

Rural Electric Utility Plugs Into Wireless IP Network



South Central Indiana (SCI) Rural Electric Membership Cooperative (REMC) electricity cooperative provides substation interconnectivity reliably and cost-effectively via a Motorola wireless broadband PMP network.

Situation: The need to interconnect more than 20 substations with the utility's microwave-based backbone network

Located in Martinsville, Indiana and serving more than 34,000 customers over a seven-county area, SCI is the largest of rural Indiana's 40 electrical membership cooperatives, and also one of its most progressive. With a network of 22 electric substations throughout the region, the utility needed high-speed connectivity to backhaul the advanced metering infrastructure (AMI), SCADA and other business-critical data from the substations, many of which are remotely located, to the company's microwave-based backbone network. With cost a major consideration, the utility knew that because of high deployment expenses, a wired network was not financially feasible. The utility also preferred to own its own dedicated network rather than lease from a public consumer-grade 3G operator.

Solution: An advanced all-IP wireless broadband network from Motorola

Working with wireless integrator, MapleNet Wireless, SCI chose to deploy a Motorola IP-based point-to-multipoint network. The Motorola system offers a variety of frequency options — ranging from 900 MHz to licensed 3.65 GHz to 450 MHz — and allows the company to keep its 4.5 MHz network in place. A multi-platform transmission system, the IP network can be used not only to carry mission-critical data, but also for other crucial functions such as connecting two-way radio system repeater sites, and supporting advanced alarming and video security systems.

Result: Cost-effective wireless substation connectivity that delivers both high performance and high reliability

Thanks to thorough upfront engineering and detailed spectrum analysis for the use of unlicensed frequencies, SCI reports that the network is running very well. The company is enjoying 4-to-5-nines reliability, low latency and excellent throughputs of 1 to 2 Mbps. The network uses multiple frequencies for minimizing interference, and offers GPS synchronization for mitigating against self-interference and an intuitive interface that makes it easy for its staff to manage, monitor and troubleshoot the IP network from a centralized management system.

"If you're operating in various frequencies, you need proper upfront engineering, frequency planning and coordination. That's the key to keeping an unlicensed system operating effectively and reliably."

- Steve Carender, national sales manager, MapleNet Wireless

CUSTOMER PROFILE

Enterprise

South Central Indiana
REMC (SCI)

Industry

Rural energy distribution
cooperative

Motorola solution

- Motorola wireless point-to-multipoint network

Solution features

- IP-based solution
- PMP connectivity for 22 substations
- GPS synchronization
- Intuitive interface

Benefits

- High Throughput
- Up to 5-nines reliability
- Low latency
- Centralized management and monitoring
- Cost-effective deployment and expansion

Motorola IP Network Keeps SCI Well Ahead of the Energy Distribution Curve

To improve its operations and to support the increased data from more frequent AMI reads, SCI needed a higher capacity network.

AMI and SCADA Transmission

To ensure a timely flow of mission-critical information, including AMI and SCADA data, SCI needed to provide connectivity from each substation back to the company's backbone network and its central office. Working with systems integrator MapleNet Wireless, the company decided to move to an IP-based model by implementing a Motorola point-to-multipoint (PMP) wireless broadband network. "Utilities like to have privately owned networks," says Steve Carender, sales manager, MapleNet Wireless, "They prefer not to lease from a public network because they lose control and they have to pay stiff monthly fees."

SCI and MapleNet Wireless selected the Motorola PMP solution for a number of reasons. "The Motorola network was chosen because it was affordable and accessible," says Carender, "but also because it provided a full range of frequencies, a common management platform and the capacity for being much more than a backhaul system." The system also allowed SCI to increase efficiency and save money by keeping its legacy network in place.

Upfront Preparation

Network operators can choose Motorola solutions that operate in licensed or unlicensed frequencies. Because parts of the network use unlicensed spectrum, exceptional reliability was paramount. "With proper engineering upfront and recognition that you are dealing with unlicensed frequencies, you can

design and deploy a very reliable system," explains Carender. To ensure maximum availability, extensive testing was performed before implementation. "We also did spectrum analysis in every location," adds Carender, "and met with area wireless providers to coordinate spectrum usage." The SCI network uses 900 MHz as well as 5.4 GHz where noise and interference are high.

System Benefits

The utility's wireless broadband network offers SCI and its customers a variety of important benefits.

Proven IP Infrastructure. As an acknowledged leader in the industry, Motorola wireless broadband technology is proving itself every day in more than 1,500 networks in over 120 countries.

Range of Frequencies. SCI chose its Motorola network in part because of its full range of frequencies. In addition to the 900 MHz and 5.4 GHz spectrum currently being utilized, the company can also go to 2.4, 5.2 or 5.7 GHz. Motorola now also offers solutions in the licensed 3 GHz frequencies which MapleNet is deploying in the SCI network.

GPS Synchronization. With GPS, the network minimizes self-interference. This is especially important for SCI since many of its towers are located on high hills and can hear and impact one another.

Low Latency. The Motorola PMP network delivers low round-trip latency necessary in a utility environment where systems are using sensitive voice and control applications.

Throughput. The IP system delivers optimum levels of throughput for a utility environment, from small locations requiring between 1 and 2 Mbps to larger locations requiring 7 Mbps or more.

Centralized Management. The network also provides one of SCI's top requirements, a centralized management system that is technology transparent, has an intuitive interface and can enable successful management by workers new to wireless.

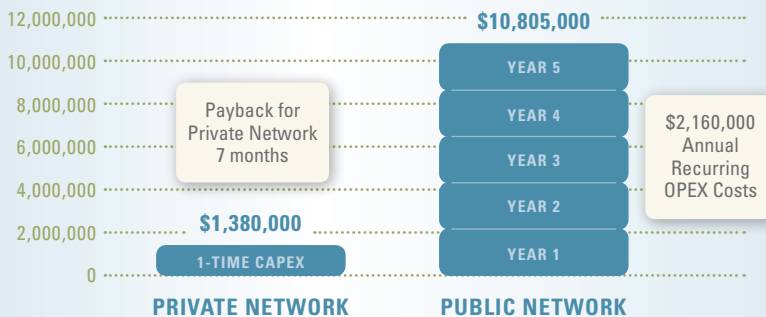
System Flexibility

Although SCI's immediate networking need was for high-speed backhaul from its substations to the backbone network, the company also chose its Motorola network for its flexibility and scalability. In the near future, the company is planning additional functionalities such as connecting two-way radio system repeater sites, carrying alarming data and providing real-time video surveillance to improve security at each of its substations.

SAMPLE UTILITY BUSINESS CASE: PUBLIC VS. PRIVATE NETWORKS

This hypothetical utility business case for a public versus private wide area communications assumes a financial scenario somewhat analogous to SCI's. The network includes 1,000,000 smart meters, 2,000 AMI collection points and 10,000 Smart Grid devices (e.g. capacitor banks, reclosers, switches, etc.). The network provides 100 percent coverage to each collection point and 1 kb of data is read daily from every meter. A \$15 per month is assumed for charges for the cellular data plan. The illustration shows the remarkable results.

PUBLIC VS. PRIVATE WIDE AREA COMMUNICATIONS NETWORK



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