RAJANT

CASE STUDY

Rajant Safeguards City's Water and Wasterwater Infrastructure with Real-Time Monitoring

One of modern society' s unsung pleasures is providing clean water. It's something that most of us take for granted. Regardless of location, the survival of a population relies on both the cleanliness of the water and the effective recycling of used water. The United States is no exception, making the management of existing water supplies critical. Without a reliable system for delivering and treating water, communities would face severe health risks, agricultural challenges, and economic disruptions. Recognizing this, GrayMatter, in partnership with Rajant, is collaborating with the dedicated engineers at an Ohio utility to ensure a continuous supply of clean water to its citizens. Moreover, by combining the technologies of GrayMatter and Rajant the methods of managing water and wastewater available have boosted the municipality into the 21st century.

The Challenge

The Ohio water utility had an established system for alerting users to issues. The plant operated with a phone line-based telemetry system to communicate between the water plant, booster stations, and elevated tanks. Over time, the equipment being used for this had become obsolete and reliability of the phone network diminished with the phone company's responsiveness poor. Cellular could be reliable, but the ongoing expense a burden.

The new solution needed to be user-friendly, reliable, and scalable to support growth. Further, the environment posed significant challenges as many pump sites for water were surrounded by dense tree cover or nestled within neighborhoods. These conditions made traditional point-to-multipoint communication systems, which rely on direct line-of-sight, virtually impractical. Moreover, the new system had to be maintainable in the long term, allowing for easy upgrades and the integration of new technologies. Lastly, the system currently depends on outdated technology in the form of 900 MHz spread spectrum radios. With modern applications and the desire to "future proof" this critical system, a new approach had to be taken to protect the city's investment.

The Solution

A highly responsive and efficient system has been developed by leveraging Rajant's ES1-2450 and ES1-5050 BreadCrumbs® alongside GrayMatter's

Customer Description

- **Location:** Ohio (US)
- **Customer:** Water Utility

The Partners

- **Rajant -** Pioneers of peer-to-peer radio communications enabling real-time voice, video, and data to connect machines, robots, and people together as part of a secure private mobile network.
- **GrayMatter -** GrayMatter offers Advanced Industrial Analytics, Automation & Controls, Industrial Cybersecurity, Brilliant Operations, and other as-a-service solutions to help industrial organizations transform their operations and empower their people. Visit GrayMatter at graymattersystems.com.

Solution Components

Kinetic Mesh Components:

Rajant's ES1-2450 and ES1-5050 BreadCrumbs

expertise in cybersecurity and PLC (Programmable Logic Controllers). This system not only reduces response time to any changes in water flow but also enables real-time monitoring of individual components at all stations equipped with a Rajant node and GrayMatter's PLC monitoring solution.

Capable of overseeing multiple water pumping sites simultaneously, the real innovation lies in the system's ability to integrate existing legacy technology while creating a visual dashboard for all individual components. This feature empowers the engineering team responsible for the city's water management to quickly analyze and diagnose issues without needing to physically visit the pump site for most maintenance tasks or adjustments to water flow. This capability is particularly crucial when pumps are located near the borders between water-managed cities. With dynamic, on-demand information accessible directly from the water company's headquarters, the team can swiftly detect changes and coordinate with neighboring towns, significantly reducing response times compared to merely reacting to symptoms of low flow.

The system upgrade was comprehensive, addressing several key areas to enhance performance, maintainability, and security. The first upgrade involved integrating all existing legacy equipment into the network, allowing seamless operation within the newly upgraded system without the need to replace or overhaul older hardware. This preserved the value of previous investments while ensuring compatibility with the updated infrastructure. The second upgrade focused on enhancing all Allen-Bradley software, introducing new features that not only improved functionality but also made the PLCs more maintainable, thereby reducing the likelihood of downtime due to software-related issues.

To further improve communication efficiency, the third upgrade replaced the original 900 MHz radios, which had limited bandwidth, with much higher bandwidth Rajant ES1-2450 wireless radios. This significant enhancement increased data transfer speeds, enabling the system to handle increased traffic and more complex operations without lag. Lastly, the fourth upgrade incorporated advanced security measures designed to prevent intrusion and detect unauthorized access, effectively deterring bad actors from taking control of critical human resources. By integrating robust security protocols, the upgrade enhanced the system's efficiency and ensured its security, protecting essential services from potential threats.

> "GrayMatter proposed leveraging Rajant Kinetic Mesh radios for the city's telemetry solution. Since moving to the Rajant radios over two years ago, they have experienced no lost communications. Working with the Assistant Director of Water Utilities and his excellent team, we are looking to expand the network into the wastewater side of the utility too. Rajant has been extremely helpful and supportive anytime we've reached out. Mount Vernon Executive Leadership has been very happy with their decision to use Rajant and look forward to using them more as communications needs expand."
>
> **— Richard Dreher**
>
> GrayMatter General Manager, Automation & Controls

Overall, these upgrades transformed the system into a more modern, reliable, and secure network, fully capable of meeting current demands while being prepared for future challenges.

The Results

Since becoming operational in 2018, the network has consistently provided reliable coverage for all existing sites with minimal downtime, demonstrating its effectiveness and durability. Mt. Vernon is currently in the process of incorporating 13 additional sites into the network bringing the total number of monitored sites to 21. This expansion marks a significant milestone in the project, as it broadens the scope of the network to include critical wastewater infrastructure. Once the upgrade is complete, the network will be further strengthened by incorporating a second ingress point, enhancing its robustness and ensuring greater connectivity through redundancy. This added layer of security will make the system even more resilient.