PHŒNIX CONTACT
INSPIRING INNOVATIONS

Water authority uses wireless, VPN technology for remote communication

Summary

- A water authority in Pennsylvania needed to automate communication from its remote wells and pump stations to meet new EPA rules

- Control Systems 21, a system integrator, implemented a new system that provided accurate, real-time data

- The solution used Phoenix Contact Ethernet radios to transmit data back to the main control center; where wireless was not possible, Phoenix Contact's FL mGuard router provided a secure VPN connection to communicate the data over the Internet

- Thanks to faster and more accurate data reporting, the township has reduced labor and costs and can avoid costly EPA fines

Middlesex Township needed to improve communication from several remote sites, such as this water tank.

Customer Profile

Control Systems 21 is a system integrator in Dillsburg, Pa., that specializes in the service, calibration, design and installation of process control instrumentation. From precision industrial manufacturing to modern municipal water and wastewater treatment, Control Systems 21's manageable size and no-nonsense style of business helps to optimize automation and control system budget dollars.

Challenge

The Middlesex Township Water Authority, near Carlisle, Pa., provides drinking water to 3,300 customers. Due to new EPA regulations, the Water Authority needed to update its remote pump monitoring system. The new rules required the township to report its trending data for chlorine levels and turbidity more accurately, and to respond to alarms within a half-hour.

Previously, the township monitored these levels manually. They would send personnel to the sites to manually record the data and for regular maintenance. The staff would then upload this local trending data via USB on the hour.

Because this was a manual process, the township only had data about the chlorine levels during normal business hours. They could not run the pumps after the maintenance staff's normal shift ended. To supply water after hours, the township had to purchase water from nearby municipalities.

The township wanted to upgrade this antiquated system. A new automated SCADA system would reduce the cost of manpower/maintenance and ensure they always had accurate, timely information at the main control center.

Solution

Middlesex Township contracted with Control Systems 21 to implement automatic monitoring and control its remote wells and pump stations. The solution featured a wide variety of Phoenix Contact products, including the ILC 150 VLC programmable logic controller (PLC), managed and unmanaged Ethernet switches, serial communication servers, firewall routers and several different Ethernet radios.

The new system connects different PLCs, PCs and DVRs over a wireless and VPN network. The application uses several different protocols, including EtherNet/IP, Modbus/TCP, Modbus RTU and OPC.

Corey Heckman, automation manager at Control Systems 21, said, "Phoenix Contact had everything we needed to complete the project – the ability to talk to the existing controller, the wireless systems, VPN and data logging. They pretty much covered it completely."

In particular, Heckman cited the ILC 150's gateway capability as a key factor in the decision. The ILC acted as a communications gateway to the system's legacy PLCs, communicating via EtherNet/IP to Modbus/TCP, then to Modbus RTU via a com server.

Steve Redcay, automation sales engineer at Phoenix Contact, explained, "The legacy PLCs had data that we needed to communicate back through a VPN tunnel. With the ILC, we were able to communicate with those PLCs and change the protocol to work better with a wireless network."

There was no Internet connection at the remote sites, Control Systems 21 installed Phoenix Contact Trusted Wireless Ethernet (TWE) radios. The application used both 400 MHz and 900 MHz versions, along with different gain antennas, depending on the specific requirements of the sites. Phoenix Contact cabling and surge protection enhanced the system's reliability.

Most of the sites were reachable via 400 MHz, 5 W radio. However, the township's size and topography presented a challenge in one location. The hilly terrain made line-of-sight impossible, so the radios could not reach the main office on one hop.

Heckman stated, "We would have needed a 150 foot tower to overcome the topographical issues of a 400 MHz radio. Another option was a cellular system, but that would have incurred monthly cellular fees."

The ILC controller acts as a communications gateway to the system's legacy PLCs, communicating via EtherNet/IP to Modbus/TCP, then to Modbus RTU via a com server. The TWE radios then transmit this data back to the authority's headquarters.

At this location, Control Systems 21 selected Phoenix Contact's FL mGuard. The mGuard is an all-in-one firewall, router and VPN, designed to meet the harsh conditions common in industrial applications. The mGuard created a secure VPN tunnel to communicate critical video and Ethernet data over the Internet and back to the main office.

Results

Middlesex Township now has accurate and on-time data on chlorine and well levels. According to Rory Morrison, authority manager, the water authority no longer needs to send maintenance personnel to drive to remote sites, reducing both labor and transportation costs.

"The system is better now because we don't have to spend so many man hours at the well site. We were visiting the site several times a day, turning pumps on or off. Now we can do that remotely over a laptop or cell phone," he said.

The automation has also eliminated the need to buy water from neighboring municipalities. In addition, Heckman estimates that Phoenix Contact Technical Service and local sales support saved approximately 40 hours of labor.

"The Phoenix Contact employees are very knowledgeable," he said. "They were out for technical support, and were there for the start-up. They really trained us for the project."

Ultimately, the system's faster update times and reliable communication will help Middlesex Township keep the clean water flowing and avoid EPA fines.