Industrial Networking for Water/Wastewater

Implementing a Rugged and Reliable Ethernet Network

antaira®

making connectivity simple...

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making connectivity simple...

THE TREND OF INDUSTRIAL NETWORKING IN WATER/ WASTEWATER

Overview

Water is one of the most valuable and scarcest of resources in the world. Of all the water on Earth, less than 1% of it can be used as drinking water. Food and Water Watch estimates that by the year 2025 over 3.5 billion people will be facing water shortages.

Today, one out of every eight people do not have access to clean usable water. By the year 2050, the world's population will have increased by 40%. Therefore, providing water to our growing population will continue to be an extreme challenge.

Better education and planning, along with advanced treatment techniques and developments of new technology are the absolute minimum requirements needed to provide clean water. The water filtration process does not happen overnight, as there are multiple stages water needs to go through before it can become usable. By implementing industrial networking it is possible to bring the wide range of technology and communication types, found in a variety of water applications, together and upgrade the technology that is already in place with better, more advanced equipment while still utilizing legacy data collection and control equipment. This combination of old and new allows a greater ability to monitor and control all sections of water collection, utilization and cleaning whether the location is close or miles away. Fast, accurate and reliable monitoring helps to provide needed information required to make informed decisions for the future of our water.

Water Resources Management

Water Pipeline Monitoring
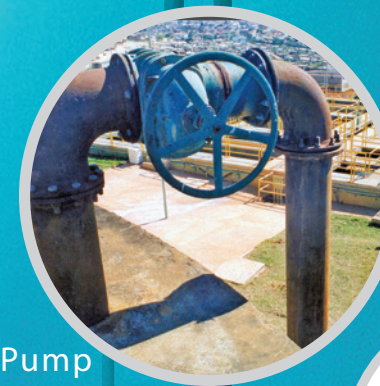
Remote Pump Station Monitoring

Wastewater Treatment Process

About Antaira

Antaira Worldwide

Antaira Technologies is a leading global developer and manufacturer of high-quality industrial networking and communication product solutions. Since 2005, Antaira has offered a full spectrum of product lines that feature reliable Ethernet infrastructures, extended temperature tolerance, and rugged enclosure designs. Our product lines range from industrial Ethernet switches, industrial wireless devices, Ethernet media converters, and industrial serial communication connectivity. Our vast professional experience has allowed us to deploy a wide array of products worldwide in mission-critical applications across various markets, such as automation, transportation, security, water/wastewater, power/utility, oil and gas, and medical.

Europe Office
Warsaw, Poland

Headquarters
Brea, CA USA

Asia Office
Xindian, Taiwan

Mission Statement

As a leader and trusted partner in the industrial device networking field, Antaira is committed to providing quality products and value-added service to its customers and channel partners to create solutions that deliver a worldwide advancement for a wide array of applications.

OUR COMMITMENT

Product Warranty

All Antaira products are backed with a warranty of up to 5 years. We warrant products against defects in material and workmanship for up to 5 years from the date of purchase. This means that Antaira will happily repair or replace the defective products within warranty, provided the products were installed and used within specification. Antaira is committed and will stand behind all of its products assuring customers will receive the highest quality and most reliable products possible.

Customer Service & Tech Support

Antaira's dedicated and competent team takes pride in delivering high-quality and prompt service to our customers. We go one step further when it comes to service. Incoming calls are routed to a live representative who can answer all inquiries quickly, whether it be pre-sales, post-sales or technical services during business hours. Antaira's technical support and RMA team have elite industry knowledge to ensure all issues are professionally and thoroughly resolved.

Satisfaction Guarantee

Here at Antaira, every sale is backed by our 45-Day Satisfaction Guarantee. Within 45 days of your purchase date, if for any reason you are dissatisfied with your experience or your expectations were not met, Antaira will promptly exchange or replace your product, or provide a full refund. We are available 12 hours a day to help clarify any questions, comments, or concerns regarding all transactions.

RoHS Directive

Antaira recognizes its environmental responsibility as a manufacturer and is dedicated to preserving the environment for future generations. We make it a priority to ensure that all our products are environmentally friendly. At Antaira, we not only make sure that our products are RoHS 2.0 compliant, but also all of our packing materials used to ship our products are compliant as well.

ANTAIRA'S 5 KEY INDUSTRIAL NETWORKING SOLUTIONS AND BENEFITS

1 Scalability and Flexibility

Today, PLCs and distributed control systems are shifting towards Ethernet as the standard communication medium due to the advances in Ethernet technology, its ease-of -use, and the common IEEE standardization between equipment manufacturers.

Ethernet significantly supports more efficient data communication throughout most facets of the water process. Achieving remote monitoring, or performing remote access and control, as well as, being able to manage and respond to emergencies are the true benefits of real-time networking. Antaira provides a wide array of industrial Ethernet network solution products, including industrial Ethernet switches, Ethernet fiber media converters, industrial wireless devices, and serial communication devices that are easy to adopt. Antaira's devices are highly integrated with serial, LAN, and WLAN, all of which support IEEE standards and are available in a variety of port configurations with 10/100Mbps or Gigabit copper, fiber, SFP and PoE technologies.

2 Reliability

Reliability is a key factor when dealing with a precious commodity such as water. Network downtime and loss of communication are of the greatest concerns within the water industry, because downtime or loss of data can result in a variety of unpredictable events, like the contamination of water. Networking equipment must be held to the highest industrial standards to ensure damage resistance from vibration or harsh outdoor environments and constant operation. Antaira's industrial networking solution products have passed a variety of certifications specially designed and developed for industrial use within harsh environments, complete with approvals to ensure uninterrupted data transmission between the equipment and the network.

3 Self-Healing Redundant Network

Most water/wastewater areas are in harsh environments, where any number of unexpected events may cause downtime and/or failure of equipment and/or the network. A robust redundant network ensures systems and equipment are functional at all times, even during an unforeseen event. Antaira's industrial managed Ethernet switches and latest serial device server series support various redundancy features to maximize communication providing near instantaneous responses. The built-in network redundant protocol within the managed switches provide a ring redundancy network topology solution to reroute data communication if any disconnection should occur in the network, and continuously perform non-stop networking 24/7. Antaira provides an open standard Ethernet Ring Protection Switching (ERPS) network redundancy protocol to ensure fast network recovery times of less than <50ms and maximize network uptime.

4 Ruggedized and Long Lasting

Rugged designs are essential for equipment used within water protection, piping and treatment due to their harsh environments. Antaira's industrial networking solution products are designed with IP30/40/50 or IP67 rated weatherproof housing, robust metal casing, wide operating temperature tolerance, and vibration proofing, making them suitable for use in tough industrial environments. In addition, all industrial networking solution products are designed and developed with high MTBF, EMI noise immunity and serial isolation protection.

5 Making Connectivity Simple

Building a complete robust industrial network that spans all sections of the water infrastructure from pipeline monitoring, water purification, resource management or the water treatment plant itself, is critical. Performing excellent real-time remote network management and providing enhanced features for reducing troubleshooting and downtime are major benefits to engineers or network plant operators within these industry segments. Antaira's industrial managed Ethernet switches, industrial wireless devices, and industrial serial device servers are pre-loaded with a user-friendly (ease-of-use) web console interface to allow for easy adoption, as well as, quick setup and deployment to perform real-time and remote network management. Antaira not only provides simple connectivity solutions to support industrial water/wastewater applications, but also a total low cost of ownership to users.

Industrial Ethernet Switches

Managed   **Unmanaged**   **PoE**

Industrial Wireless (IEEE 802.11)

Panel Mounts   **VPN Cloud**   **Outdoor IP67**

Industrial Media Converters

100Mbps Fiber   **Gigabit Fiber**   **Rack Chassis**

Serial Connectivity

Serial Device Servers   **Serial to Wireless Device Servers**   **Serial to Fiber**
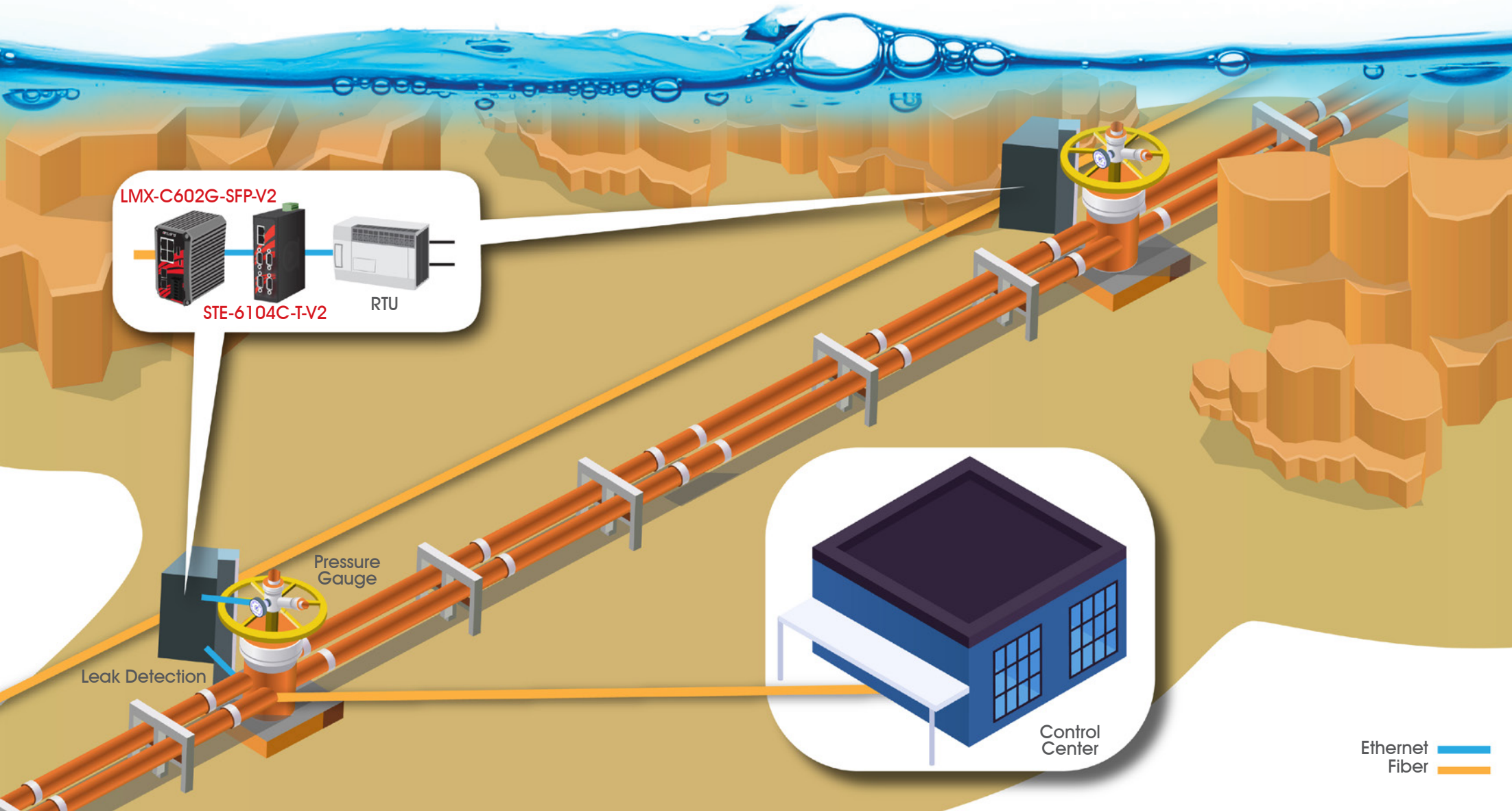
Water Pipeline Monitoring

Overview

Water pipelines are the essential distribution systems that provide the critical link between water sources, purification plants,treatment plants, and end users. In the United States there are over 1.2 million miles of main water lines that perform this essential task. Today, water pipelines are older infrastructures and face significant challenges such as requiring more monitoring, maintenance and security. Rapid response and repairs are critical if pipelines break or are damaged. Real-time networking equipment solutions are used to monitor and manage the water pipeline infrastructure and ensure utility engineers maintain a continuous and efficient water flow to residential, commercial and industrial users.

LMX-C602G-SFP-V2

STE-6104C-T-V2

RTU

Pressure Gauge

Leak Detection

Control Center

Ethernet
Fiber

Application

Water is without a doubt the most precious resource in the world. Monitoring of the nation's water transportation infrastructure is of vital importance for consumption, food production and power generation. Due to the massive and rugged geographical areas water pipelines traverse, direct human inspection of this water transportation system is challenging. Therefore, equipment such as flow meters, pressure gauges, vibration and moisture detectors are utilized for monitoring of our water supply. Monitoring stations placed along the water pipeline can provide remote access and surveying of larger geographical areas by fewer individuals. Data received from the monitoring equipment in the field can allow for better allocation of maintenance and service personnel. With more real-time information at the disposal of the control center team, the whole system is able to operate more efficiently with less downtime.

Challenges

. Remote locations contain extreme temperature and humidity
. Real-time data transmission between pipeline and control center
. Fast response time to any issue or emergency
. High MTBF network equipment to eliminate any downtime concerns
. Ability to transmit data over long distances

Application Requirements

. Industrial grade networking devices to perform under harsh
  environments
. Capability to monitor stations on a widely distributed water
  pipeline network
. Reliable real-time data routing with built-in network management
  software
. Alarms and warnings to alert personnel of possible issues
. Low voltage power input
. Expandability

Antaira's Solutions & Benefits

Antaira's Industrial Managed Ethernet Switch Series provides layer 2 network management software allowing users to remotely monitor and manage the network. Managed switches provide standard features such as QoS, SNMP, IGMP, Email alerts and IEEE 802.1Q. Additional PoE features, such as, remote PoE power management, and automatic end device power recovery can also be managed.

Antaira's Industrial Serial Device Server Series provides single or multiple RS232/422/485 connections bridging legacy serial measurement devices to transmit data back/forth by utilizing built-in Real COM software or a TCP socket function to remotely monitor from the control center.

Key Products

LMX-C602G-SFP-V2

4-Port RS232/422/485 Serial Device Server
• 4*RS232/422/485 DB9 male serial ports (software selectable)
• Dual 10/100Tx LAN ports support daisy chain and data redundancy
  applications
• Flexible operation mode support: Virtual COM, TCP/UDP server/client
• Multiple configuration options for either web console, telnet,
  or windows utility
• Temperature range: -40 to 75 ℃

STE-6104C-T-V2

6-Port Industrial Managed Ethernet Switch
• 6*10/100Tx + 2* 100Fx (SC/ST) multi-mode or single-mode
• Dual fiber ports for daisy chain communication down long water pipelines
• Advanced event handling by email alerts
• Configuration via web console,telnet or CLI
• Configuration backup through external USB interface
• Dual power input 12~48VDC
• Wide operating temperature range: -40 to 75 ℃
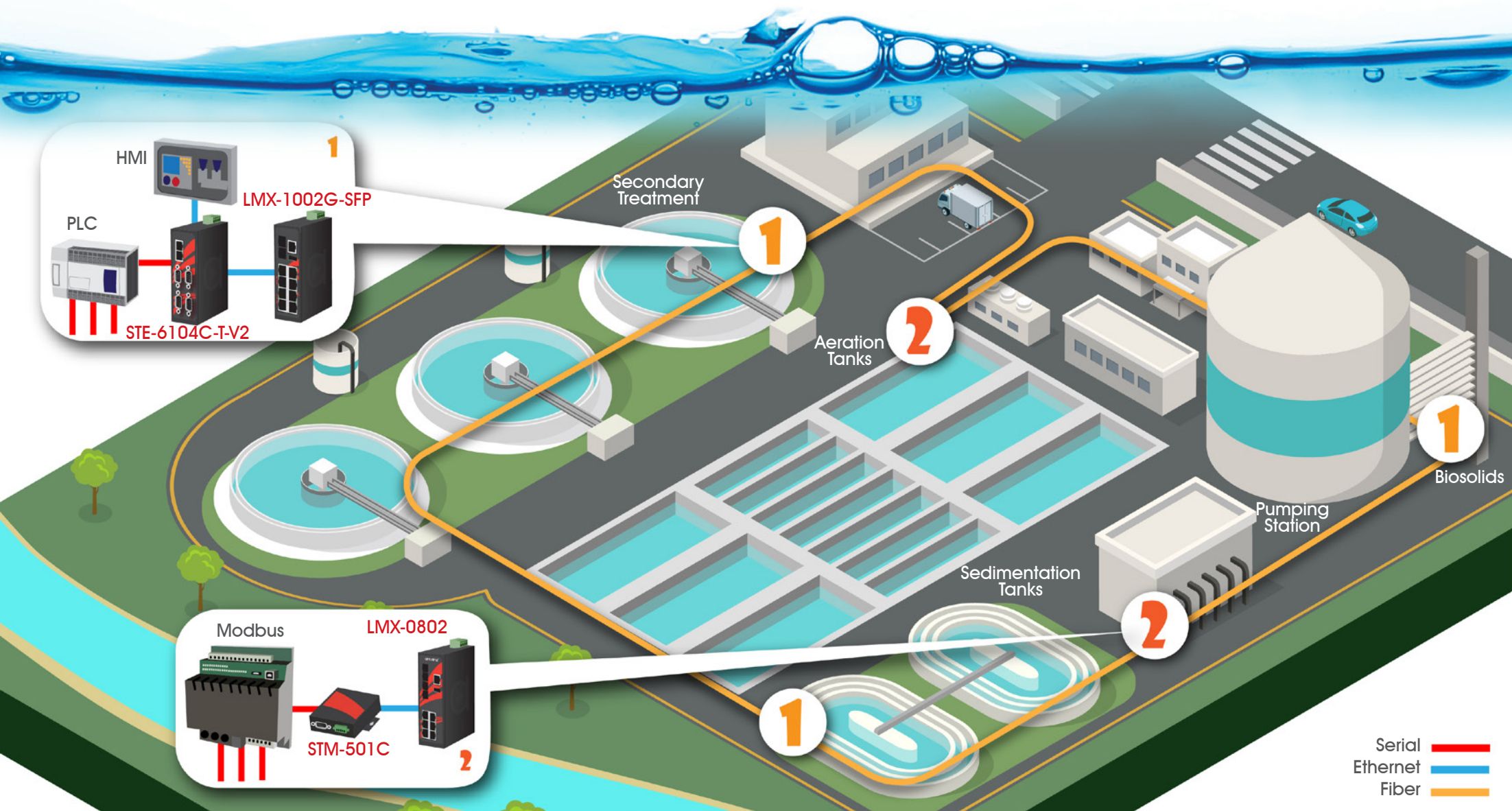• DIN-rail and wall mounting options

Wastewater Treatment Process

Overview

With an ever increasing population, not only is the availability of water becoming more important but so is the quality. Water treatment plants play a critical role in the water purification and reuse process. Any water or foreign object that flows down the drain, sink or toilet makes its way to the wastewater facility and must be dealt with quickly and efficiently to meet the added demands of the area. Therefore, modern wastewater treatment plants must operate flawlessly 24 hours a day, 7 days a week to ensure a usable water supply of high quality. Maintaining a clean water supply for irrigation, aquifer replenishment and even drinking is a fundamental requirement for today's society.

HMI
LMX-1002G-SFP
PLC
STE-6104C-T-V2

Secondary Treatment
Aeration Tanks
Biosolids
Pumping Station
Sedimentation Tanks

Modbus
LMX-0802
STM-501C

Serial
Ethernet
Fiber

Application

The control and management of wastewater treatment plants is a complex task requiring thousands of measurement devices to provide constant data to various locations. Because of the large quantity of devices and the standardization that IEEE compliant devices offer, Ethernet is used as the communication standard around the plant site. Equipment and network redundancy is required for all steps within the water treatment process and can be utilized using a redundant network topology standard such as STP, RSTP, or ERPS G.8032. High-speed fiber backbones can help utilities collect data from remote locations and is immune to electric noise from large equipment and power generation found in many areas of the plant site. Since treatment plants are still in the process of upgrading, serial communication equipment or measurement equipment that require a serial connection remain. Serial device servers can be utilized to convert this serial data to Ethernet data, therefore allowing treatment plants to utilize their older equipment but still connect to the network.

Challenges

. Harsh environment with temperature and humidity challenges
. Large geographical area
. Heavy equipment usage
. Zero down time with 24/7 usage
. Different communication standards
. Advanced monitoring and management control

Application Requirements

. Industrial grade networking devices to perform under harsh environments
. Capability to connect legacy serial devices to the TCP/IP network
. Fiber optics for long distance communication
. Reliable data routing with built-in network management software
. Self-healing redundant network support
. Shock & vibration resilience
. High MTBF and wide temperature range support

Antaira's Solutions & Benefits

Antaira's Industrial Managed Ethernet Switch Series comes with layer 2 network management software and fiber connection support allowing operators to build a self-healing redundant network to eliminate any network downtime concerns, and increase determinism within the control network.

Antaira's Industrial Modbus Gateway provides a 1-port RS232/422/485 connection that converts legacy Modbus RTU/ASCII/485 serial measurement device data to a Modbus TCP network.

Antaira's Industrial Serial Device Server Series provides single or multiple RS232/422/485 connections bridging legacy serial measurement devices to transmit data back/forth by utilizing built-in Real COM software or a TCP socket function to remotely monitor from the control center.

Key Products

STE-6104C-T-V2

4-Port RS232/422/485 Serial Device Server
• 4*RS232/422/485 DB9 male serial ports
• Dual 10/100Tx LAN ports support daisy chain and data redundancy applications
• Flexible operation mode support: Virtual COM, TCP/UDP server/client
• Temperature range: -40 to 75 ºC

STM-501C

Modbus TCP to Serial RTU/ASCII Gateway
• Supports up to 8 MODBUS TCP master to MODBUS RTU/ASCII
• Serial RS232/422/485 communication support
• Manageable through web interface, CLI or telnet

LMX-0802 Series

8-Port Industrial Managed Ethernet Switch
• 6*10/100Tx + 2*100Fx (SC/ST) multi-mode, single-mode 30Km
• Dual 10/100Tx LAN ports support daisy chain and data redundancy applications
• Flexible operation mode support: Virtual COM, TCP/UDP server/client
• Temperature range: -40 to 75 ºC

LMX-1002G-SFP Series

10-Port Industrial Managed Ethernet Switch
• 8*10/100/1000Tx + 2*100/1000 SFP Slots
• Redundant ring network supported with: RSTP/MSTP and G.8032 ERPS
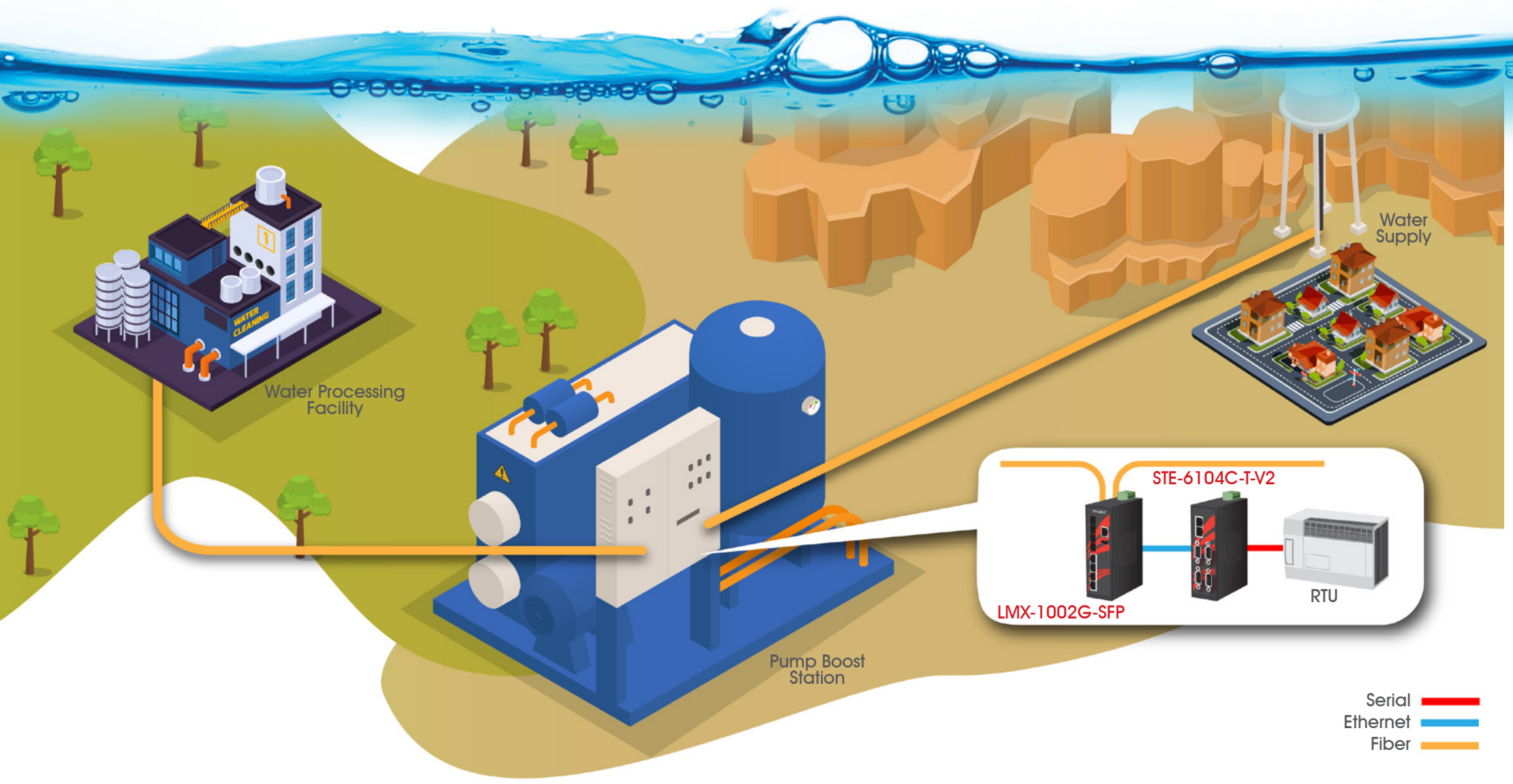• Power Input Design: 12~48VDC

Remote Pump Station Monitoring

Overview

As populations expand and the demand for clean water increases, water pumping stations are commonly built to extract and sterilize water from underground wells. A water pumping station is a remote and complex system comprised of sterilization equipment, ground storage tanks, elevated storage tanks, well pumps, and booster pumps. Today, as with nearly every segment of the water industry, pumping stations are benefiting from "smart" technology used to monitor and analyze pumping systems in real-time, more quickly, efficiently, and with minimal human interference.

Water Processing Facility

Water Supply

STE-6104C-T-V2

LMX-1002G-SFP

RTU

Pump Boost Station

Serial
Ethernet
Fiber

Application

Maintenance and troubleshooting of pumping stations can be challenging and time consuming as these premises are classified as confined spaces and often located in remote areas. A rugged industrial Ethernet device networking solution setup is critical in order to efficiently monitor and control the remote pump station's water flow, pressure levels and potential leak issues in real-time. Industrial networking equipment can also provide built-in advanced event handling software features to report alarms in real-time via text message or email, and immediately notify on call technicians, as well as any other staff of emergency and non-emergency occurrences.
In the past, local service engineers were called out to visit unmanned pumping stations to check the status and determine if any problems occurred. By implementing an industrial device network to a remote pumping station, the control system status can be read and analyzed before sending a service engineer to investigate.

Challenges

. Remote field site contains extreme ambient weather concerns
. Real-time data transmission between the pumping station and control center
. High MTBF network equipment to ensure reliability
. Ability to transmit data over long distances

Application Requirements

. Industrial grade networking devices to perform under harsh environments
. Capability to connect existing devices to the TCP/IP network
. Reliable data routing with built-in network management software
. Shock & vibration resilience
. High MTBF and wide temperature range support
. Enable integration of video surveillance systems

Antaira's Solutions & Benefits

Antaira's Industrial Managed Ethernet Switch Series are pre-loaded with layer 2 network management software allowing users to remotely monitor and manage the network, and contain open standard software features such as ERPS network redundancy solution, QoS, SNMP, IGMP, and IEEE 802.1Q to improve control network determinism.

Antaira's Industrial Serial Device Server Series provides single or multiple RS232/422/485 connections to users applications that are speaking COM, bridging legacy serial measurement devices to transmit data back/forth by utilizing built-in Real COM software or a TCP socket function to remotely monitor from the control center.

Key Products

LMP-0602 Series

6-Port Industrial PoE+ Managed Ethernet Switch
• 4*10/100Tx (4*PSE: 30W/port) + 2*100Fx (SC/ST) multi-mode, single-mode up to 30Km
• Network redundancy: STP/RSTP/MSTP and G.8032 ring protection <50ms
• Network management: SNMP, QoS, VLAN and IGMP support
• Configuration via web console,telnet or CLI
• Configuration backup through external USB interface
• Dual power input 12~48VDC
• Wide operating temperature range: -40 to 75 ºC
• DIN-rail and wall mounting options

STE-6104C-T-V2

4-Port RS232/422/485 Industrail Serial Device Ser
• 4*RS232/422/485 DB9 male serial ports (software selectable)
• Dual 10/100Tx LAN ports support daisy chain and data redundancy applications
• Flexible operation mode support: Virtual COM, TCP/UDP server/client
• Multiple configuration options for either web console, telnet, or windows utility
• Temperature range: -40 to 75 ºC
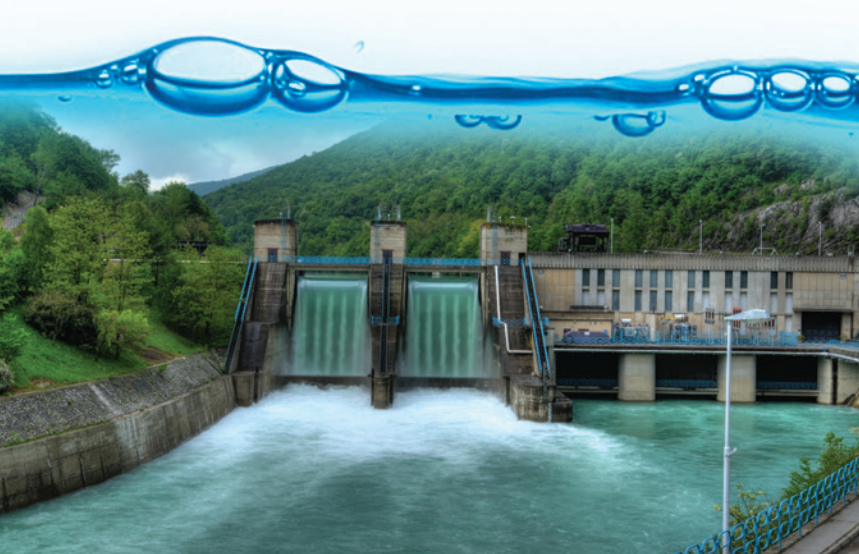
Water Resources Management

Overview

Water is an essential natural resource that shapes regional landscapes and is vital to our ecosystem. The need to conserve and protect this valuable commodity is not only important to humans but also to rare and native plant species, and animals. Unfortunately, the massive disregard, overuse, age, and abuse that humans have exercised on water have worn this resource thin. The task of water resource management is very large requiring the effective distribution of water to various agencies and usages such as agriculture, manufacturing, power generation, drinking, recreation, sanitation and even transportation. More effective means of monitoring the usage and quality of water available can provide essential information necessary to make informed decisions and manage variable water supplies to meet rapidly changing or uncertain demands.

- Wifi
- PoE
- Serial
- Ethernet
- Fiber

Application

Dams require an extensive amount of monitoring and control data that provide critical information to keep things running efficiently and reliably. Monitoring is performed for both security and safety reasons around the outside perimeter, input channel, spillway and inside the dam itself. The local administration center is responsible for collecting, monitoring and controlling information related to water intake, distribution and even power generation in hydroelectric dams. The equipment that provides information to the control center can have different communication mediums such as serial, Ethernet, fiber optics or wireless. Due to the average age of dam infrastructures, it is not unusual for serial equipment to still be found. However, it is imperative that data communication be resistant to electronic noise interference generated from large motors, turbines and power. Fiber optic cables are immune to electronic noise and are an ideal solution in providing fast, reliable uninterrupted data communication. Fiber optics are also ideal for providing long distance communication to off sight administration centers.

Challenges

. Large geographical coverage areas with long distance communication
. Ambient weather changes
. Increased reliability
. Electric noise
. Rugged and harsh environments
. Multiple agency data management
. Possible voltage difference

Application Requirements

. Communication required beyond the standard 100M Ethernet distance
. Remote and local data collection
. Centralized management and monitoring
. Industrial grade high MTBF networking equipment
. Management software including SNMP, VLANs, IGMP and QoS
. Network redundancy preventing single point infrastructure failure
. Serial isolation protection for voltage difference potentials
. Network data redundancy of equipment
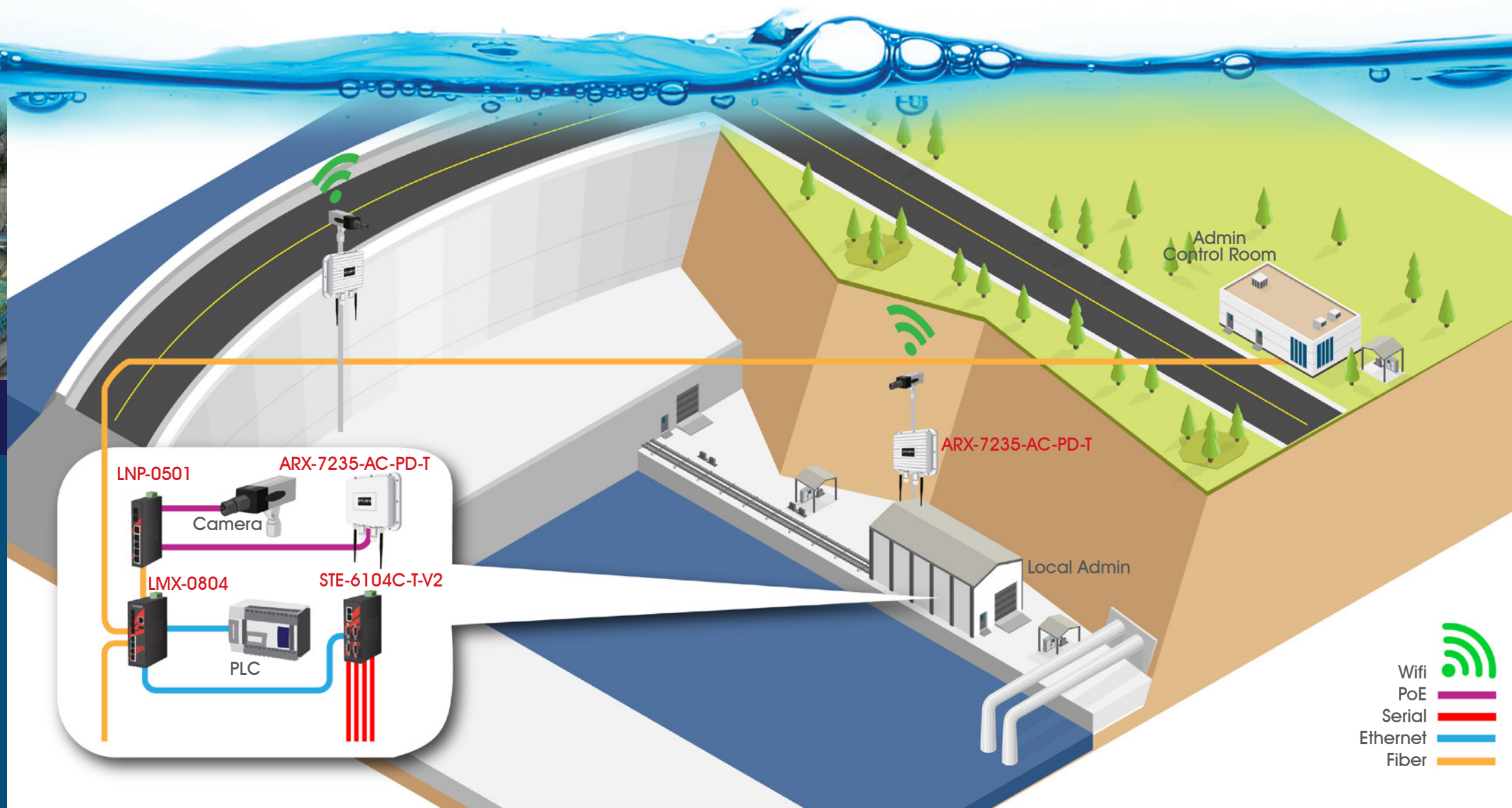
Antaira's Solutions & Benefits

Antaira's Industrial Managed Ethernet Switch Series provides layer 2 network management software that allows users to remotely monitor and manage the network.

Antaira's Industrial Serial Device Servers Series provides single or multiple RS232/422/485 connections bridging legacy serial measurement devices to transmit data back/forth by utilizing built-in Real COM software or a TCP socket functions.

Antaira's Industrial Modbus Gateway provides a 1-port RS232/422/485 connection that converts legacy Modbus RTU/ASCII/485 serial measurement device data to the Modbus TCP network.

Antaira's Industrial Wireless (IEEE 802.11) Series provides a pre-configured, IP67 rated, water-proof designed wireless bridge for "point-to-point" application solution that transmits data wirelessly from a pump station control system to a remote tank.

Key Products

STE-6104C-T-V2

4-Port RS232/422/485 Serial Device Server
• 4*RS232/422/485 DB9 male serial ports
• Dual 10/100Tx LAN ports support daisy chain and data redundancy applications
• Flexible operation mode support: Virtual COM, TCP/UDP server/client
• Temperature range: -40 to 75 °C

LNP-0501 Series

5-Port Industrial PoE+ Unmanaged Ethernet Switch
• 4*10/100Tx IEEE 802.3at compliant 30 watt PoE+ ports
• 1*100Fx fiber connection for SC or ST in either single or multi-mode fiber
• High surge and ESD protection

ARX-7235-AC-PD-T

Industrial Outdoor IEEE 802.11 Wireless Device
• Wireless AP/Client/Bridge/Repeater/Router with PoE PD
• Supports IEEE 802.11a/b/g/n/ac
• IP67 Metal Housing
• Temperature Range: -40°C to 70°C

LMX-0804G-SFP

8-Port Industrial Gigabit Managed Ethernet Switch
• 4*10/100/100Tx +4*100/1000Fx dual rate SFP slots
• Network redundancy support with RTSP; or ERPS for fast network recovery <50ms
• Built-in web console with advanced network management software, such as SNMP, IGMP, QoS, VLAN

V 1.0.9.1.2

Headquarters
ANTAIRA TECHNOLOGIES, LLC.
780 Challenger St,
Brea, CA 92821
Toll-Free: 1-844-268-2472
T: 1-714-671-9000
F: 1-714-671-9944
www.antaira.com
info@antaira.com

Europe Office
ANTAIRA TECHNOLOGIES SP
Z.O.O.
Ul. Kieślowskiego 3 / U6
02-962 Warsaw. Poland
T: +48 22 862 88 81
F: +48 22 862 88 82
www.antaira.eu
info@antaira.eu

Asia Office
ANTAIRA TECHNOLOGIES CO. LTD.
8F., No.43, Fuxing Rd.,
Xindian Dist., New Taipei City 231, Taiwan
T: +886-2-2218-9733
F: +886-2-2218-7391
www.antaira.com.tw
info@antaira.com.tw