

Utility District Goes Wireless For Deregulation

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Deregulation.

Effective January 1, 1998, deregulation of the United States power utility industry became a reality, making electric power the biggest American industry to ever become deregulated by the

Federal government. The reasoning behind this move is to normalize the cost of power across the United States by making available low cost power from selected areas in the United States, such as the Northwest, available to high cost areas like Southern California. High level officials in this industry are predicting the nation's \$212 billion dollar a year electric bill will drop by 20% to 30% in the next five to ten years as a result of the deregulation. One thing for sure, there are many changes ahead facing this long protected industry.

POWER REVOLUTION

Klickitat County Public Utility District (PUD) is a leader in the power revolution. Klickitat PUD, a municipal subdivision of the State of Washington, provides electricity to almost 10,000 customers and water and sewer to 800 customers, over a 1,800 square mile area in south central Washington (see Figure 1).

In the past Klickitat PUD purchased 100% of its electric power from the Bonneville Power Administration but under a new negotiated contract signed in June 1996, they are now allowed to purchase up to 25% of their power on the open market.

In early September 1997, after conducting a Request for Proposals for system integrators, Klickitat County PUD awarded a contract to Programmable Control Services® (PCS) Inc., an authorized Allen-Bradley® Systems Integrator, to install a state-of-the-art PLC based Supervisory Control and Data Acquisition (SCADA) system. The Klickitat SCADA system will initially be used to monitor loads and resources on a real-time basis from a central location, allowing more cost effective



Figure 1: Klickitat County

purchasing decisions for electric power. The PUD is also installing equipment to control distribution feeder breakers and voltage regulators in one substation to test the control equipment for future installations and also to experiment with automated voltage reduction schemes to reduce system peaks.

WIRELESS NETWORKING

Prior to the writing of the Request for Proposal, Klickitat hired an outside consultant to investigate fiber optics, leased phone lines, and radio telemetry as options for the communications network for the new SCADA system. Radio telemetry was chosen because it was the most cost effective and time efficient solution compared to the other options. After award of the contract an on-site radio frequency (RF) Site Survey was performed. Figure 2 shows the layout of the RF network.

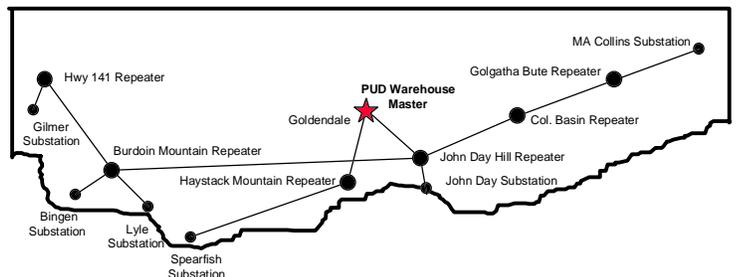


Figure 2: Klickitat PUD RF Site Layout

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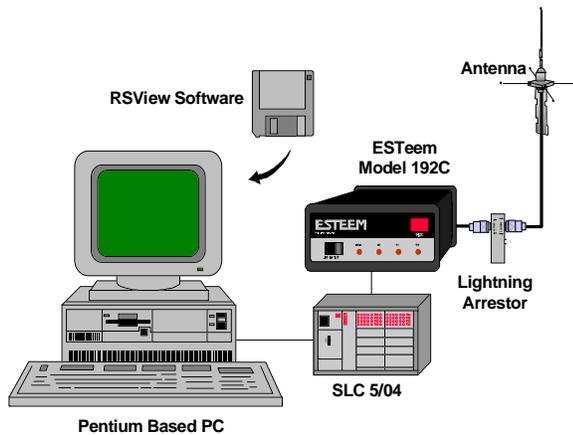


Figure 3: Master Station Hardware Diagram

The foundation of a radio network is the RF Site Survey. The site survey engineer performs on-site measurements and analysis to determine factors needed to design the RF data communications system including RF signal levels between all nodes, co-channel emitter frequencies/signal strengths, RF data quality, and repeater nodes locations, if needed. Additional design input is given on antenna selection and location, feedline requirements, lightning/power protection for each node, as well as specific installation requirements as dictated by the customer's application.

Listed below are the main reasons the ESTEEM® Model 192C product was selected by PCS.

- Integral Allen-Bradley protocol driver in the radio for seamless interfacing
- Digi-repeater capability for reduced system cost and complexity
- 19,200 bps data rate
- Licensed narrow band frequency of operation
- Encompass® Partner with Allen-Bradley
- Customer Support services of manufacturer
- Proven site capability

RTU vs. PLC

In the Power Utility market there is an on-going debate as to which is best for applications, Remote Terminal Units (RTU's) or Programmable Logic Controllers (PLC's). Listed below are the major reasons why a PLC approach was selected by Klickitat.

- "Off Shelf Hardware"
- User maintainable system software
- Hardware expandability for easy system expansion
- Peer to peer communication capability

- Lower obsolescence factor
- Large selection of I/O modules
- Market leadership of technology
- Customer support of vendors
- PLC vendor's 3rd party relationships
- Lower expected system life cycle costs

SYSTEM HARDWARE

The Master Station, located in Klickitat's Warehouse in Goldendale, WA, consists of an Allen-Bradley SLC 5/04®, ESTEEM Model 192C, and Pentium® based PC running Rockwell Software's RSView® software configured for SCADA applications (see Figure 3).

At each substation is an Allen-Bradley SLC 5/03, Powermonitor II®, and ESTEEM Model 192C (see Figure 4).

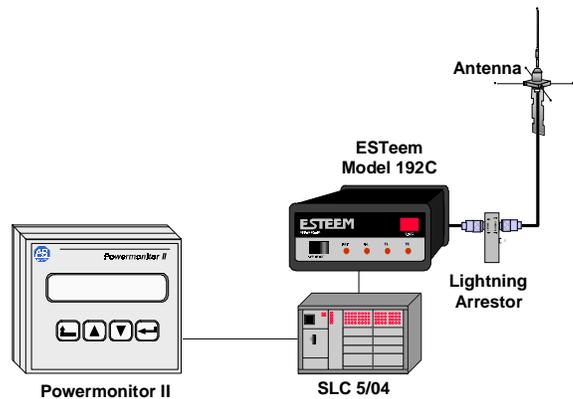


Figure 4: Substation Hardware Diagram

The Master PLC gathers load data from all of the substations on a half-duplex, polled-by-exception basis through the ESTEEM radio (or backup phone link in case of failure of the wireless network). Load data from all substations is taken from the Master PLC and stored in a personal computer located at the master site called the Master Station. Currently, this data is available to the PUD's power broker via a telephone connection. However, the system is designed so that in future, the Master Station will forward this data via dedicated telephone line to Chelan PUD, located in the north central section of Washington state at a four second update rate. The power broker uses the transmitted load information to develop a user load history, which is used for purchasing future blocks of power from the open market for use by Klickitat.

RSView software running on the Master Station serves as the "window" into the SCADA system. All current process data, including events and alarms, is displayed by

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the RSView software at the Master Station, and a dial out voice alarm system has been integrated into the package.

The wireless network was not used to send data to the power broker because the broker was physically distant from the radio coverage area of the network.

CONCLUSION

In this era of power utility deregulation, Klickitat PUD's SCADA system will prove a powerful tool for efficient load management, cost saving, and faster response to system needs. By knowing exactly what their loads and energy usage is, Klickitat PUD can achieve considerable savings by planning power purchases, thereby lowering electricity costs.

Since purchasing power is the single largest cost to the PUD, even a small percentage saving per kilowatt-hour results in large annual cost savings. Savings obtained by installing the SCADA system will pay off the capital costs, in a short time period.

Forecasted future expansion of the SCADA system will include remote monitoring and control of individual feeders, and access to fault location information from intelligent relays. This future capability will allow the PUD to find faults in a shorter amount of time and remotely operate switches to isolate customers and restore power quickly.

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