

Industry Overview

Energy



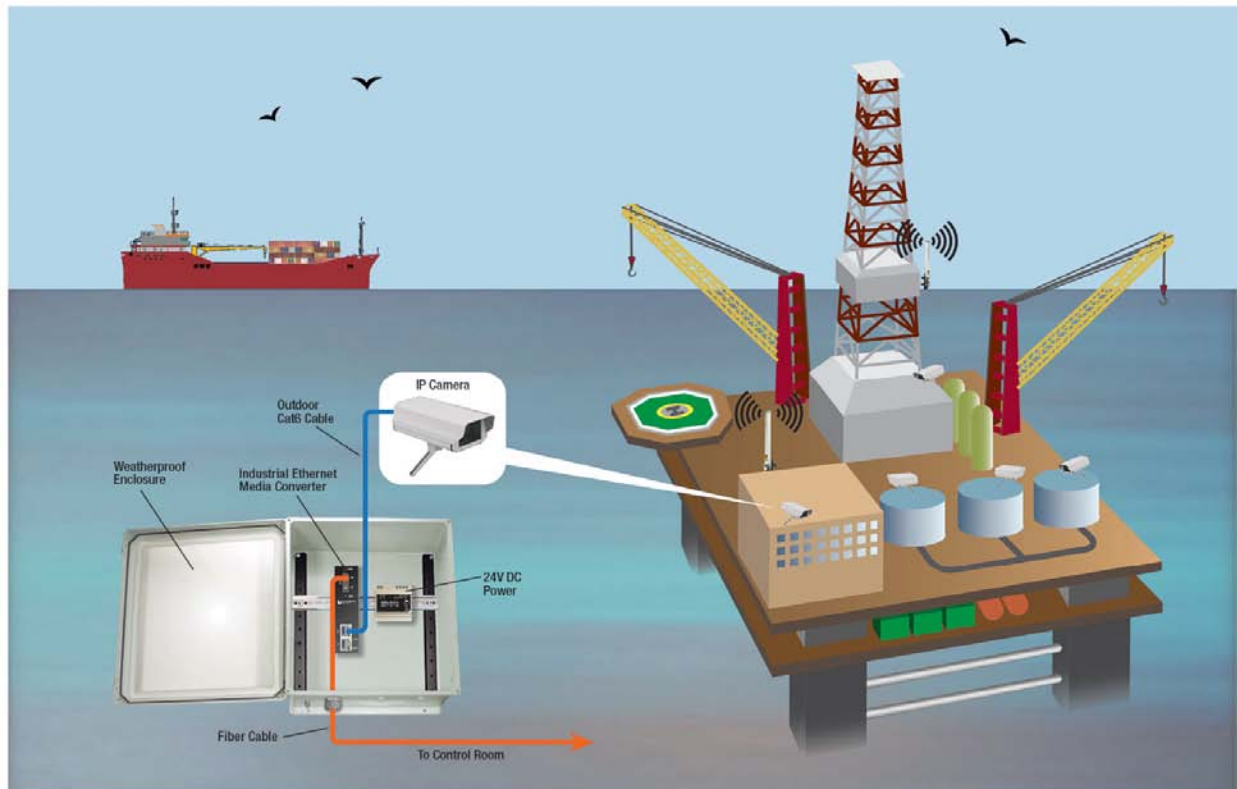
Oil and Gas

L-com's product offering includes rugged products designed for use in land based and marine oil and gas extraction and processing applications. Products include IP rated fiber and copper cable assemblies, Industrial Ethernet IP switches and media converters, weatherproof equipment enclosures and a host of wireless antennas, RF amplifiers, RF splitters and filters to address frequencies ranging from 400 MHz to 5.8 GHz. Cabling options include shielded, armored, direct burial and aerial style cables as well as PUR, low smoke zero halogen (LSZH) and high flex cables for use in outdoor and harsh environments.

Offshore Oil Platforms

Communications and control networks used in offshore drilling applications are exposed to moisture, salt, vibration and temperature extremes. Products used in these environments must be able to withstand the harsh environments encountered at sea. L-com offers purpose built wired and wireless industrial communications products for such applications. Our IP rated products offers years of rugged outdoor use and the highest levels of performance.

In the application diagram below IP cameras used for surveillance are connected via L-com's rugged outdoor Category 6 cabling to Industrial Ethernet media converters which are housed in L-com's weatherproof NEMA enclosures. The media converters provide fiber optic links back to the central control room located on the rig. L-com's HyperLink® brand antennas, RF amplifiers and outdoor access points provide connectivity to wireless sensors and controllers located throughout the platform.

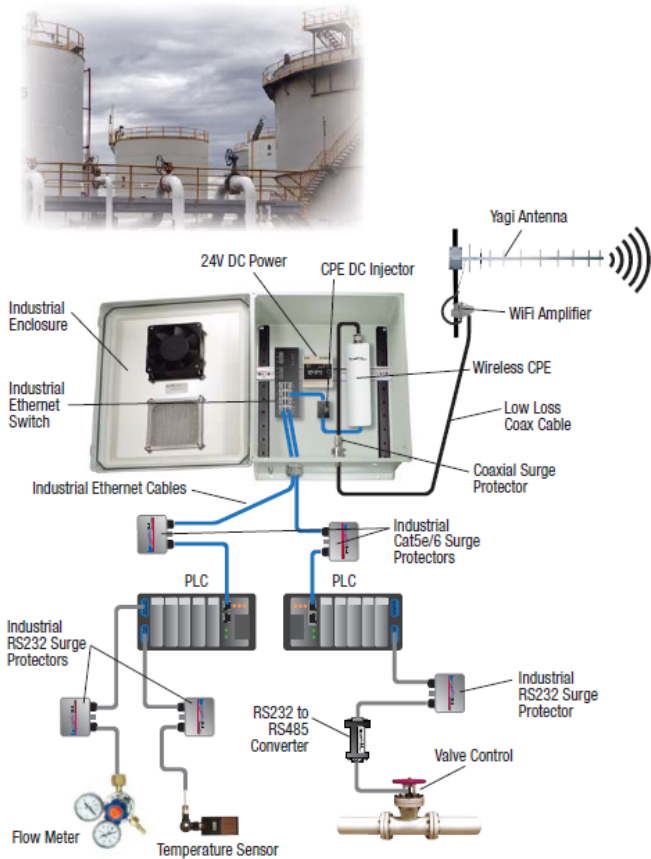


Petroleum Refineries

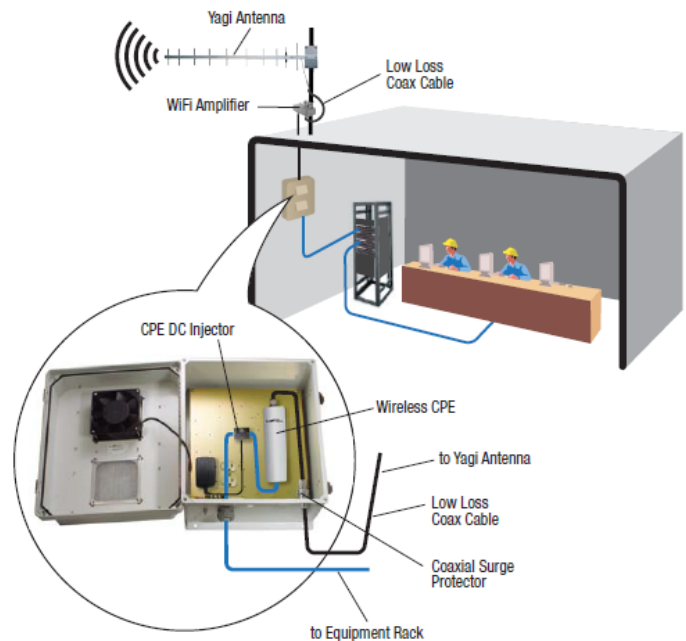
Petroleum refineries utilize myriad wired and wireless sensors to monitor and control critical process applications. These sensors provide real time data that can warn operations personnel of potential problems with various systems. Furthermore many valves and controllers are now network enabled using either wireless or wired connectivity. Another critical system found at refineries is the security and surveillance network which has become just as important as the process network.

In the illustration below, L-com's antennas, RF amplifiers and wireless CPE's provide wireless bi-directional communications to sensors, valves and controllers located throughout the refinery. L-com's outdoor NEMA enclosure houses an IES series Industrial Ethernet switch which provides a link between the PLC's and RS232/485 connected devices. The central control location utilizes L-com's Yagi antenna, RF amplifier and wireless CPE providing a connection to the wired Ethernet control and monitoring network.

Field Control Station



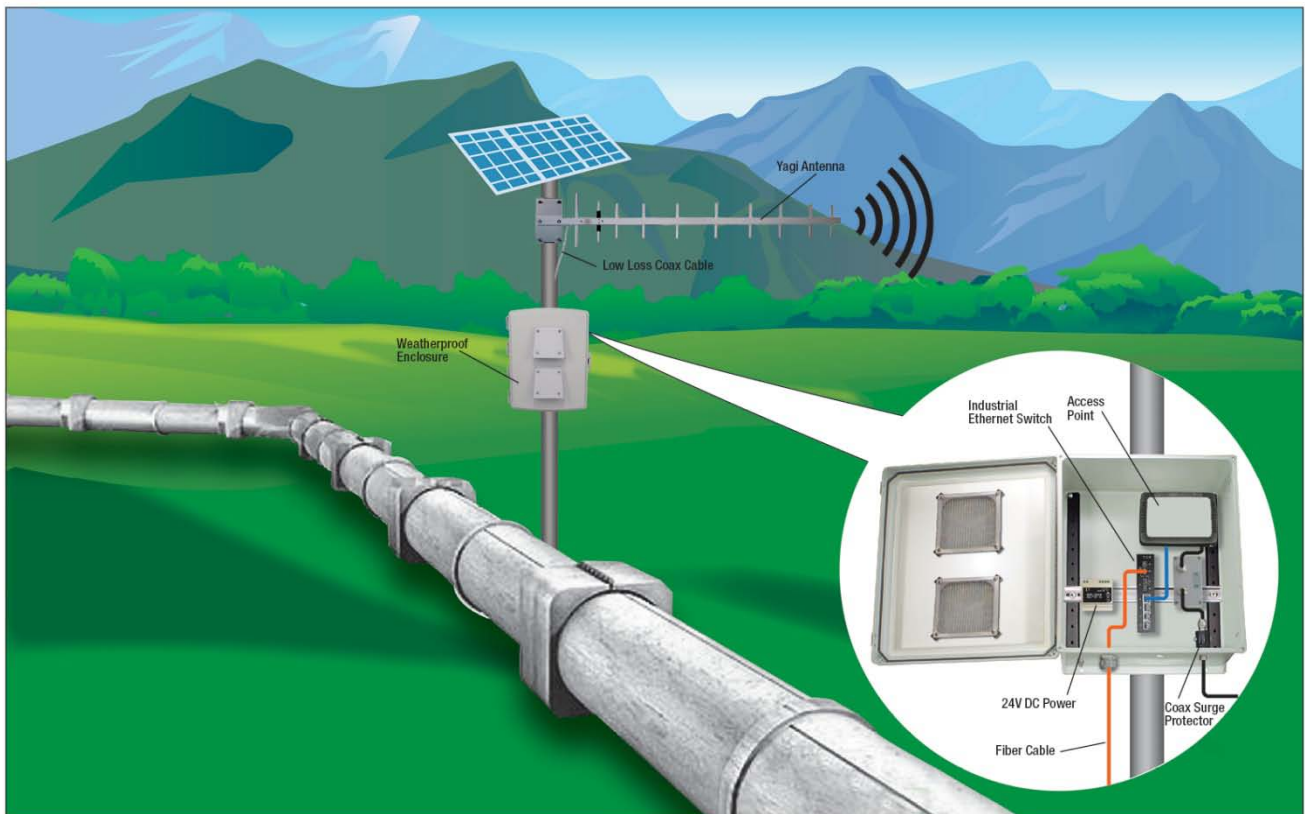
Central Control



Natural Gas Pipelines

Natural gas pipelines can span hundreds of miles and are often located in harsh, remote areas. In order to manage the safety and efficiency of the pipeline, communications networks are required. Critical pressure, leak detection, temperature and cathodic protection sensors along the pipeline provide real time data that is sent to the control center. Additionally IP surveillance cameras are located along the pipeline providing security. All of these systems require remote network connectivity via wireless and in some cases fiber optic links or a combination thereof.

In the diagram below L-com's outdoor NEMA enclosure houses an RF amplifier, coax surge protectors, access points and L-com's IES series Industrial Ethernet switch providing connectivity to critical sensors attached to the pipeline. The IP cameras are connected via outdoor rated category 5e cabling to the Industrial Ethernet switch. L-com's HyperLink® brand high gain Yagi antenna provides the wireless connection to the central control facility. Alternative designs utilize single mode fiber cabling, Industrial Ethernet Switches and media converters to enable a fiber optic network for monitoring, safety and control of the pipeline.

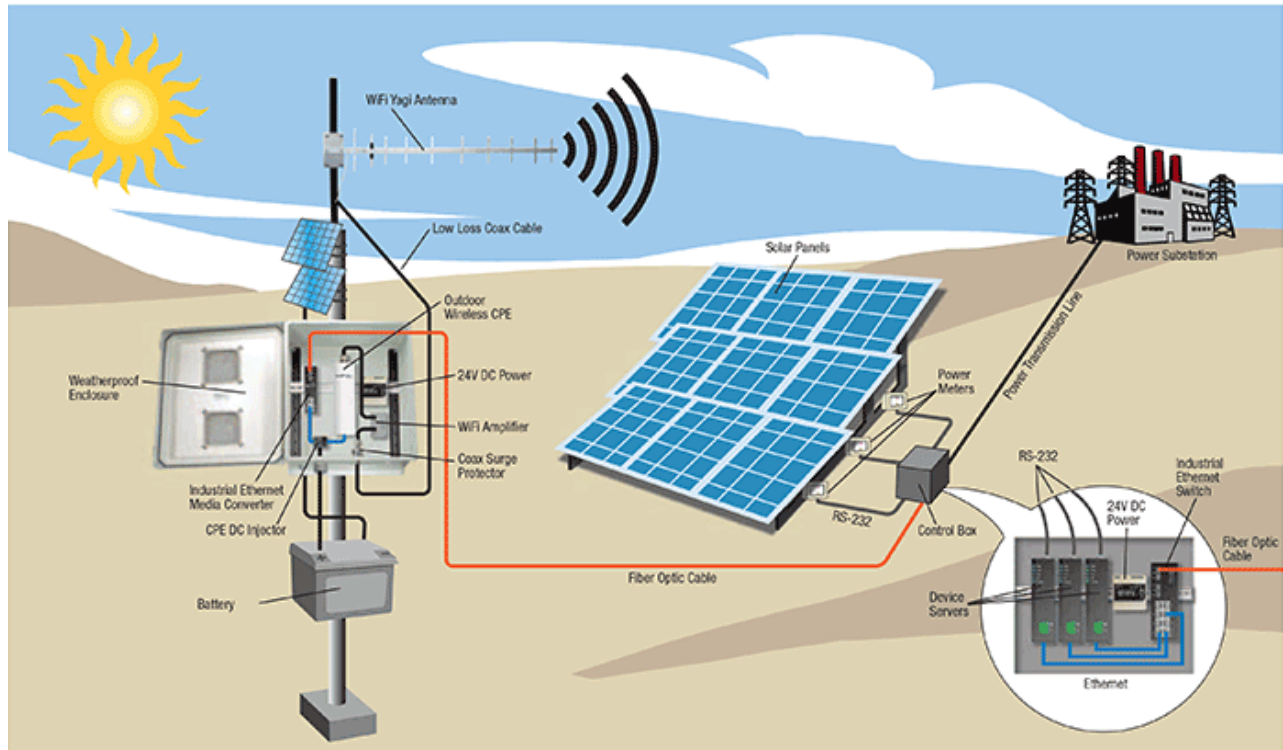


Renewable Energy

To address renewable energy networks, L-com offers a complete line of wired and wireless networking products for both Serial RS232/485 and Ethernet architectures. Our product selection includes outdoor, IP rated copper and fiber cables, connectors, switches and converters to interface with existing network infrastructures or for use in new build outs for solar, wind and hydro energy network applications.

Solar

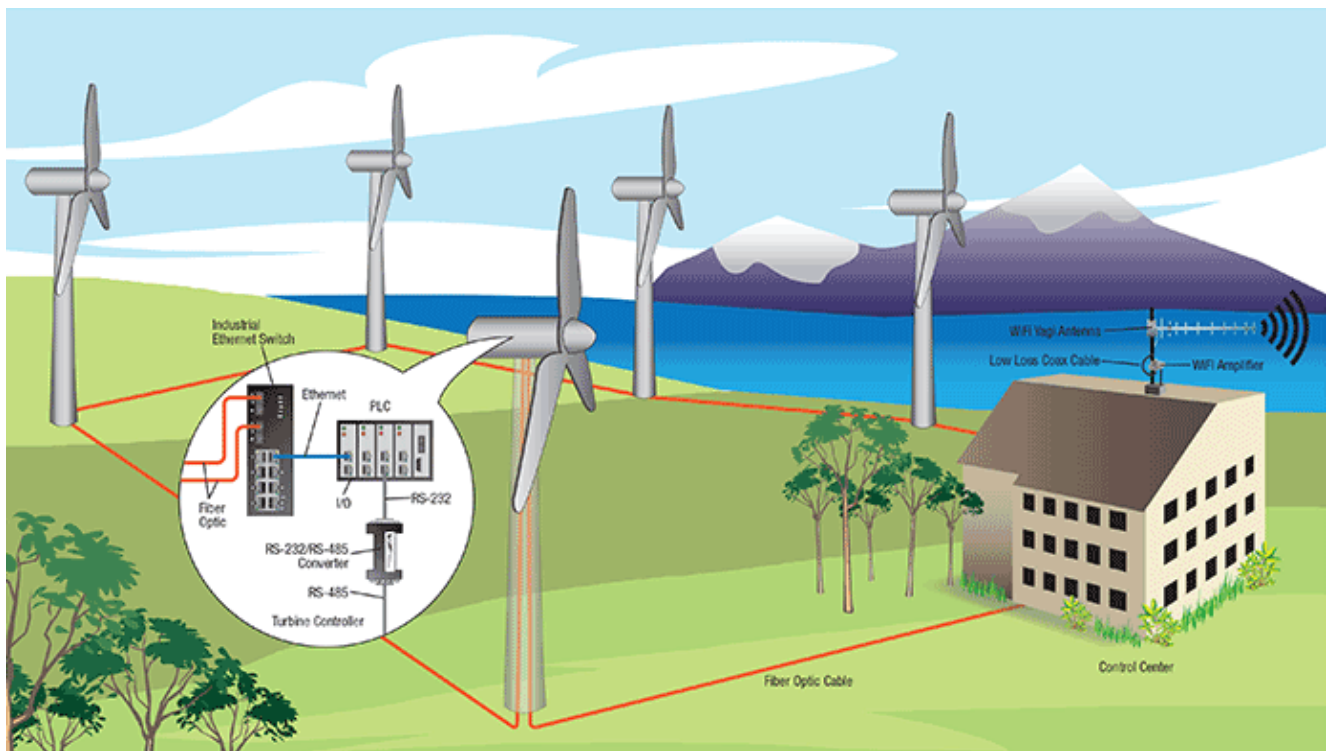
In the solar energy network application diagram below, L-com's wired and wireless connectivity products enable long distance control and monitoring of the solar panel array. L-com's double shielded D-Sub cables connect to the power meters housed on the panels. Using RS232 to Ethernet device servers a connection to the Ethernet network is achieved via L-com's IES Series Industrial Ethernet switch. The EMI/RFI resistant fiber optic cable connects to an Industrial media converter which connects to L-com's Wireless CPE. L-com's coax surge protectors, low loss coax cables and high gain Yagi antenna complete the wireless connection back to the power station control center for control and monitoring of the solar panel array.



Wind

One of the fastest growing forms of renewable energy has been harnessing energy from the wind. Wind turbine installations have grown exponentially on a global scale over the past decade. Control and monitoring of these turbines, whether on land or at sea, requires a combination of wired and wireless networks.

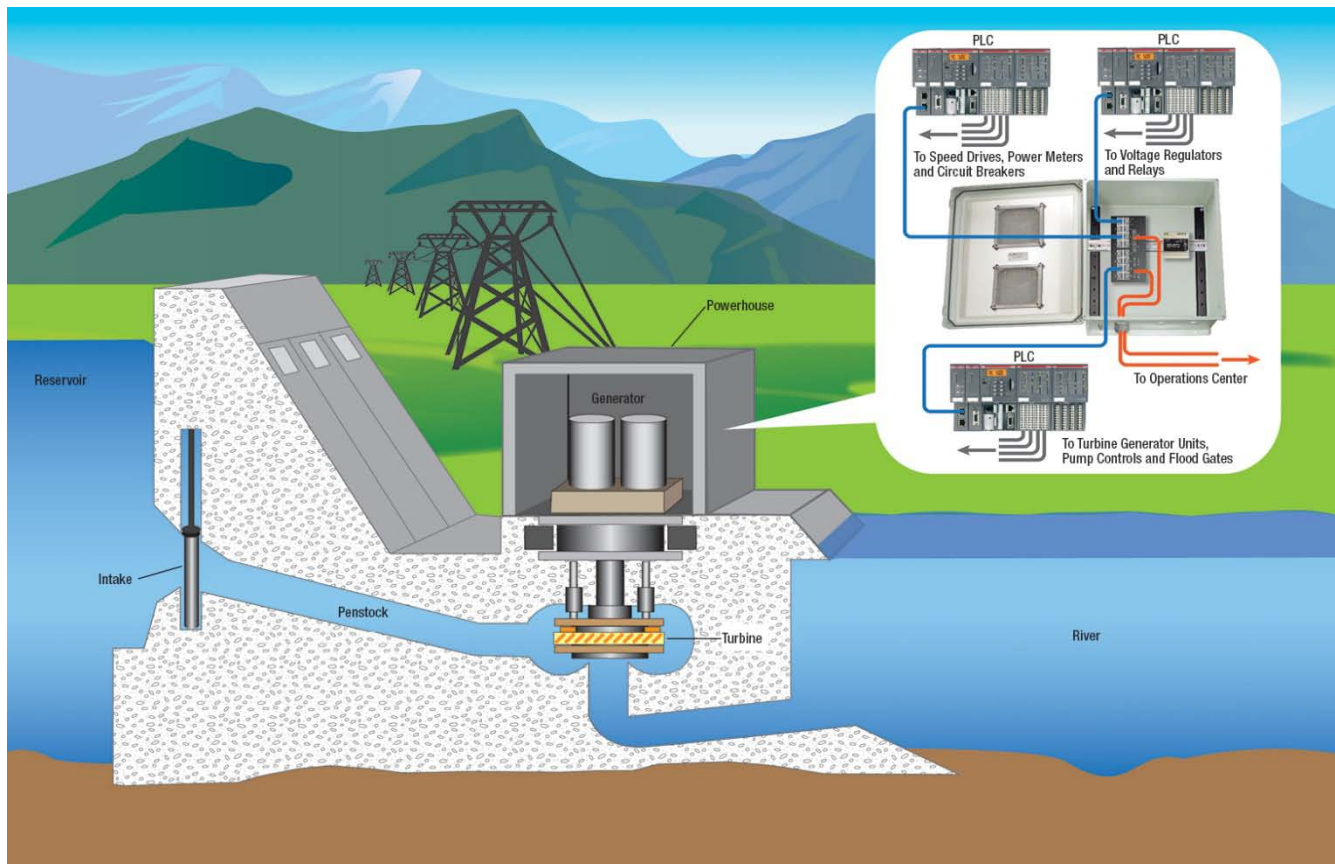
Below, L-com's IES series Industrial Ethernet Switch provides a direct connection to a programmable logic controller (PLC) which sends control signals to the turbine changing its speed and angle. L-com's RS232 to RS485 interface converter connects a turbine control module to the PLC bridging the gap between serial protocols. L-com's Fiber Optic cabling provides the connection between the control center and the turbines allowing complete access and control of the wind farm. Housed on the roof of the control center are L-com's HyperLink® brand Yagi antenna, low loss coaxial cable and L-com's RF Amplifier. These wireless products combine to send information to a central operations center located miles away.



Hydro

Hydroelectric power is by far the oldest form of renewable energy compared to the other options in use today. Hydroelectric power is also the most widely used and one of the lowest cost forms of renewable energy. There are many computerized and automated systems used in hydroelectric plants. Many of these systems utilize Programmable Logic Controllers (PLCs) to control critical values, motor starters, controllers, sensors and flood gate control systems. Other systems employ wireless connectivity for monitoring and control of the plant. Additionally, surveillance and security systems are used to warn operators of unauthorized intruders and for visual analysis of the dam and plant area to look for structural breakdown.

In the diagram below, L-com's Industrial Ethernet cables connect to PLC's and then L-com's IES series Industrial Ethernet switches. Fiber optic cables connect to the IES Ethernet switch and collapse back to the operations center. The PLCs automate and control the turbine generator units, pump controls, speed drives, voltage regulators and other critical systems to ensure efficient and safe operation of the hydroelectric dam. Other configurations utilize L-com's Directional and Omni directional antennas to communicate wirelessly to a central control office.



L-com, a global leader in the manufacture of wired and wireless connectivity products, offers a wide range of solutions and unmatched customer service for the electronics and data communications industries. The company's product portfolio includes cable assemblies, connectors, adapters, computer networking components, and custom products, as well as their HyperLink® line of wireless products which include Antennas, RF Amplifiers, Coaxial lightning and surge protectors, and NEMA rated enclosures.

L-com's HyperLink® wireless products are designed for WiFi, WiMAX, SCADA, 802.11a/b/g/n, RFID and Bluetooth applications. Trusted for over 30 years, L-com, which is headquartered in North Andover, MA, is ISO 9001: 2008 certified and many of its products are UL® recognized. www.l-com.com

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