

Cloud SCADA Solves Big Problems for Small Utilities

By David B. Mundie



Rural municipalities and utilities have unique problems with operations. They have small budgets that must be stretched to cover large geographic areas. Although they need SCADA systems to improve efficiency and maintain service, they rarely have the budgets or the in-house expertise to design or maintain them.

Their technology choices have been limited to line-of-sight radio networks or phone lines to get connectivity. In areas with hilly terrain, line-of-sight radios often require costly repeaters.

Leased phone lines have become more expensive and less reliable over the years. As these traditional systems become older, the cost to maintain them gets higher.

Cloud SCADA systems allow utility operators to access and control their systems from any Internet-connected device. Not only that, but the cloud SCADA provider carries the burden of licensing and maintaining SCADA software and hardware. This reduces costs and development needs for the utility.

Harriman Utility Board

The Harriman Utility Board (HUB) provides electric, gas, water and sewer services for the city of Harriman, Tenn., and the surrounding area. Over the years, HUB also has absorbed smaller water service providers and integrated them into its system. This created a patchwork of technologies for monitoring its water system.

Before a new system was implemented, personnel received monitoring data via one computer in the warehouse; thus, operators or service personnel in the field had little access to the data when they were away from the office. At the water plant, some of the aging monitoring equipment was not working due to limited availability of repair parts. Many of the remote locations had no telemetry on them at all and required onsite visits from operations staff to check on status and tank levels. Some sites were checked during daily site visits, while others were checked much less frequently.

Because of the long distances from one end of the system to the other, it was becoming more difficult to operate the system reliably and efficiently. HUB has more than 4,800 water customers and more than 200 miles of pipe. The driving distance from the office to the farthest tank is more than 45 minutes.

After experiencing some problems with one booster pump station and tank in particular, HUB allowed a demonstration of a small cloud SCADA system to be installed for monitoring.



The system was set up to control the booster pump station to maintain the tank level within an acceptable range. This demo system proved to be invaluable in enabling personnel to monitor the health of this remote section of the system.

"Before we installed the cloud SCADA system for our water distribution network, we relied heavily on the past experience of our operators to predict where our leaks were occurring," said Candace Vannasdale, gas, water and sewer engineer for HUB. "A call would come in saying someone was out of water, and our guys might spend hours trying

remote monitoring

to pinpoint where the problem was occurring. Now we get a notification via text message when a tank begins to drop unexpectedly, for example, and can respond and correct the issue long before the customer ever knows there is a problem. Our operators have understood their system's behavior all along, but now to see it up on the screen is validating to them. To start and stop a pump or change the operating scheme of a booster station with a click of a button on their smartphone or tablet is probably their favorite part."

After spending a year reviewing many options, the board decided to implement the High Tide Technologies Cloud SCADA system, which was used during the demonstration, throughout the complete system. The main reasons for this choice were:

- Cost advantages compared with radios and phone lines;
- Simplicity of installing and repairing the equipment;
- Level of support received from the solution provider on the demo system;
- Local distributor's (Wascon Inc.) ability to provide quick service when needed;
- Variety of communications solutions offered, such as cellular, satellite and Ethernet to reach all locations;
- Range of hardware options from two inputs to 50-plus inputs to cover all sites, including solar-powered options for some remote tank sites with no electric service; and
- Ability to monitor the water treatment plant on the same system.

The Final System

The final system consists of 28 remote sites and includes 13 tanks, 16 booster pump stations, the water treatment plant, the raw water intake pump station, a pressure reducing valve station and three zone meters. Installation of the new system started in February 2014, and all 28 sites were online by May 2014. The speed of installation was attributed to the detailed work done by the engineers involved to fully identify all of the sites and the monitoring requirements of each.

The final system consists of a mixture of GSM and CDMA cellular units, as well as direct Ethernet at the water treatment plant and one solar-powered satellite unit at a remote tank site. One advantage of the cloud SCADA approach was that no infrastructure, such as base stations and repeater towers, was required before the system was functional. As each station was installed, it was immediately available on the cloud SCADA interface for HUB to start monitoring and controlling.

The system automatically controls remote booster pump stations to maintain the levels in the tanks as specified by HUB personnel. Statistics for run times, tank levels and water usages are maintained for analysis by the operations staff as well as in-house and consulting engineers.

Two 50-in. monitors were installed at the water treatment plant so the plant operators can keep track of the system's status and control the high-service pumps to maintain the optimum storage level in the main system tanks. Another 50-in. monitor was installed at the operations warehouse

so the distribution operators and manager also can easily track system status. System pressures are reported and cell phone alarms are issued when any tank or pressure level is out of range.

Reduced Water Loss

There are many benefits attributed to the new system. One of the major goals was to reduce water loss, which had been increasing for many years. With the data they are getting from the zone meters and the tank levels in the middle of the night, the engineers have been able to direct the service staff to exactly which parts of the system have leaks. Before the system was installed, the staff spent significant time "chasing leaks," according to Frankie Davis, gas, water and sewer manager for HUB. Since the system was put in, the water loss has been reduced by 10%.

HUB frequently would get calls from customers about low water pressure and overflowing tanks. With the new system, those calls have been dramatically reduced along with overtime costs. Because the system is cloud-based, access to the data is available to the plant operators, field service personnel and management anytime from wherever they are. Finally, an unexpected benefit has been a more accurate understanding of the way the system works so it can be better engineered and calibrated in the future.

Planning Ahead

The flexibility of the system will allow HUB to achieve greater efficiency in the future. The data gathered from pump stations will allow HUB to better perform preventive maintenance and increase the life of the pumps. The utility will install and monitor more zone meters so it can continue to drive down water loss numbers. It also will expand the system to cover its natural gas distribution so it can monitor and maintain the system pressures with fewer staff visits in cold winter months. Overall, HUB now has a high-tech system that is tailored to its operations.

Conclusions

Cloud SCADA systems are ideal for smaller utilities. With cloud solutions, smaller utilities are not required to have in-house expertise, large budgets or numerous staff. These solutions make large and sophisticated SCADA solutions affordable for small providers. **w&wd**

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