Electro Industries GaugeTech
The Leader in Web Accessed Power Monitoring

Monitoring Case Study

case number 0014

New Hampshire Electric Coop

Integration of Revenue and SCADA Metering

New Hampshire Electric Co-op is a modern Electric Utility that depends upon metering information from its substations to drive its SCADA based Load Control System and to monitor one it's major expenses, delivery of energy into the system (billing verification).

By 2002, information flow from their existing meters had become unreliable and operating costs associated with substation meters had soared. Nearly every day, at least one of the 42 substations had a meter problem that required a technician visit and correct. Since NH Elect Co-op is located in the White Mountains, each visit usually required at least a half day of a Technicians time. This activity almost required the full time support of a Metering Technician.

Other issues that the Metering Technicians were dealing with:

- The closed QDIP protocol used in these meters made troubleshooting and problem resolution difficult
- The Quantum 210 and 330 meters had reached the end of their practical life. Parts and support are not available.(42 meters).
- Metering data required for critical applications was not always available:
- Reliable data for verification of billing by energy suppliers was not always available
- The Meters were not providing reliable Input of substation load data into Load Control System
- The SCADA System was not receiving reliable Substation Telemetry (V, I, W, VAr and VA)
- Connection to the Metering Center required expensive DDS lines
- The Meters did not support connection to modern SCADA systems (DNP 3.0 or MODBus)
- Revenue data from existing meters could not be imported directly into the Metering Data Centers MV-90 System and required expensive preprocessing using DOS based software on obsolete hardware.

Project Thumbnail

Application

Substation Metering

System

Nexus 1260 meters, ITRON MV-90 data center, ACS SCADA System

Results Summary

- **SCADA and Revenue Data Reliability Problem Solved**
- **Meter maintenance costs reduced by 90%**
- **Maintenance visits to the meters reduced from >1/day to <1/month.**
- **Data retrieval costs reduced by 50%**

Project Goals

Scott Joyce, the System Engineer, laid out a project to resolve these problems by upgrading the substation meter. His goals where to not just improve data reliability but to also significantly reduce the cost of supporting the meters.

Scott's Project Goals:

• Very significantly Improve the availability and reliability of data presented to SCADA system for Load Control and Substation Telemetry

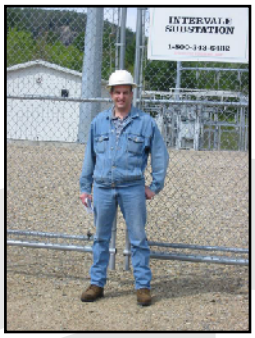
• Maintain a very accurate record of energy flow

• Reduce meter service and maintenance costs for 42 substation meters ($X/year)

• Reduce the cost of collecting and processing data from 42 substation meters ($X/year)

• Eliminate costly DDS (Digital Data Service) lines needed to return meter data to the Meter Data Center

• Upgrade meters for connection to SCADA system and improve data availability



• Begin standardization on DNP protocol for substation metering

• Replace rack mounted meters with S-base meters to reduce service costs

Meter Requirements

Scott developed a new metering concept based on the project goals that stressed meter accuracy, communications capability, and true 4 Quadrant Metering. However "simple-to-use" would be the key to project success.

Meter Bid Proposal requested the following:
Form 9S - Polyphase meters
Optional Metering Pulse Output (KYZ)
Time-of-Use Metering (TOU) Capability
Load profiling and Data storage

System Requirements

• Very accurate 4 quadrant measurement (delivered and received, lagging and leading) of revenue quantities

• Reliable 115k communications between meter and SCADA system

• Support for open standard SCADA communications (DNP) and ModBus

• Reliable 56k telephone communications and Control Center Meter Reading Center (ITRON MV-90)

• Simultaneous multi-port communications between meter, SCADA, and Meter Reading Center

• Compatibility with ITRON MV90 Data Center Software

• Very flexible Load Profile Recording of up to 20 data channels with recording intervals down to 1 minute

• Time-of-use metering with 2 seasons

• Programmable meter displays

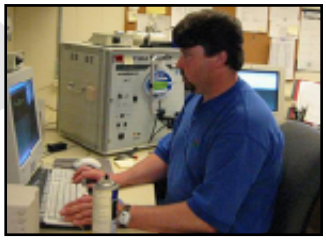
• External displays that can be mounted remotely from the meter

Nexus 1260 Selected

After reviewing available meters, New Hampshire Electric Coop selected the Electro Industries/ GaugeTech Nexus 1260.

The Nexus 1260 was selected for the following reasons:

• 115 kb communications to SCADA System (DNP and MODBus)



• Simultaneous multi-port communications

• True four quadrant metering

• MV90 compatibility

• Very flexible Load Profile Recording up to 20 channels with intervals down to 1 minute

• Records kW, kvar, and kVA

• Time-of-Use Metering (2 seasons)

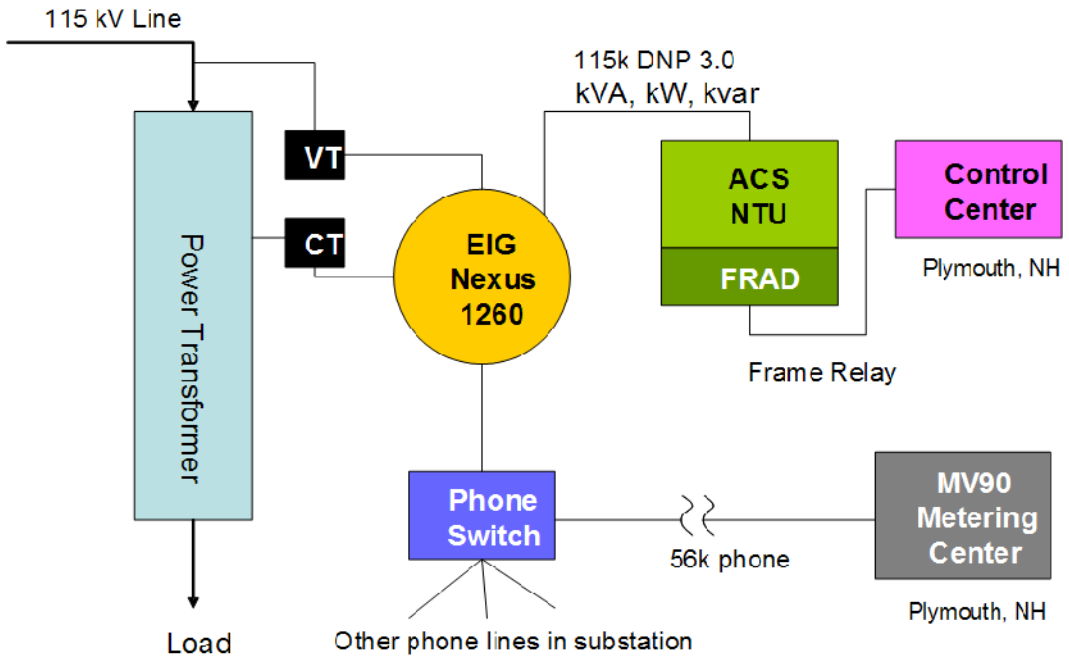
• Can be time synched to atomic clock

• Optional external displays

Project Implementation

The project implementation steps included replacing the old rack mount meters with new socket meters and then adding the communications links to the substation NTU and Central Meter Data Center. Then interfaces with SCADA and MV-90 had to be established. The MV-90 driver for the Nexus 1260 had already been developed by ITRON and the ACS interface module followed soon afterwards.

Intervale Substation after Upgrade



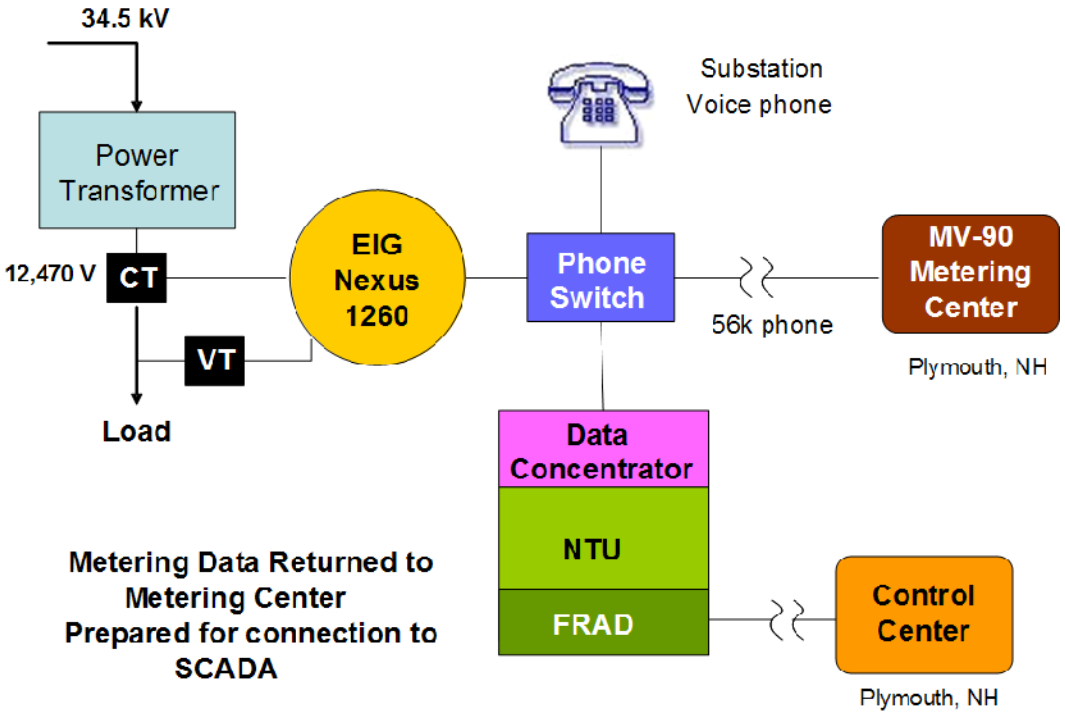
Integrated Metering and SCADA Information

As integration was proceeding a decision to share the substation phone line with the meter phone line was made and further reduced overall operating costs. Sharing is accomplished by adding a phone switch and taking advantage of the communications intelligence in the meter.

At the Intervale substations, direct high speed communications to the SCADA system was implemented. This implementation is a model of how the other substations may be upgraded in the future.

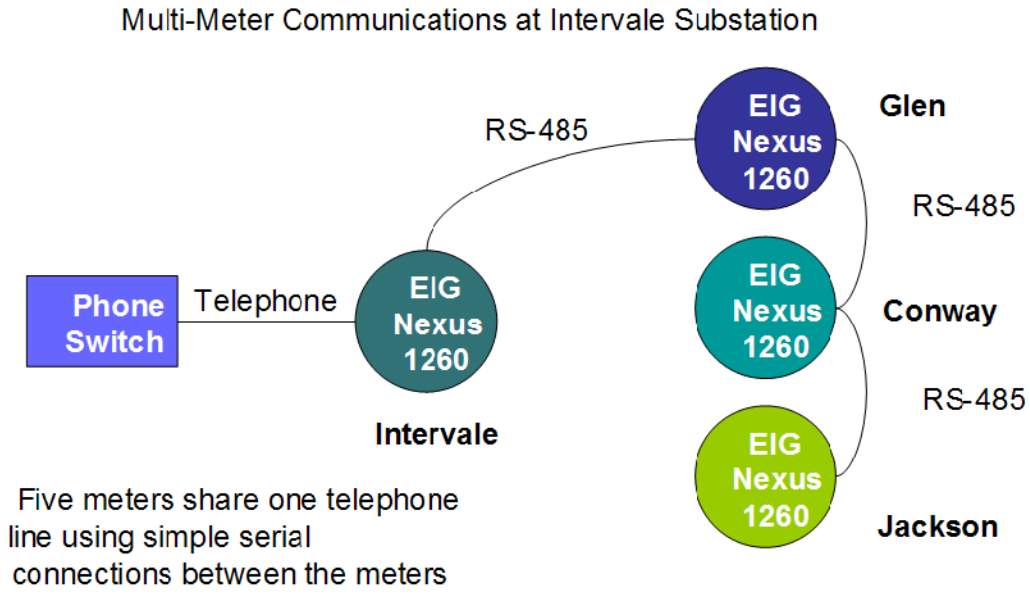
At the other 41 substations, 56k communications to a Data Concentrator is used instead of 115k communications.

Typical Upgrade after Substation - the other 41



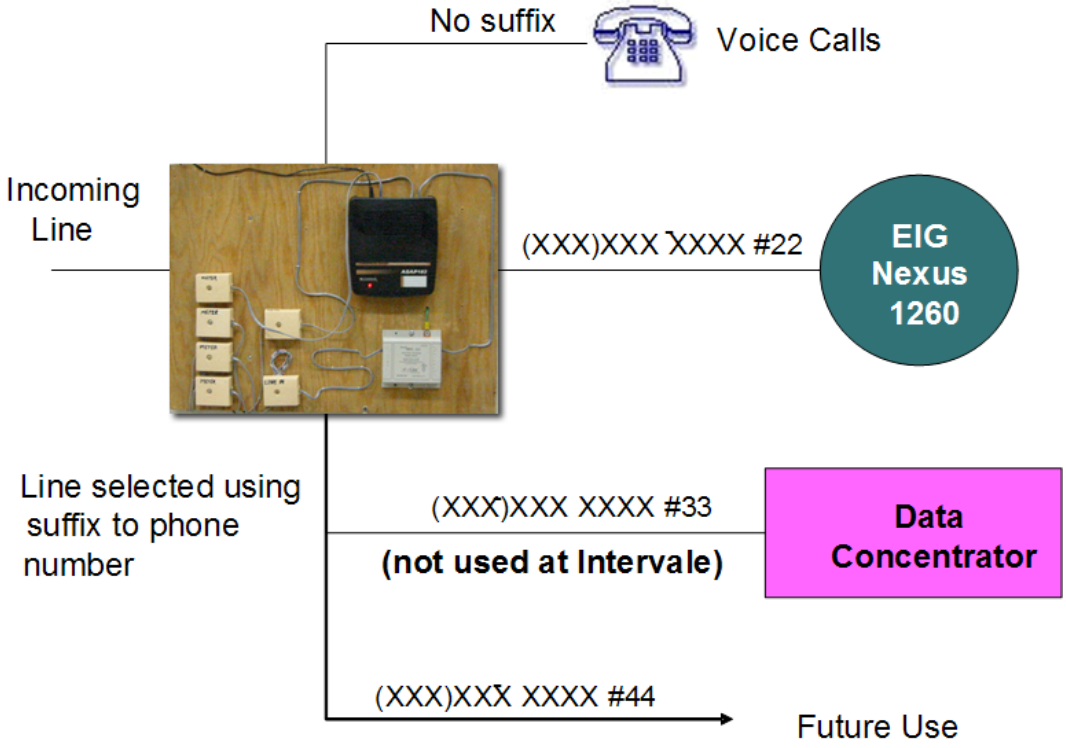
One other difference in implementation at Intervale substation is the sharing of one communications line among 4 meters. This was another significant savings in operating costs. The Nexus meters allow one meter to act as a communications master and to share communications with up to 5 meters using RS-485 connections.

Daisy Chaining Meters



The telephone line sharing at all substations was implemented using an addressable phone switch. A suffix is added to the phone number to address the five switch positions on the phone box. For, example to call the Nexus meter, 22 is added to substation phone number. This approach allows voice communication to a person in the substation or data communications to devices on the four other lines, a significant savings in communications costs.

Shared Telephone Information



Results

After completion of the project Scott Joyce, now Control Center Supervisor at New Hampshire Electric Co-op, summarizers the results as:

- The System now has reliable data for Intertie billing verification and Load Control
- Tool Kit for Revenue and Telemetry applications is now in place and ready to be implemented when needed.
- Meter maintenance costs reduced by 90% ($42,000/year) - Maintenance visits to the meters went from >1/ day to <1/month.
- Data retrieval costs reduced by 50% ($11,000/year)
- The daily locked up DDS or phone line has disappeared.
- 1988 computer needed to run DOS software has been eliminated.
- Expensive DDS lines eliminated.
- Phone line switch adds voice and SCADA communications without adding additional phone lines (Savings of $48/month / line = $1152/year)
- MV-90 link to all substation meters in place and working.
- Prepared for DNP link from Meter to SCADA system at all 41 substations (link in place in Intervale Substation, #42).

NH Coop Background

Today, the Co-op has fulfilled its mission to bring electricity to the rural residents of New Hampshire. As NHEC branches out to become a complete energy solutions organization, it continues to serve 75,000 members in 116 New Hampshire towns and cities.