



Eaton small-scale SCADA system for Grand Valley Power

Location:

Grand Junction, Colorado

Segment:

Utility

Challenge:

Create a cost-effective, scalable SCADA system to provide improved system reliability, increased system visibility, improved workforce efficiency and real-time communications with a supplier able to design and provide a turnkey project solution

Solution:

Eaton provided end-to-end project support including system design, equipment specification, installation and commissioning

Results:

A remotely-hosted modular, scalable SCADA system capable of meeting all of GVP's functional requirements, implemented with minimal capital infrastructure investment and low maintenance overhead

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Matt Williams, staff engineer

Background

Incorporated in 1936, Grand Valley Power (GVP) is the oldest electric cooperative in Colorado. It was established by a group of farmers in the Grand Valley who had been unable to secure electric service from existing utilities. At the time, the utility served about 400 homes and farms in the lower Grand Valley.

Today, GVP serves more than 17,000 customers, has seven substations and 1,625 miles of distribution line. With an increasing number of customers relying on its service, GVP sought to improve system reliability and access to real-time performance data by establishing a robust communications and monitoring infrastructure that would enable the utility to communicate with its remote intelligent electronic devices (IEDs).

To enable personnel to pinpoint equipment issues or the cause of an outage without physically checking equipment, GVP wanted to establish a SCADA system. This system would also enable the utility to remotely monitor and control substations, provide access to real-time and historical load data, as well as remote access to fault data.

Challenge

When Matt Williams joined GVP as a staff engineer, he sought to establish an infrastructure to communicate with devices in the field. Given today's technology, he did not want to continue to rely on regular onsite system inspection by field operators to gather data.

Williams knew there were modern SCADA solutions available that were both flexible and modular. Today's SCADA systems can scale from a single substation to systems that involve hundreds of substations with a feature set customized to fit a utility's needs.

There were many technical challenges involved in establishing the necessary infrastructure at GVP to change its historical process via the use of a small-scale SCADA system. Some of GVP's substation equipment would need to be updated with modern control capabilities, a communications infrastructure would need to be implemented, and the SCADA system would need to be easy to manage and maintain with limited staff resources.



Powering Business Worldwide

“I was confident that acquiring a SCADA system would solve the communications issues we faced, enhance safety, and allow us to operate in a much more efficient manner, but I wasn’t sure we would get what we needed given our budgetary constraints,” Williams said. “We chose to work with Eaton because it had the technical knowledge and could provide us with an affordable turnkey solution and serve as a single-source vendor. GVP had a great working relationship with Eaton and GVP personnel were already familiar with many of their products.”

The key to project success was to determine the system requirements and appropriate project support. Before converting their entire system, GVP decided to embark on a pilot project in 2015 to determine whether a SCADA system could help them improve:

- System reliability and power quality (access to real-time and historical trending)
- Visibility to direct crews during outages (through a one-line diagram)
- Safety by remotely operating equipment
- Restoration efforts (using remote fault data, reporting and instant notifications via email and text)

Plus, the solution needed to be scalable—so it could be implemented over a few years and evolve as the utility’s requirements changed.

The pilot established cellular communications via a private cellular network to Eaton SMP 4/DP substation gateways and Cooper Power™ series recloser controls in two of GVP’s substations. The project also used Eaton’s Yukon™ Visual T&D™ software and one set of GridAdvisor™ Series smart sensor fault indicators. The Eaton software and an SG-4250 communications gateway were installed in a remote data center.

In 2016, following the success of the pilot program, GVP sought to expand on the project and establish communications from Eaton’s SCADA software to recloser controls in three additional substations, add another set of GridAdvisor Series fault indicators, and establish direct communications to two recloser controls located at midpoint locations on the distribution line.

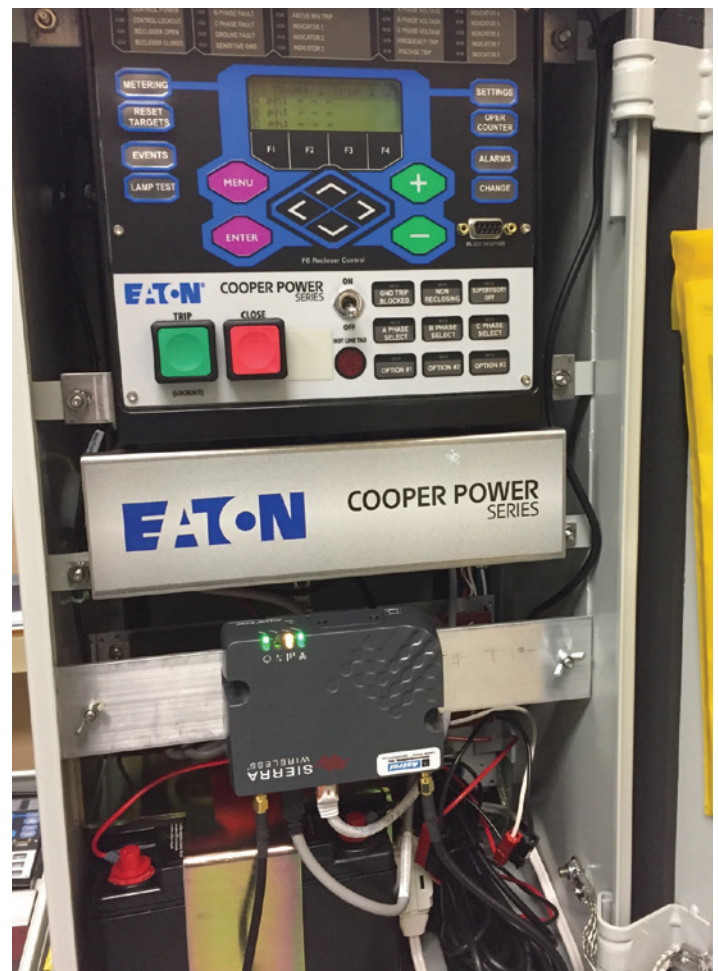
Solution

Eaton provided GVP with a turnkey solution that included full equipment and power system support: engineering, procurement, and installation of the hardware and software to support the infrastructure. The Eaton services team provided upfront planning, design, fieldwork, and project management for the duration of the collaboration with GVP, as well as configuration, installation and commissioning of equipment in the field. The team specified the equipment that would be used to facilitate the project and developed the one-line diagram, which shows the power distribution path. Further, Eaton’s services team worked with the cellular provider, data center and product development teams to deliver the solution the customer needed.

The Eaton solution included the Cooper Power series SMP™ gateway to communicate with recloser controls through an Ethernet switch and pull data from the IEDs using the DNP3 protocol; the data is transmitted over the customer-provided cellular modems to the data center where the Yukon Visual T&D software is installed. Eaton also provided engineering services to configure and test the solution and generate the single-line diagram. To help expedite the project and reduce costs, Eaton configured the equipment before it even reached GVP, and was onsite for additional configuration and commissioning to ensure the system was running smoothly.



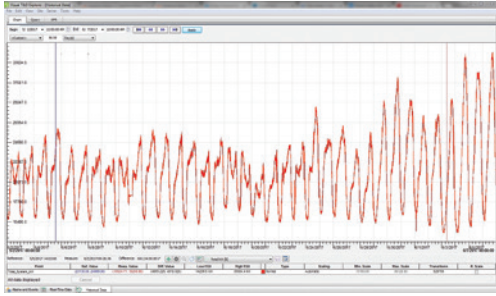
Capacitor bank control with cellular modem



Line recloser control with cellular modem

The SMP gateway was used because it provides a powerful and rugged platform for utilities to achieve secure and reliable data acquisition and management. Installed in the weatherproof NEMA enclosures, the Eaton gateway provides essential communication and security services, and operates over broad temperature ranges, which is crucial for utilities like GVP that operate in extreme temperature/weather environments. The SMP gateway installed in the remote data center serves as a centralized communications hub for all devices that are communicating on the system.

The Yukon Visual T&D SCADA software is a centralized SCADA system that supports substation monitoring, visualization and control through local and remote connectivity and visualization, interactive single-line diagrams, data acquisition, control, alarming and event processing and event recording, as well as historical information and report generation.



Historical data trending in Visual T&D Client software

The solution was engineered and configured both offsite and onsite and the entire process was managed by Eaton:

- Offsite: Eaton configured the SMP gateways and updated diagrams in the software and Eaton's power system automation engineers provided turnkey support, including installing the gateway and power supply in the Eaton weatherproof enclosure.
- Onsite: Eaton's services team also configured and commissioned the SMP Gateways, recloser controls, and communications between the controls and the gateway; tested the system; and provided further commissioning assistance.

"Eaton provided us with everything we needed to overcome both the operational and technical challenges we faced in implementing a SCADA system," Williams said. "I can now sit at my desk and have a bird's eye view of our substations and line devices. When any anomalies occur, we see right where they are so we can send people directly to the problem area and restore power faster for our members."

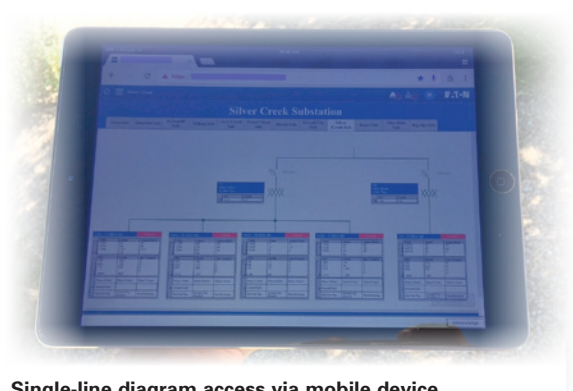
Results

Working with Eaton, GVP is realizing the reliability and efficiency benefits from the implementation of a scalable, modular and flexible small-scale SCADA system. With the help of Eaton experts in power system automation and its services team, GVP was able to meet project deadlines with quality support. Its legacy communications system is taking full advantage of the benefits of cellular technology and Eaton's expertise.

Through the SCADA system, Grand Valley Power is receiving everything it specified on its initial wish list: remote monitoring, access to real-time and historical data and remote access to fault data. Now, if an overcurrent device operates, GVP knows exactly where the fault occurred and its team operates more efficiently than it did prior to the project. As a result, GVP members experience shorter power outages.

"Our SCADA system is providing all the benefits we hoped it would, including system reliability and power quality, visibility, safety and efficiency," Williams said. "We are very pleased with the solution that Eaton has provided us, and we are excited that our project goals were met at a very affordable cost."

Phase 3 of the project is underway in 2017: the addition of two capacitor bank controls, connection of the two remaining substations and installation of all remaining GVP line reclosers. GVP also has a wish list for the future that includes regulator controls, additional capacitor bank controls and transformer monitoring equipment.



Single-line diagram access via mobile device



Turnkey substation communications enclosure designed, built, and tested by Eaton

EATON SOLUTIONS

Eaton turnkey SCADA solutions:

- Power system engineering support
- Yukon™ Visual T&D™ software
- SMP Gateway
- Form 4D recloser control
- Form 6 recloser control
- GridAdvisor™ Series II smart sensors
- Weatherproof NEMA-rated enclosure

Project management support included:

- Design
- Equipment ordering
- One-line diagram development
- Both onsite and offsite configuration
- Installation
- Commissioning

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Eaton
 1000 Eaton Boulevard
 Cleveland, OH 44122
 United States
 Eaton.com

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