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100 Series Endpoints

100W Endpoints and System Security

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Introduction

The nation depends on its transportation, energy and water infrastructure to deliver the needs of society. For obvious reasons, extraordinary effort is being made to protect the security of these vital systems. For water systems this means securing against the intrusion and spread of life-threatening contaminants, ensuring safe delivery of clean water and protecting the supply of water from over-use or depletion.

Fortunately, the advancement of technologies has allowed water providers to leverage existing systems designed for metering data collection to assist in protecting their water distribution systems. Using advanced meter data endpoints, fixed network communications and advanced analysis applications, water providers are able to continuously measure, monitor, collect, manage and analyze data from the distribution system, providing a near real-time picture of how the system is operating and providing various event alarms.

The ChoiceConnect™ 100W endpoint from Itron is an advanced data collection meter interface unit that offers an array of functionality and benefit to water providers who strive to ensure a high degree of security over their distribution system.

Overview

The 100W water endpoint is the newest addition to Itron's portfolio of advanced water metering devices. The endpoint design supports both water pit and remote installations, and is compatible with encoded and pulse-generating registers from industry-leading water meter manufacturers. The 100W utilizes 50 radio channels, selected randomly, and delivers exceptional reading performance with increased radio frequency (RF) output power and an advanced antenna. Key functionality includes two-way communications down to the 100W, as well as the ability to offer data logging and time-synchronized interval data reads. Data logging enables advanced analysis of consumer water usage patterns and other events such as reverse flow from a meter. It also enables security monitoring and asset management benefits that reach out into a water provider's distribution system, such as district metering, leak detection and other advanced system controls.

Security Benefits

The design of the 100W water endpoint lends itself to a variety of enhanced security measures as described in the following sections.

Reverse Flow

One security scenario that has received attention is the threat of contaminated water (whether accidental or deliberate) entering the distribution system from a site other than the water source. When water pressure from a site is greater than the system pressure, a back flow or reverse flow event is created—creating a potential path for hazardous contaminants to enter the municipal water system.

With the 100W endpoint, potential reverse flow conditions are automatically detected then reported as an alarm by the system to the specific endpoint and location. The 100W detects when the water meter register runs backwards or when the total quantity of water that flows in the 'reverse' of the meter direction is greater that the quantity of water that has flowed in the 'forward' direction over a period of time. The reverse flow alarm and event location allows the water provider to quickly investigate and mitigate the flow event to minimize risk of exposure to contaminants that may have entered the system.

District Metering

The ability to monitor the flow of water through an entire water system is becoming a reality with near-real time district metering, providing an overall picture of system performance and unaccounted-for water. Access to system level information can call attention to anomalies that, left undetected, can adversely affect system reliability and delivery.

The 100W and companion analytics can detect unusual events quickly. Customers (meters) are aggregated into groupings by territory and district meter. The utility then can take meter readings from the district meter and compared against the aggregated readings of the meters in that district. Time-synchronization is the key—the comparison of the district meter to the aggregated group must take place at the same moment in time. How much water is pumped (reading from the district meter) is compared against the water metered out (customer meters within the district.) If the amount of water metered out is less, there is unaccounted for water losses (theft or leakage for example) and if the metered-out reading is higher, a water intrusion event could be possible.

District metering is often used to detect and isolate possible leaks in a distribution system, helping to reduce intrusion points in a system and non-revenue water, as well as mitigate large leak events and associated liability issues and service disruptions.

Proactive Leak Detection

Distribution system leaks are a major cause of water losses. Distribution system leaks can be costly, disruptive and adversely impact the system's integrity (leaks can become paths for contaminants to come into the water system whenever pressure in the system is lost). By monitoring and eliminating leaks, water providers can minimize major water infrastructure maintenance projects and associated repair costs.

The 100W is available with two ports, one for connection to the water meter register, the other for an integrated acoustic leak detection sensor. The sensor listens for system leaks (as small as a pinhole and up to several hundred feet away), every night and leverages the fixed network to bring back leak detection recordings for analysis in the hosted software application. Every morning the water provider receives a leak status displayed on a service territory map, with those sensors identifying potential leaks nearby highlighted in red for field investigation and mitigation.

System Compatibility:

With the ever-growing need to manage resources more effectively; new technologies are being developed to help water providers meet the growing challenges. Many of the new technologies will be placed in the field and leverage communication systems for remote telemetry and analysis.

The 100W offers an additional port for integration with remote devices. This compatibility will offer water providers greater flexibility and functionality in monitoring their distribution systems for improved overall security. Several of the technologies available or under evaluation include;

- Acoustic leak sensors are available for proactively detecting leaks in the distribution system and reducing costly and disruptive leaks that adversely impact the system's integrity.
- Actuator values are available for water meters that remotely shut-off or restore water service, which will isolate a specific location from the system for possible security-related issues.
- Quality sensor technology is being developed that will regularly monitor water quality and transmit data back to the utility for analysis of water purity and contaminants.
- Pressure sensor technology is being developed to monitor the changes in system pressure, flagging any extreme changes, thereby further enhancing the knowledge of system performance.

Itron either offers or is working with third parties in the development of these advanced technologies that will continue to bring greater operational and security benefits to the water industry.

Reliability

The 100W assembly and battery pack are fully encapsulated to protect internal components from water, contaminants, corrosion, rough handling and temperature cycling. Its simple design uses relatively few components, resulting in lower overall service costs.

Lower Cost-of-Ownership

The 100W water endpoint's industry-leading battery life ensures attractive financial returns. Additionally, the endpoint's advancements in leak, reverse flow and tamper detection translate into fewer field investigations and substantially lower expenditures for installation, meter reading, customer service and field service. This new endpoint will incorporate a low battery indicator as part of its normal message.

Itron Inc.

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