Tennessee's Dickson Electric Uses Sensus FlexNet System to Increase Reliability and Efficiency

Case Study

Located southwest of Nashville, Tennessee, Dickson Electric System services more than 30,000 residential and commercial customers across Montgomery, Cheatham, Hickman, Dickson and Houston counties. The service territory is comprised of mostly rural terrain and stretches approximately 90 square miles, utilizing roughly 2,600 miles of distribution line.

For the past 100 years, Dickson has relied on contracted meter readers to gather usage information and to perform regular maintenance and outage management services for its customers. There were a number of significant drawbacks to this type of service provision, primarily the associated expense of paying the workforce for after-hour and weekend services during outages.

Another related challenge that Dickson Electric faced was the issue of inclement weather. The region typically experiences approximately three months of winter, often accompanied by icy conditions that prevent workers from being able to access meters for days at a time.

An additional issue that Dickson wanted to overcome was undetected theft of service. Meter tampering had been a sporadic problem that the utility was having a hard time preventing because it couldn't always pinpoint exact times and locations of theft.

CHALLENGE

The combination of these challenges prompted Dickson Electric's management to consider a number of possible solutions to enhance the utility's service offerings. Given its long history of using a contracted workforce, the utility felt confident that it had an accurate representation of how much it cost to have manual meter reads as opposed to the cost of installing an advanced metering infrastructure (AMI) solution. The large return on investment expected through implementing an AMI application gave Dickson the final push it needed to move forward in its decision making process.

Initially, Dickson Electric considered both power line carrier solutions and mesh networks.

With power line carrier solutions, data throughput can be slow—polling at only 15-minute intervals—and there is not much flexibility beyond meter reading capabilities for applications like remote disconnect/reconnect. Dickson Electric was interested in providing a foundation for further service offerings and thus a limited solution was not a viable option.

A wireless mesh topology was not ideal for Dickson because of the real potential for signal interference over unlicensed spectrum and inherent maintenance issues from the large installed base of data collectors that would be necessary to cover its service area.

SOLUTION

Dickson wanted to implement a solution that would provide a dynamic platform to accommodate remote disconnect/reconnect, voltage monitoring, distribution automation and SCADA. The utility was particularly intent on introducing distribution automation, as it was preparing for an upcoming pilot program with the Tennessee Valley Authority (TVA) centered on voltage reduction and peak load management.

A fixed-based network using point-to-multipoint (PMP) wireless topology over licensed spectrum became the clear

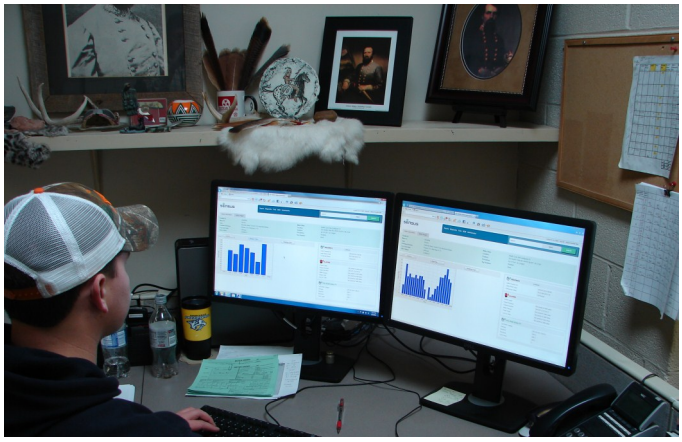
choice for Dickson to implement a safe and reliable network. PMP involves a Regional Network Interface (RNI) which receives data that is forwarded from a tower gateway base station. As a result of channel allocation, algorithms in the RNI can continually monitor and adjust network demand to allocate signals over a less burdened channel to deliver the lowest possible latency. This architecture provides throughput for PMP networks exceeding that of mesh topology, and has the added benefit of operating on a licensed spectrum.

For Dickson and its customers, the faster data throughput, higher signal range and the reduced footprint of PMP provided the most performance dollar for dollar and accomplished all necessary tasks over a single network. In this particular case, it was the FlexNet™ system from Sensus.

Strong Deterrent to Theft

Tampering with the data on one of the newly installed Sensus electric meters is made difficult by strong encryption key technology and other safeguards built into the device. There were a number of locations showing evidence of tampering when the old analog meters were replaced with digital units. The new AMI system alerts personnel to any outages at specific addresses, as they should. When a telltale sequence of events occurs and a specific meter has been de-energized more often than its neighboring meters, there's a good probability that the customer has removed the meter to tamper with it or to install jumpers around the meter base.

A tampering event occurred within weeks of Dickson's new AMI system going live. These voltage losses were recorded at Dickson between office hours by a data historian with the meter acting like a sentinel around the clock. Slowly but surely, the small number of customers attempting to bypass meters are recognizing that this type of activity will not go unnoticed.



Dickson Electric manages its AMI application over FlexNet from a desktop console. FlexNet is integrated with a Milsoft dispatch system for faster system restoration.

More than Metering

The network has proved to be very reliable, response rates have been excellent, and the system has been very easy to use and maintain.

In addition to its six network base stations, Dickson strung approximately 100 miles of fiber optic cable for network backhaul and to allocate bandwidth for SCADA capabilities. The FlexNet system is integrated with all enterprise systems, including a Milsoft dispatch system for accommodating customer needs during power outages and for faster restoration.

Dickson Electric is committed to a ten-year pilot program with TVA, mostly comprised of voltage reduction and direct load control for system optimization, in addition to AMI. The pilot program encompasses roughly five percent of Dickson's grid, although plans to expand the technology into its entire service territory are already in place. Automating all the capacitor banks in particular will help provide a consistent load profile through volt/var optimization and guard against regulatory penalties for falling outside the range for power factor.

CONCLUSION

The FlexNet wireless network is the existing platform for much of this work and the foundation for future applications. Early projects include automated monitoring and control of capacitor banks, voltage regulators and download re-closers over the wireless network to protect against faults. Dickson is making good use of the data gained from those devices, such as phase currents, operational status and the number of operations. Future plans are formed for direct load control for peak shaving through the network and for communicating directly to in-home devices on HVAC units and electric water heaters.

For more information, visit www.sensus.com.

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