock Hill, James G. Bagley Jr. , was a key champion for deploying the wireless broadband infrastructure. "We wanted to build a foundation for the city's future rather than just an AMR system," said Bagley. Even at that early stage, of deployment, it was becoming apparent that the city's high-speed wireless network was providing the capacity and capability to deliver many different kinds of city services — all on the same infrastructure.

"With our high-speed wireless broadband network, we now have the capacity to deliver many different kinds of city services — all on the same low cost, reliable network."

James G. Bagley Jr.
Assistant City Manager
City of Rock Hill

It should come as no surprise then that the city has now expanded the network to cover approximately 50 square miles of Rock Hill. This is the entire incorporated landmass of the city, even covering the campus of Winthrop University, and there are plans to expand the network to newly incorporated areas and new development. According to current city CIO, Vincent Simonowicz, "The city sees its network as a foundational necessity to support public safety and public utilities, but will also greatly benefit economic development, tourism, and community services in general. For all new areas being built out and incorporated we are taking everything needed into account as a city and building on it, so as to improve quality in delivery and

service levels. We're using an integrated approach to extend coverage for our applications and models for residential, shopping, industrial, as well as parks and recreational areas. These are each a subset of the overall 'smart city' portfolio of services. Whenever the city can enhance city life, city services, or public safety by connecting it, we will do so."

The City of Rock Hill hosted the US Youth Soccer National Championships in July 2012. As part of the tournament, the city provided wireless service during the event in ways that enriched the event:



- The city-wide mesh around the Manchester Meadows Soccer Complex was opened to the public throughout the tournament
- Separate SSIDs were set-up for officials and players/parents
- The officials network allowed them to enter game statistics into an application provided by US Youth Soccer. Referees were required to have mobile devices which supported this application.
- The network for players and parents provided them with web access. The site for the tournament, which they were directed to on log in, also utilized GIS information to direct attendees to the right fields from their cars, had instructions on how to use the service, and how to get to Rock Hill Rocks (the city site). This had dining guides, other city information, and was customized for the event.
- During the event, the network was accommodating roughly 200 unique users at any given time in addition to normal user levels
- The US Youth Soccer Association praised the "innovative and outstanding wireless service" in testimonials made to the city after the tournament.

Public safety communications

As part of their network, Rock Hill has deployed Tropos 4210 and Tropos 4310 mobile routers in police cars and fire trucks. These devices link these vehicles and the public safety officers in them directly to the broadband mesh network deployed throughout the city, and provide often critical information to these personnel. This means faster and better informed responses to emergency situations in the city, and obviously has a positive impact on city life.



With Tropos mobile routers mounted in police vehicles, officers have high-speed access to criminal records, including mug shots, right in their vehicles. Within seconds they can perform a background search from a laptop computer or pull up mug shots and fingerprint profiles to help identify a suspect quickly. The GIS/GPS capability of the network allows officers to more accurately identify and mark locations of interest for dispatch and other officers. While the ability to create and file reports from their on-board laptops means each officer spends an average of two additional hours each day in the field protecting the community.

Fire department vehicles equipped with mobile routers allow firefighters to download documentation such as building blueprints and hazmat data on their way to an emergency call so they are better prepared upon arrival. Before, the department would have to wait for this information to be researched in paper logs which led to delays. The fire department is partnered with the county, using software from New World Systems for dispatch, reporting, record keeping, and general situational awareness information that gets pushed out to laptops on the vehicles via the city wireless network. Information from 911 gets posted in real time. So for example, dispatch might add information on sprinkler hook-up location or it might learn that an elderly person is in the building after fire vehicles are on route to a location, but with this system and the network, that information gets pushed to the fire department personnel in a timely manner.

Mobile work order system

Other municipal workers utilize the network to more efficiently do their jobs as well. In fact, every department in the city has mobile web access to their work orders for the day. This includes city departments for water and electric utilities, solid waste, and public works, and it means workers for these departments can more efficiently perform and communicate about their tasks for the day, but additional applications are being found by these departments as well. The Solid Waste department can relay information about specific types of refuse to their vehicles so that the right vehicle shows up to pick it up. While the public works department can mark the location of potholes using GPS/GIS and repair crews can be dispatched more efficiently to the right locations.

“We’re really pleased with the fact that Rock Hill is not just staying abreast, but is actually on the cutting edge of the latest technology, and that the implementation of this technology provides a direct benefit to our citizens,”

Doug Echols
Mayor
City of Rock Hill

Smart city meets smart grid

Beyond providing connectivity to city employees and their vehicles, Rock Hill is also looking to modernize and automate services provided by their municipally owned utilities. The first phase of this project has been rolled out to about 5000 homes and includes automatic meter reading for water and electricity. Centralized, automated utility meter reading eliminates manual readings which are sometimes inaccurate and enables centralized remote turn off and even possibly turn on services, if it can be determined to be safe; which each automation replaces or saves a truck roll for each event. The meters include two-way communications so they can be read on demand, giving the city and the community immediate access to individual customer usage statistics, as well as making it easier to detect water leaks and water theft. On the electric utility side, this data is also being utilized for applications like outage management, and in the future may also be incorporated into demand management programs. Once the city commits to full-scale AMI deployment, they are planning to use their city network to backhaul that data to their operations center.

“Tropos earned our trust by delivering a reliable, high-performance network that meets our application needs.”

James G. Bagley Jr.
Assistant City Manager
City of Rock Hill

The city electric utility has also begun trials for automated fault detection, isolation and recovery in their distribution network. This will allow the city to more quickly identify, minimize, and repair outages as they occur around the city, and the intelligent devices being deployed in trials and an upcoming pilot will also be communicating using the city’s wireless network. In particular, the low latency, security capabilities, support for utility communications protocols, and the general resiliency of the city wireless mesh lent themselves to this application.

Tropos solution

The Tropos wireless mesh solution offered the best fit for Rock Hill’s myriad requirements for performance, coverage, mobile access, and the ability to manage, control, and get statistics from one central location. The initial implementation consisted of a wireless broadband mesh network covering 32 square miles of the city as well as a mobile infrastructure that utilized routers mounted in city-owned vehicles. Tropos 5210 routers were mounted on light poles across the city and Tropos 4210 routers were used inside city vehicles for easy and reliable roaming access by police officers and firefighters. The Tropos 5210 routers include battery backup to enable service to continue in the event of a city power outage.

Since the initial phase, the network has been expanded to where it now covers 50 square miles of incorporated Rock Hill, and there are plans to continue this build-out. In addition the equipment that was originally deployed, the city has also deployed the current generation Tropos 4310 mobile routers, and Tropos 7320s routers, mainly in a concentrated area around the city hall. The Tropos 7320s essentially form a high capacity cluster and as act as the gateways for lines of connectivity that radiate out through the city.

Application highlights

Examples of key citywide applications for which the wireless-broadband network is used.

- **Automated utility meter reading** – Reduced operational costs, improved meter reading accuracy, energy conservation and overall customer service.
- **Document management** - City records such as building permits and plans for housing subdivisions are accessible-electronically from a centralized database, allowing building inspectors and other city workers to quickly and easily find the information they need when in the field as well as allow them to file reports.
- **Real time work-orders** – Work-orders can be downloaded and completed real time in the field. Routing of work and priorities can be based on location of crews with AVL or GPS in the vehicles and dispatched based on the nearest crew, improving field worker efficiency.

For more information please contact:

ABB Inc.

Tropos Wireless Communication Systems

555 Del Rey Avenue

Sunnyvale, CA 94085

Phone: +1 408.331.6800

E-Mail: tropos.sales@nam.abb.com

abb.tropos.com

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