

Swanton Village Electric

Electric Grid Gets Smart with Fiber-based SCADA Network

Company Background

Swanton Village Electric (Swanton) is a municipal electric utility serving thousands of residential and commercial customers in northwest Vermont. The utility generates the majority of its own power through a hydroelectric dam, but also sources energy through its cooperative membership in the Vermont Public Power Supply Authority (VPPSA).

A cornerstone of Swanton's mission is the reliable and efficient delivery of electricity to its customers, which can be a challenge at times given the rural population, diverse landscape and wide-ranging annual weather conditions in its serving area.

For Al Mosher, Swanton's Electrical Systems Support Technician, attaining the utility's service delivery and customer service goals with a limited team means relying on smart grid technology – specifically a Supervisory Control and Data Acquisition (SCADA) system – that enables him to remotely monitor and intelligently control Swanton's electric distribution facilities.

Project Overview

For Mosher, a SCADA system is only as smart as how fast it can collect and synthesize data from the field to drive operational decisions. If the SCADA network is slow or cannot collect the data, it's virtually useless.

Swanton's Power RICH SCADA system used spread spectrum radios to communicate between the SCADA master control at the main office and the substations, switches and reclosers in the field. Since the system used the Modbus Remote Terminal Unit (RTU) protocol, it was polling Swanton's field devices for 250 pieces of information every quarter of a second.

Based on the protocol's design, each radio would compile all 250 pieces of data from each device before sending it all back through the repeater radio to the master control. Because this took some time and there was a delay in the master receiving the data, the system ended up sending a repetitive polling request, which only led to further traffic bottlenecks and an inability to effectively monitor and control the network.

Swanton quickly realized it needed to upgrade its SCADA communications infrastructure and the decision was made to build a fiber optic network. This new approach called for physically interconnecting Swanton's main office and the SCADA RTUs co-located within the substations, switches and reclosers in the field using fiber optic cables to provide a high-speed, full-duplex SCADA communications network. This design would eliminate the traffic bottlenecks and give Mosher a real-time view into Swanton's facilities and more control over managing the utility's electric load.

Choosing nextGen

As he searched for a network construction partner, Mosher first heard about nextGen Telecom Services Group from the Vermont Electric Power Company (VELCO), a statewide electric transmission company that connects to Swanton's grid and is also an existing nextGen customer.

““ *NextGen differentiated itself during the bid process with a level of professionalism that was unparalleled and was carried through the entire project by everyone involved, from the line crews and splicers to the executive team.* ””

– Al Mosher
Electrical Systems
Support Technician
**Swanton Village
Electric**

In a competitive review of multiple bids for the SCADA network project, Mosher chose nextGen because of the breadth of services the company offered – from design and splicing to construction, testing and total project management – and he knew nextGen had the experience in every aspect of the project to make it successful.

“NextGen differentiated itself during the bid process with a level of professionalism that was unparalleled and was carried through the entire project by everyone involved, from the line crews and splicers to the executive team,” said Mosher. “NextGen’s workers were ‘cracker jack,’ efficiently getting their job done and advising us on the optimal splicing and fiber cabling for our specific rugged outdoor environments. From our perspective, we got incredible bang for our buck with nextGen.”

Building the Network

The final design for Swanton’s network included the deployment of an ADSS fiber optic network, consisting of more than six miles of construction. This gave Swanton the ability to interconnect the main control center with direct fiber feeds to the SCADA RTUs at the following Swanton field facilities:

- 3 substations
- 5 field switches/reclosers
- 1 hydroelectric dam

While most of the network construction was roadside, it did require crossing an interstate highway as well as a gorge to reach Swanton’s hydroelectric dam.

All aerial construction work was completed in the supply region of the utility poles, underscoring nextGen’s experience in cable placement in both the communications and power spaces of the poles.

“Unlike many telecom construction firms that can only work in the communications space on utility poles, we recognized fiber optics as the common denominator across communications and electric utilities industries and have invested in the employee training, work processes, tools and equipment to make our fiber optics expertise relevant for SCADA, wind farms and other smart grid and clean power applications,” said Dave Marcoux, Vice President, Construction Services, nextGen.

Swanton’s complete network was constructed and fiber drops spliced to the SCADA RTUs in less than eight weeks, coming in on schedule and on budget.

With the new fiber optic SCADA communications network in place, the traffic bottlenecks and inability to monitor and control the network are a thing of the past. There are no delays in collecting the data Mosher needs – everything from faults and system voltage to phase currents over time – and he can easily troubleshoot and redirect capacity to address consumption problems from blackouts or brownouts or switch customers between substations without any service impacts.

Smart Grids at the Speed of Light

Smart grids are a general term for the modernization of the transmission, distribution and consumption of electric energy. While significant emphasis is placed on smart meters and two-way controlled appliances in homes, just as important are the systems to improve the automation, monitoring and control of the distribution networks as demonstrated by Swanton’s upgraded SCADA communications network.

From that perspective, fiber optics are truly the wave of the future for managing the distribution of electric services. Unlike legacy copper cables, optical fibers do not conduct electricity or suffer signal interference and have the capacity to support high-speed, two-way communications with facilities in the distribution network. The end result is much more efficient electrical load management within one distribution network or multiple grids.

“We’re known for using Yankee ingenuity to solve problems for our customers, whether it’s getting a tree limb off a power line or upgrading our SCADA system, and nextGen showed similar drive, determination and fiber optics expertise to deliver results for us,” added Mosher.

In addition to Swanton, nextGen has provided fiber optics services for a number of smart grid, wind power and clean power projects. These include optical ground wire (OPGW) splicing for the interconnection of VELCO substations in a smart grid, as well as ADSS fiber placement and splicing for connecting wind turbines to the grid in the Kibby Mountain and Stetson II wind farms in Maine.

About nextGen

NextGen Telecom Services Group offers communications network infrastructure engineering, construction and fiber optics services to service providers, enterprises, government and municipal customers throughout the eastern United States. More information about the company and its services is available at www.ngengroup.com.