Down-To-Earth Non-Revenue Water Strategies

Practical, Accessible New Technologies Bring Water Loss Prevention Within Reach for Water Utilities

Source: Telog, A Trimble Company

ABSTRACT

Non-revenue water (NRW) and, in particular, water loss through leakage has become an increasing priority focus for water utilities around the world. With failure rates of aging infrastructure increasing and growing water stress due to population growth and climate change, reducing the loss of essential water resources is paramount. Leak monitoring and detection systems from Trimble Water help water utilities proactively identify and reduce NRW and water loss, prevent service outages, and prioritize infrastructure repairs. Easy-to-use wireless and mobile leak detection solutions provide clear, accurate, real-time insights into the condition of the water network beyond the treatment plant. Paired with Trimble's intuitive cloud-based GIS software, Trimble's solutions make it simple for water professionals to visualize, manage, and analyze data from the field and use that knowledge to improve productivity and network performance.

BACKGROUND

Leak detection and prevention have long been a priority for water suppliers and utilities. Pipeline bursts, aging infrastructure, and equipment deterioration in municipal water distribution systems result in the leakage of significant amounts of clean, treated water each year, costing billions of dollars for water utilities worldwide. The more water that leaks out of a system, the more utilities must treat to fill customer demand, so operators are understandably motivated to quickly locate and repair leaks and reduce the costs associated with treating and pumping NRW.

However, many utilities have extremely limited visibility into the operation of their distribution systems or the condition of their water networks beyond the treatment plant. Until recently, the cost and complexity of identifying, locating, and repairing leaks have made leak detection and prevention a difficult challenge for water professionals. Utilities too often must react to large leaks and pipe bursts instead of addressing small leaks before they cause infrastructure damage. Without visibility into system performance or the condition of underground pipes, utilities have typically based their preventive infrastructure replacements solely on age instead of prioritizing network upgrades based on highest need or risk.

PROBLEM

Conventional leak detection equipment requires highly skilled operators to achieve accurate results, making it difficult and often cost-prohibitive for utilities to maintain experienced crews that can

cover the network and catch small leaks in a timely manner. As a result, many small leaks go unnoticed until they develop into big leaks or bursts that cause visible surface pooling, sinkholes, disruptions to customer service, and, of course, significant NRW.

SOLUTIONS

A comprehensive NRW strategy requires a combination of leak detection, monitoring, prevention, and response. Fortunately for the water industry, modern hardware and comprehensive software solutions from Trimble Water bring these capabilities within reach for utilities.

Fixed wireless sensors deployed throughout the water network allow utilities to efficiently detect leaks in the system and monitor water flows, pressures, and transients. A new generation of smartphone mobile devices enables even inexperienced crews to perform field surveys or confirm and pinpoint the location of small leaks detected by the fixed system.

Cloud-based GIS software captures all the data from both fixed and mobile sensors, analyzes it, and presents it in a clear, easy-to-use dashboard. Used in conjunction with fixed and mobile hardware assets, the software allows plant operators to visualize leak alerts, view and monitor leak intensity and leak development, respond to incidents before conditions deteriorate, and prioritize scheduled repairs.

Together, these hardware and software solutions make it simple and cost-effective for utilities to evaluate in real time the condition of their water distribution networks, significantly reduce NRW, and prevent damage to infrastructure.

Fixed Leak Detection and Monitoring

The Telog LDR-32 is a wireless, battery-operated acoustic sensor that's easy to install for both above- and below-ground applications. Samples are captured and uploaded to the cloud during off-peak hours using existing cellular networks — no costly radio infrastructure is required.

Placed at key points across the water system, the plug-and-play sensors monitor the network for signs of leakage by collecting data continuously and correlating data readings between adjacent points on the network. This continuous, correlation-based detection method enables the sensors to immediately identify very small leaks not yet detectable by surveys or noise-loggers.

The Telog LDR-32 works with pipes of every diameter and every material — cast iron, steel, plastic, PVC, HDPE, or concrete. The sensors can be deployed as fixed detection systems to provide an early warning to the water utility for large leaks in transmission or trunk mains or small service leaks anywhere in the network.

As the data is captured and analyzed, the information collected provides utilities with an ongoing assessment of the condition of pipes in the network. Understanding how quickly small leaks become big leaks, or whether one section of the network is more susceptible to leaks than another, helps utilities prioritize maintenance and repairs and determine whether a localized repair is sufficient or whether an entire section may need to be upgraded or replaced.

Mobile Leak Detection

Trimble's Mobile Leak Detection solution is an all-in-one system that combines advanced acoustic detection principles with the power of cloud processing to achieve accurate leak correlation and location. Used with a smartphone, the mobile kit provides utility crews with all the tools necessary for efficient surveying and leak detection, including an accelerometer for use with metal pipes and a hydrophone (used at tap points such as hydrants and valves) for use with PVC, HDPE, or large-diameter pipes.

With the Mobile Leak Detection kit, utilities can send their crews out to pinpoint the location of a leak identified by the fixed system or to perform leak surveys in areas determined to be at risk for leakage. The crews simply plug in the appropriate sensor to a smartphone audio

port, activate the accompanying Trimble Unity app on the phone, and quickly and efficiently move through the network. All data is uploaded to the cloud as it is collected, allowing supervisors and users back at the plant to analyze results in real time and provide remote support to the crews in the field.

In all cases, both the leak data and the correlation data are transmitted to and stored in the cloud, so non-experts can perform the field surveys, while leakage experts back at the plant review observations from the field, including sound recordings as well as data readings.

Wireless Pressure & Flow Monitoring
In addition to identifying and responding to leaks in the water distribution system, utilities strive to optimize water pressures throughout the network, using only as much pressure as they need for service. Spikes in pressure can damage assets on the network, and too much pressure means more NRW in the event of a leak.

Wireless pressure monitoring instruments such as the Telog PR-32-A and Telog PR-32iA can be permanently deployed on the water network, providing another important component of a complete NRW strategy. The PR-32A series — the highest-resolution transient monitoring solutions on the market — are capable of capturing up to 256 samples per second. The devices deliver real-time data from the field to the office, while the Telog PR-32iA adds the ability to store the waveform of captured pressure transient waves detected on the monitored network.

These pressure and flow monitoring capabilities combine with Telog's fixed and mobile leak detection solutions to create a powerful system of wireless water infrastructure monitoring that provides a complete real-time picture of conditions within the water network. Understanding the flow and pressure in a distribution area allows utilities to match pressure to demand and minimize the volume of water lost in the event of a leak. The monitors also help utilities avoid transients, water hammer, and damage to the water network caused by recurring spikes in pressure. With pressure and flow monitors deployed throughout the system, utilities are able to define sections of the water network, see how each section is performing, and determine how best to prioritize repairs and upgrades.

DATA ANALYSIS

While these wireless fixed and mobile solutions have made it possible to collect data at previously inaccessible points along the water network, the real value comes in the analysis of that data. Software solutions from Trimble Water allow utilities to gather all the data collected on the water network into one place and gain clear insights into the performance of the network. Day-to-day data analysis allows utility operators to change operating parameters as needed, optimize pressures on the network, perform NRW audits, and respond to small leaks as they emerge.

Along with real-time leak identification and reporting, the software builds a history of leak occurrence, allowing water utilities to track all repair activity in the field, including information about which assets were affected and what type of repair was performed. Utilities can then use this history to profile and analyze areas on the network at risk for leaks and make informed decisions about whether a section of the network requires full replacement or a localized repair. By giving water utility operators the information they need to make strategic near-term and long-term investment decisions, Trimble's software solutions provide the final missing piece of the NRW strategy puzzle and provide a key insight for the utility's asset investment planning decisions.

Summary/Conclusion

With their ease of use and real-time, cloud-based data analysis capabilities, mobile and wireless leak detection and monitoring solutions from Trimble Water provide a practical, comprehensive solution for water utilities seeking to prevent service interruptions, prioritize infrastructure repairs, and reduce the costs associated with non-revenue water. Leakage analytics enables the reduction of NRW and associated operating costs in addition to providing input to strategic capital investment decision-making with a positive return on investment.

Why Trimble Water?

Trimble Water, a division of Trimble, Inc. (Nasdaq: TRMB), provides a range of asset management and remote monitoring solutions for water and wastewater utilities. Through its Telog portfolio, the company has pioneered water monitoring solutions for more than 30 years and offers remote monitoring and IoT solutions that address the broad needs of water distribution and wastewater collection systems. Trimble's products include cost-effective and easy-to-use leak monitoring and detection solutions for water and wastewater systems, giving utilities secure, reliable, real-time insight into their entire networks.

Learn More

To learn more about mobile and wireless leak monitoring and detection systems and non-revenue water (NRW) solutions from Trimble Water, visit www.TrimbleWater.com, email TrimbleWater_ContactUs@trimble.com or call +1-888-835-6437 today. ■