Electronic communication system optimizes performance of regional reclaimed water distribution system

The Customer

More than 1.4 million people live in the City of Orlando (Fla.) and this number is growing. The city also is home to some of the state's most fertile agricultural areas and the headquarters for large companies. This growing need for water services required an expansion of waste-water treatment. In addition the area faced a state requirement for eliminating discharge of treated effluent to surface waters.

In response, Orange County (Fla.) and the City of Orlando began developing an integrated water reclamation program. Working together, the city and county created the Eastern Regional Reclaim Water Distribution System.

Problem:

Regional reclaim water distribution system causes four pump stations to compete for putting water into the system.

The Eastern Regional Reclaim Water Distribution System circles Central Florida and provides reclaimed water, which is pumped into the system from both Orange County and the City of Orlando, to residential and commercial customers. As the first reuse program permitted in Florida and one of the largest in the country, the system provides approximately 28 million gal/day of reclaimed water for crop irrigation.

The Challenge

The project's major challenge was recognized only after the formation of the system. Four different pump stations on the system were all vying to pump at the same time, creating competition to put water into the system and causing problems with pressure and maintenance.

"It would take the Operations staff of three different facilities to communicate with each other in order to get the system to function correctly," said Guy Mecabe, City of Orlando Wastewater Systems manager. But even with this effort, the staff was only receiving value updates from each other by their phones throughout the week, he explained. "It proved difficult to make operational decisions with such infrequent data."

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And because both the city and county are "selling" water for irrigation through the system, "each is only compensated based on the flow that was delivered to the system," Mecabe said. "There were several instances where one municipality's revenues were impacted due to the other over pressurizing and delivering more flow. For example, if Orange County's pressure set-point was higher than that of the city, then the city delivered no flow and therefore collected no revenue for that period," Mecabe said.

System managers needed to collect data from all the different Supervisory Control and Data Acquisition (SCADA) systems from each pumping station to display on a single Human Machine Interface (HMI) screen. This solution would allow operators to view pump status, valve positions, flows, tank levels, and pressure from each of the pumps stations so they could make informed operational and maintenance decisions.

The Approach

The city and county met to discuss the creation of a physical connection to solve the problem. The city's team was familiar with Kepware Technologies and suggested using the company's LinkMaster Software as the application layer solution. The city and county discovered an existing physical connection between the two networks for the police departments, which required only the changing of some settings on existing firewalls and assigning network address translation (NAT) addresses. Both municipalities agreed to purchase the servers and software.

The team worked with the LinkMaster Software, creating a virtual environment simulating the network technology. Due to Distributed Component Object Model limitations using Open Process Control (OPC) Data Access (DA) components, the implementation team exchanged the software with Kepware's KEPServerEX with both OPC DA and Unified Architecture (UA) Drivers, which created a successful exchange across the domains.

Organization:

City of Orlando - The first reuse program permitted in Florida and one of the largest in the country, providing approximately 28 million gal/day of reclaimed water for crop irrigation. The system is an important component of the two municipalities' environmental mission. Reclaimed water is transported to the center of the agricultural community.

Industry:

Wastewater

Solution:

KEPServerEX®, OPC DA and Unified Architecture (UA) Drivers, LinkMaster Software

The Benefits

The results were "exactly as expected," Mecabe said. Once communication was established, each entity created a read-only tag database from the other's OPC data and the city and county were each able to build their respective HMIs which now allow all operators to view pump status, valve positions, flows, tank levels and pressure from each of the pumps stations to make informed operational and maintenance decisions.

"Since the implementation, there is no need for anyone to call, and they have up to the second real-time values with trending from which to make informed decisions. This has saved an estimated 5-7 man hours per week," Mecabe said.

The pump stations at each treatment plant pump reclaimed water to a common transmission force main. The transmission main extends 34 m (21 mi) to deliver the combined flows to the distribution center. From the distribution center, reclaimed water is pumped through the distribution system for irrigation and/or rapid infiltration basins for recharge of the aquifer.

The agricultural community now has a dependable water supply for irrigation and freeze protection, and can possibly reduce fertilizer use because of the nutrients in the reclaimed water. The project also results in reduced energy costs because the water is delivered under pressure.

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