Ethernet switches interconnect award-winning wastewater treatment plant
2007-12-04

5 and 8-port unmanaged Ethernet switches

24+4G-port Gigabit modular managed Ethernet switch

Introduction

Project Introduction

The City of Carmel owns and operates a wastewater treatment facility that processes and treats sanitary waste from Carmel, Clay Waste District, Westfield, and Hamilton Western Utilities. The plant runs continuously 24/7 and has the capacity to treat 12 million gallons of wastewater every day. The innovative strategies and high standards at the wastewater facility were recognized by the Environmental Protection Agency which called it the "best municipal plant in its class".

The wastewater treatment plant needed to upgrade and expand its SCADA system. The main objective was to create a reliable network that included existing equipment sites along with additional locations while ensuring that scalable technology and bandwidth are available for future growth. Fiber connections were required in many areas as it was easy to deploy for longer distances throughout the facility, to offer immunity to EMI and RFI, and to eliminate any potential ground loops. Upgrading the network also involved the need to network legacy serial devices that communicate via RS-232 and RS-485 connections.

The most common communications protocol used in Ethernet networks is TCP/IP. TCP/IP permits the use of diverse protocols since data that uses protocols such as Modbus or DF1 can be encapsulated in TCP/IP packets. Protocol flexibility permits Ethernet networks to integrate existing devices by using serial device servers.

Moxa Solution

The Carmel WWTU needed to interconnect a combination of components within both new and existing buildings at their facility. Legacy devices that transmit data through serial ports had to be integrated with the newer Ethernet-ready components.

Moxa's NPort serial device servers were deployed to accomplish this task. However, a bigger concern was how to set up the industrial Ethernet network. The plant chose the EDS-726 26-port managed Gigabit Ethernet switch for the control building since it provides multiple, easily-configured, modularized ports that support multi mode fiber connections for the long distances necessary to cover the entire plant site. In addition, the EDS-726 can handle the entire PLC data collection requirements essential for central control by mixing and matching both copper and fiber ports, while at the same time leaving room for additional expansion ports in the future. In addition to the EDS-726, the plant used a combination of managed EDS-508-MM-SC and unmanaged EDS-308-MM-SC switches to connect directly to PLCs, HMIs, and edge devices located in the 7 other buildings. These switches permit 10/100 Mbps bandwidth with a combination of copper (RJ45) and fiber port (SC or ST) connections. The plug-and-play capability of unmanaged switches that use Ethernet, along with TCP/IP connectivity, sharply reduced the costs associated with configuration and reconfiguration.

Simple Network Management Protocol (SNMP) allows network managers to configure and monitor network health remotely. This enables them to identify potential problems before they threaten network capabilities. In addition, the self-healing network recovery feature of Moxa's managed switches make them extremely reliable. When a fiber connection is broken, or a network switch fails, a Moxa Turbo Ring network will self-heal in less than 300 ms, even when the network has as many as 80 switches. An additional benefit of a ring topology network is the reduced cost of network cabling compared to a Rapid Spanning Tree Protocol (IEEE 802.1W) network. Wiring a ring topology network requires far less fiber optic cabling, since fiber cabling connects from switch to switch, instead of from each switch back to the control room. The plant saves on both material and labor costs. Ultimately, the Moxa solution provided the facility with cost effective network redundancy between the control building and Biopast, Centrifuge, Return, and new North Galley & Ultraviolet Buildings.
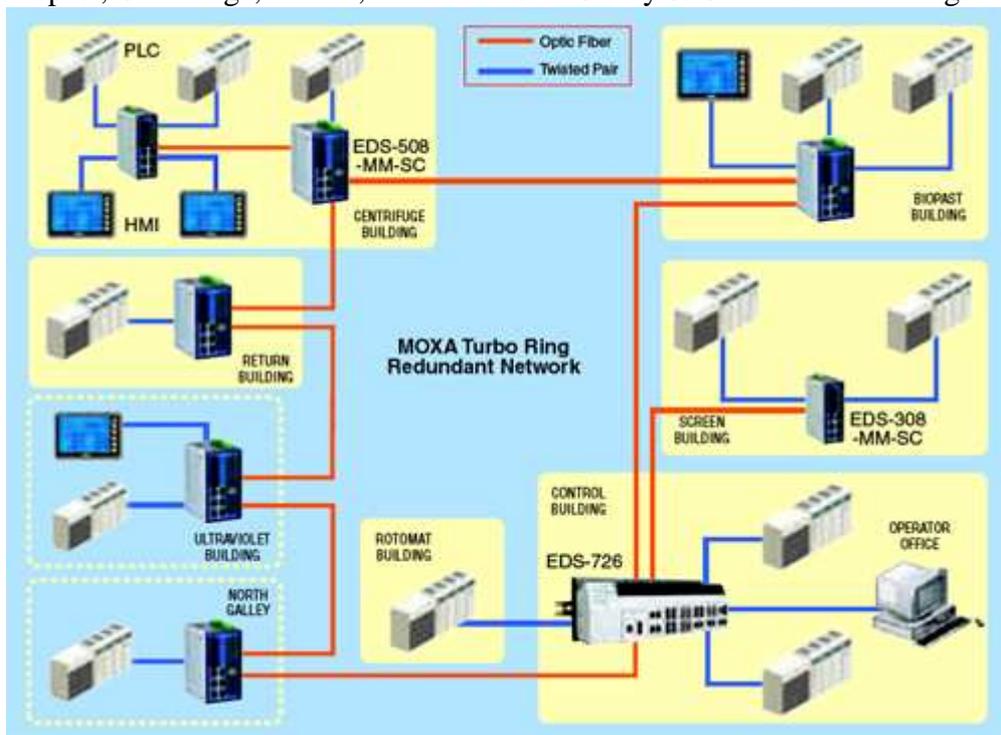
Why Moxa

• Flexibility with copper and fiber cabling options as well as scalability with modular switch form factor.
• Reliable communication network with Moxa's Turbo Ring, which supports a fast redundant ring and recovery time less than 300 milliseconds.
• Long transmission distance capability for communication between distant stations.
• Built-in web-based management to help engineers manage and maintain the network from a remote location.
• User-configured exception warning via e-mail or relay output, that helps the system administrator detect and solve the network problems.