Pave the Way to Digitization in Oil and Gas

Integrated Networking, Computing, and Automation Solutions

MOXA®

Reliable Networks ▲ Sincere Service

Maximizing Synergy between Industrial Automation and Ethernet Networks for the Oil and Gas Industry

Oil and gas are still indispensible fuels for the global economy, and exploring for new sources of oil and gas remains a lucrative and attractive endeavor. New oil platforms, rigs, and pipelines are constantly being constructed to meet the demand for oil, with a corresponding growth in the number of factories and control centers used to process and manage crude oil. To maximize efficiency and safety, these systems are becoming more integrated, but unfortunately, the traditional SCADA systems used by the oil and gas industry are difficult to integrate because they are highly independent and have limited connectivity to other systems. This limitation will need to be overcome as oil facilities grow more complex, and safety and reliability grow ever more important. Moxa's complete range of industrial networking, monitoring, and computing products are engineered for harsh mission-critical environments, and provide the reliability, flexibility, and safety needed to maintain and operate oil and gas facilities.

Onshore

Pump Stations

Offshore

Pipelines

Oil Refining
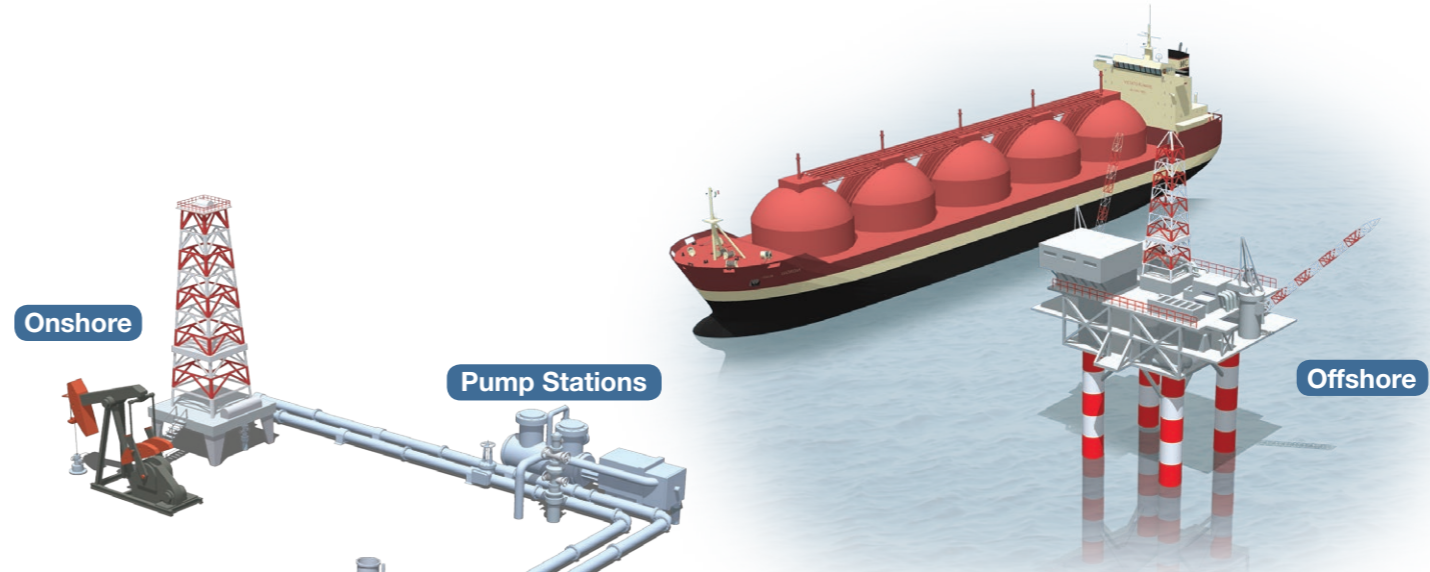
Industrial-Grade Robustness

Safety is a top priority of the oil and gas industry. Any processing or pumping facility is vulnerable to catastrophic damage. For this reason, all electrical devices must meet strict safety benchmarks.

Moxa offers a complete range of automation and networking products specially developed for use in oil and gas facilities, each meeting global certifications such as UL/cUL C1D2, and ATEX Zone 2, IECEx, or marine classifications like DNV GL, ABS, LR, and NK. Whether you require Ethernet switches, computers, gateways, or I/O devices, Moxa has a product that best fits the hazards of the oil and gas industries.

Moreover, Moxa's products come in rugged designs that withstand extreme weather, vibration, and the effects of chemical corrosion. Moxa products come in IP30/54/66/67 and IP68 ratings. With robust metal housings, wide temperature and vibration tolerance, and optional conformal coating for resistance to corrosion, Moxa devices are engineered for the industry's longest MTBF even in the tough environments. Whether your application is an ocean platform, an arctic pipeline, a coastal refinery, or a desert drilling rig, we have a device that's been proven safe, solid, and stable.

Assured Network Reliability

Unexpected system downtime can lead to catastrophic damage in oil and gas applications, threatening assets and even lives: for this reason, it is critical to keep monitoring and network systems functional at all times, especially during emergencies. As IA converges with IT, cybersecurity is also becoming an important element in maintaining system viability.

A leader in industrial networking, Moxa's high reliability, high availability networking solutions are founded on three key pillars: advanced network redundancy, high bandwidth portfolio, and enhanced network security. For wired LANs, our Turbo Chain and Turbo Ring features deliver millisecond-order network recoveries, while for wireless LANs Moxa provides zero packet loss guarantees and network-level wireless redundancy enabled by AeroLink Protection. Our Ethernet switches provide up to 10 gigabits of bandwidth for future-proof scalability. Finally, all of our Ethernet products support strong security protocols that include 802.1X, HTTPS and SSL, alongside industrial secure routers that feature strong firewall, NAT, and VPN functionality.
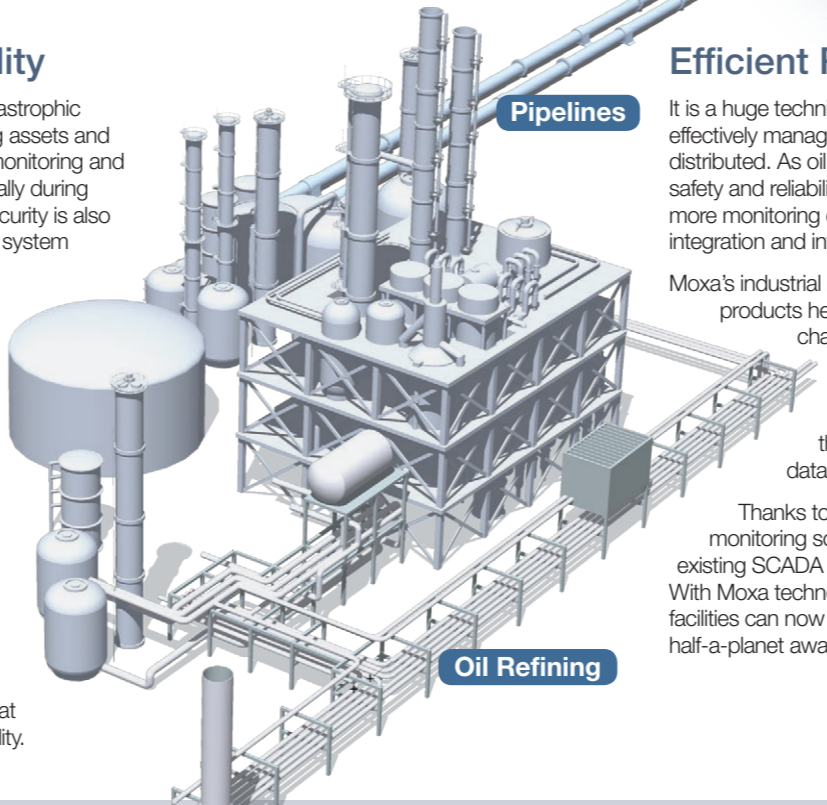
Efficient Remote Monitoring

It is a huge technical challenge to build a control center that effectively manages a network remotely located and widely distributed. As oil and gas facilities grow more complex, safety and reliability become ever more important: that means more monitoring devices in the field, requiring ever greater integration and interoperability.

Moxa's industrial networking, monitoring, and computing products help network administrators to overcome the challenge of integrating a variety of IA protocols like PROFIBUS, EtherNET/IP, and Modbus TCP with central HMI/SCADA systems, and to combine them in ways that enable the receipt and response of field data with high efficiency.

Thanks to our ready-to-run software, Moxa's monitoring solutions can be easily integrated with the existing SCADA system, and provide active event alarms. With Moxa technology, system administrators for petroleum facilities can now make critical real-time decisions on systems half-a-planet away without any need for on-site support staff.

Easy Asset Manageability

Oil and gas facilities are increasingly located in remote and hazardous environments where a sustained human presence is costly. It is critical for system administrators to minimize the need for on-site personnel, both during deployments as well as for routine maintenance and monitoring. For this reason, software optimizations for device deployments and preventive maintenance become extremely valuable.

Moxa provides a number of easy-to-use software optimizations for remote administration. MXstudio is Moxa's integrated network management and diagnostics tool for Ethernet products. With MXstudio, users can speed up the process of field device configuration and troubleshooting. MGate Manager is a powerful automated utility that allows the control center to take over gateway configuration from on-site personnel. With Moxa's software enhancements, controllers can better collect data, evaluate component and network health, and monitor devices for unexpected events.

Comprehensive Coverage of Industrial Networking, Monitoring, and Computing Solutions

Industrial Ethernet

Industrial Ethernet Switches

Industrial DSL Extender

Industrial Media Converters

Industrial Secure Routers

Industrial Ethernet Gateways

Industrial Network Management Software

Industrial Wireless

Industrial Wireless AP/Bridge/Clients

Industrial Cellular Gateways

Serial Connectivity

Serial-to-Ethernet Device Servers

Remote Automation

Remote I/O Devices

Industrial Computing

Panel Computers

Embedded Computers

Optimizing Network Communication for Offshore Oil Drilling Control Systems

Oil & gas communications networks are mission critical, but often must be deployed at offshore oil fields in an environment with severe hazards and challenges. To successfully monitor a drilling platform remotely, the entire infrastructure needs to be extremely reliable and available. In addition to redundant wired or wireless network systems with failover capability, the network equipment must comply with industrial standards that certify its ability to operate in an environment with varying temperatures, corrosion, and vibration.

Network Requirements

- A single, highly interoperable computing platform to effectively serve drilling control systems
- Real-time monitoring of the field site from the driller's cabin
- All information (e.g., power, drilling speed, temperature points, etc) must be displayed on the drilling console
- Zone 2 certification for hazardous locations, to guarantee system safety
- Robust, durable devices to reduce system downtime
- Network redundancy to enhance communication efficiency and reliability

Moxa Solutions

- Complete line of Zone 2-certified networking, computing, and monitoring solutions
- Sunlight-readable, IP66-rated panel computers
- Turbo Ring and Turbo Chain network redundancy technologies deliver integrated Ethernet rings that recover in 20 ms* or less
- Industrial Ethernet gateways for a wide variety of industry-standard protocols and MX-AOPC UA Server, for seamlessly integrating remote I/O into the SCADA
- Industry's most user-friendly network management and diagnostics tool: MXstudio network management suite
- Booting up under extreme low temperatures, ensuring the whole network availability

*Note: 10G/1G Ethernet recovery time < 50 ms

Offshore production network diagram with labeled components
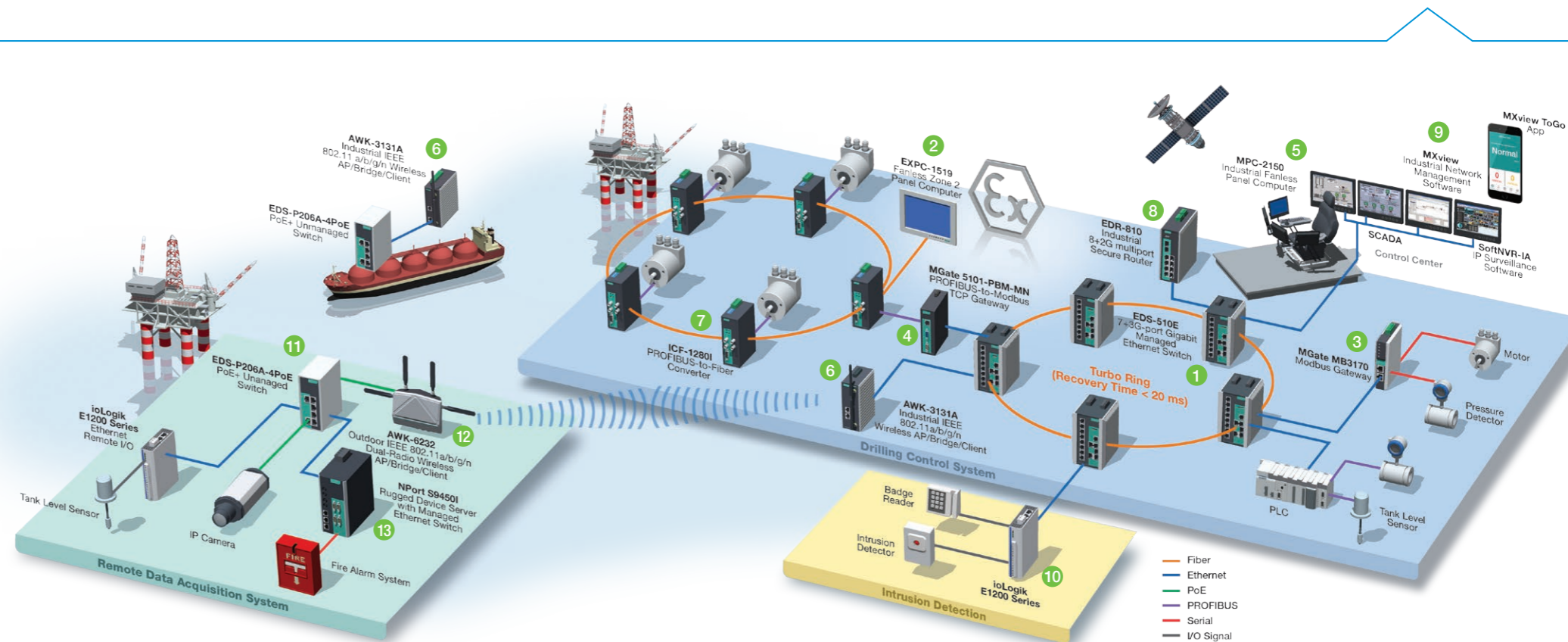
Drilling Control System

1 EDS-510E — **7+3G-port Gigabit Managed Ethernet Switch**
- Turbo Ring and Turbo Chain for sub 20ms* faster Ethernet network recovery
- Future-proof Gigabit performance
- Intelligent managed and security features
- Extra robust design for harsh environments

*Note: 10G/1G Ethernet recovery time < 50 ms

2 EXPC-1519 — **Fanless Rugged Zone 2 Panel Computer**
- High performance Intel® 3rd generation Core™ i7-3555LE or Celeron 1047UE CPU
- Multiple connectivity including cable gland
- -40 to 70°C extended operating temperature

3 MGate MB3170/3270 — **1/2-port Serial-to-Ethernet Modbus Gateways**
- Slave mode supports 32 TCP masters and up to 62 serial slaves at the same time
- Master mode supports 32 TCP slaves at the same time
- Emergency request tunnels ensure QoS control
- Redundant dual DC power inputs

4 MGate 5101-PBM-MN — **1-port PROFIBUS-to-Modbus TCP Gateway**
- AutoScan technology for easy configuration
- Web-based GUI for I/O data visualization
- Redundant power inputs and relay output warning
- -40 to 75°C operating temperature range

5 MPC-2150 — **Industrial Fanless Panel Computer**
- High performance Intel® 3rd generation Core™ i7-3517UE or Celeron 1047UE CPU
- -40 to 70°C extended operating temperature
- 15-inch 1000 nits sunlight readable LCD panel
- Multi-touch with glove-friendly touch screen interface

6 AWK-3131A — **Industrial IEEE 802.11a/b/g/n Wireless AP/Bridge/Client**
- Millisecond-level Turbo Roaming
- Complete redundancy with AeroLink Protection
- Integrated antenna and power isolation
- -40 to 75°C operating temperature range

7 ICF-1280I — **PROFIBUS-to-Fiber Converter**
- Auto baudrate detection for easy configuration
- Fiber cable test function for easy maintenance
- Redundant ring for reliable network transmission

8 EDR-810 — **Industrial 8+2G Multiport Secure Router**
- 8+2G SFP all-in-one Firewall/NAT/VPN/router/switch
- Deep Modbus TCP packet inspection for firewall filtering
- Flexible configuration of multiple WAN and LAN ports

9 MXview — **Industrial Network Management Software**
- Automatic topology, VLAN, and IGMP visualization
- Event playback for reviewable diagnostics
- OPC agent for SCADA and third party NMS
- Third party MIB support
- Supports MXview ToGo mobile app for remote monitoring and notification

Intrusion Detection

10 ioLogik E1200 Series — **Ethernet Remote I/O with 2-port Ethernet Switch**
- Built-in 2-port Ethernet switch for daisy-chain topology
- Supports Moxa's MX-AOPC UA Server for connecting to SCADA systems
- User-defined Modbus/TCP addressing

Remote Data Acquisition System

11 EDS-P206A-4PoE — **6-port PoE+ Unmanaged Ethernet Switch**
- 4 IEEE 802.3af/at PoE ports for high-power output
- Built-in power booster for 24/48 VDC inputs
- -40 to 75°C operating temperature range

12 AWK-6232 — **Outdoor Industrial IEEE 802.11a/b/g/n Dual-Radio Wireless AP/Bridge/Client**
- Dual-radio design for 2.4 GHz and/or 5 GHz bands
- Millisecond-level Turbo Roaming
- Rugged IP68-rated housing
- -40 to 75°C operating temperature

13 NPort S9450I — **Rugged Device Server with Managed Ethernet Switch**
- 4-port RS-232/422/485 serial interface
- Supports up to 5 managed Ethernet switch ports (fiber available with some models)
- DNP3 and Modbus protocols supported
- -40 to 85°C wide operating temperature

Reliable Network Monitoring Solutions for Drilling Rig and Wellhead Automation

Intelligent oil rig and wellhead automation can be achieved with a reliable Ethernet control and monitoring system that supervises operations from the rigs, wellheads, or Gas Oil Separation Plant (GOSP) in a SCADA-based control center. This system combines field site drilling data transmission and acquisition and video monitoring, and requires a stronger backbone with non-stop redundant reliability and real-time performance. Since onshore operations face environmental hazards such as corrosion, temperature extremes, and risk of explosion, network equipment must be able to withstand hazardous environments and comply with ATEX standards.

Network Requirements

- A reliable Ethernet-based control network to remotely manage and access data at the SCADA hosts
- Direct data monitoring of many industrial fieldbus devices
- High bandwidth Gigabit backbone for video, voice, and data transmission
- Network redundancy to enhance communication efficiency and reliability
- Fiber optic cable for long-distance transmission to deliver superior EMI/noise immunity
- A secure network that protects monitoring system and critical oil rigs and wellheads
- Management software for easy network troubleshooting and maximum system uptime

Moxa Solutions

- Moxa offers Modbus, PROFINET, Ethernet/IP gateways, and Ethernet switches for efficient communication.
- Comprehensive solutions for remote monitoring and maintenance, including media converters, RTUs, panel PCs, and wireless products.
- Turbo Ring and Turbo Chain network redundancy technologies deliver integrated Ethernet rings that recover in 20 ms* or less
- Gigabit secure routers form a trusted industrial network
- Network management software and OPC-enabled solutions for seamless integration with SCADA/HMI systems
- IA complete line of Zone 2-certified networking, computing, and monitoring solutions

*Note: 10G/1G Ethernet recovery time < 50 ms
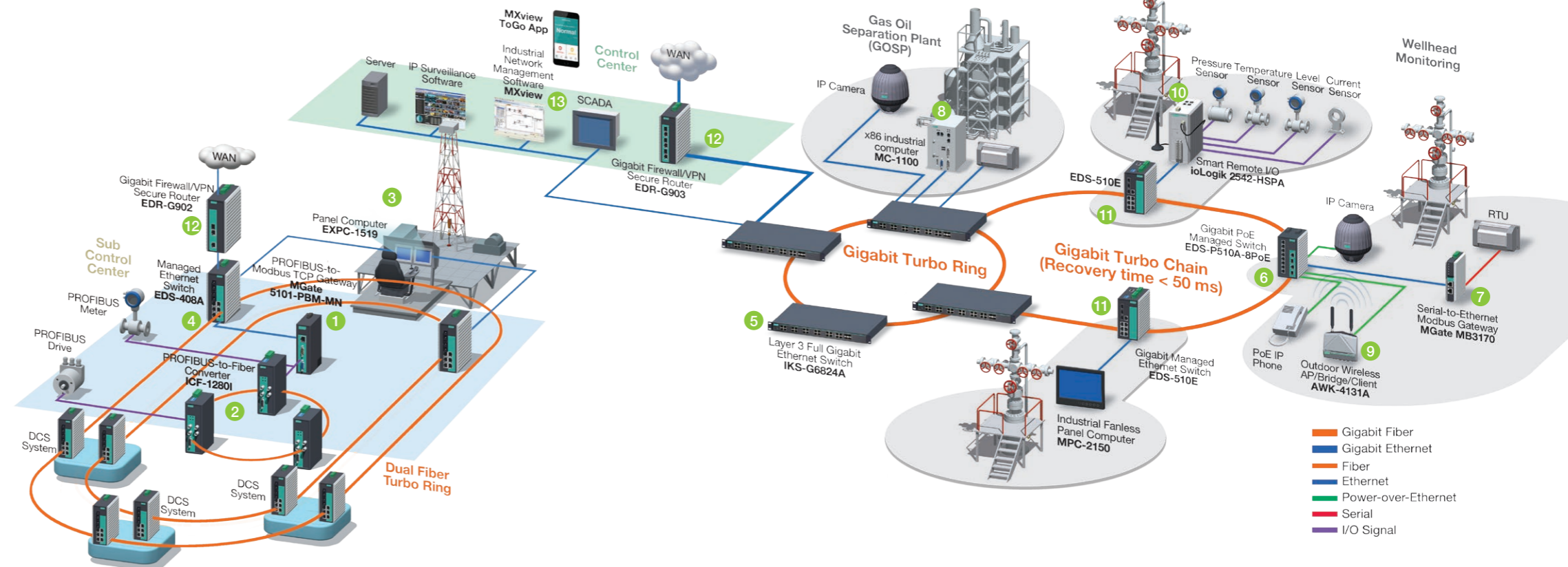
Drilling Control and Monitoring

1 MGate 5101-PBM-MN — 1-port PROFIBUS-to-Modbus TCP Gateway
See item 4 on page 3

2 ICF-1280I — PROFIBUS-to-Fiber Converter
See item 7 on page 4

3 EXPC-1519 — Fanless Rugged Zone 2 Panel Computer
- High performance Intel® 3rd generation Core™ i7-3555LE or Celeron 1047UE CPU
- Multiple connectivity including cable gland
- -40 to 70°C extended operating temperature

4 EDS-408A — 8-port Managed Ethernet Switch
- Turbo Ring and Turbo Chain (recovery time < 20 ms*), and RSTP/STP for Ethernet redundancy
- IPv6, Modbus/TCP, LLDP, DHCP Option 82, SNMP Inform, IGMP, QoS, and VLAN
- -40 to 75°C operating temperature range

*Note: 10G/1G Ethernet recovery time < 50 ms

Wellhead Monitoring and Maintenance

5 IKS-G6824A — 24G-port Layer 3 Full Gigabit Managed Ethernet Switch
- Layer 3 routing interconnects multiple LAN segments
- Up to 24 optical fiber connections (SFP slots)
- Turbo Ring, Turbo Chain (recovery time < 20 ms*) for Ethernet redundancy

*Note: 10G/1G Ethernet recovery time < 50 ms

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6 EDS-P510A-8PoE — 8+2G-port PoE+ Managed Ethernet Switch
- Up to 36 W per PoE+ port
- 2 Gigabit RJ45/SFP combo ports
- 3 kV LAN surge protection

7 MGate MB3170/MB3270 — 1/2-port Serial-to-Ethernet Modbus Gateways
See item 3 on page 3

8 MC-1100 Series — x86-based Embedded Computer
- Intel® Atom™ Processor E3845 1.91 GHz
- Din rail form factor
- Front-end computing, storage, and communication
- Dual independent displays (VGA+display port)
- 12/24 VDC input (9~36VDC range)
- -40 to 70°C operating temperature range

9 AWK-4131A — Outdoor Industrial IEEE 802.11a/b/g/n Wireless AP/Bridge/Client
- Millisecond-level Turbo Roaming
- Complete redundancy with AeroLink Protection
- Integrated antenna and power isolation
- Rugged IP68-rated housing and -40 to 75°C operating temperature

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10 ioLogik 2542-HSPA — Smart HSPA Remote I/O with Click&Go Plus, 8 DIs, and 8 DIOs
- Supports HSPA, Ethernet, and serial communication
- Supports Click&Go Plus IF-THEN-ELSE logic
- Builds in 4-port unmanaged switch
- 2 serial ports (RS-232/422/485) for connecting field devices

11 EDS-510E — 7+3G-port Gigabit Managed Ethernet Switch
See item 1 on page 3

SCADA Control Center

12 EDR-G902/G903 — Industrial VPN/Firewall/NAT Secure Routers
- High performance Gigabit copper/fiber combo port
- Up to 500 Mbps throughput
- Built-in PacketGuard™ for Modbus TCP packets

13 MXview — Industrial Network Management Software
- Automatic topology, VLAN, and IGMP visualization
- Event playback for reviewable diagnostics
- OPC agent for SCADA and third party NMS
- Third party MIB support
- Supports MXview ToGo mobile app for remote monitoring and notification

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Legend:
- Gigabit Fiber
- Gigabit Ethernet
- Fiber
- Ethernet
- Power-over-Ethernet
- Serial
- I/O Signal

Seamless Wireless Connections for Wellhead Monitoring

The oil and gas industry is moving towards a complete digital oilfield to increase production and reduce downtime. As oil and gas fields often span hundreds or even thousands of square miles across remote areas, wireless networks can improve communication efficiency. Many large oil and gas companies are adopting wireless network solutions to transmit and collect mission-critical data for all of their communication needs. Reliable, high capacity wireless networks can provide the oil and gas industry with:

• Reduced implementation time and costs
• Increased system flexibility and scalability
• Real-time production monitoring and data aggregation.

Network Requirements

■ Networks that are able to handle high data volumes and seamless communications
■ Comprehensive alternative cybersecurity solutions
■ Connecting legacy devices to wireless networks
■ Integration of various protocols in diverse oilfields
■ 24/7 operational reliability
■ Alarm settings for critical I/O tags
■ Product longevity and reliability for operating in harsh environments

Moxa Solutions

■ Moxa's industrial wireless features an antenna and power isolation, to secure mission-critical assets and extend product lifetime.
■ Moxa's industrial cellular LTE band gateway provides a higher cellular data rate, up to 100 Mbps, without geographic limitation.
■ Reliable connections are guaranteed by a redundant design, which includes dual-SIM cards, dual power inputs, and Moxa's Guaranlink software.
■ Moxa's industrial secure router provide stringent cybersecurity solutions, including a VPN, firewall, and packet checking, to ensure a high level of protection for your mission-critical assets.
■ Products compliant with Class 1 Division 2, ATEX Zone 2, and IECEx certifications
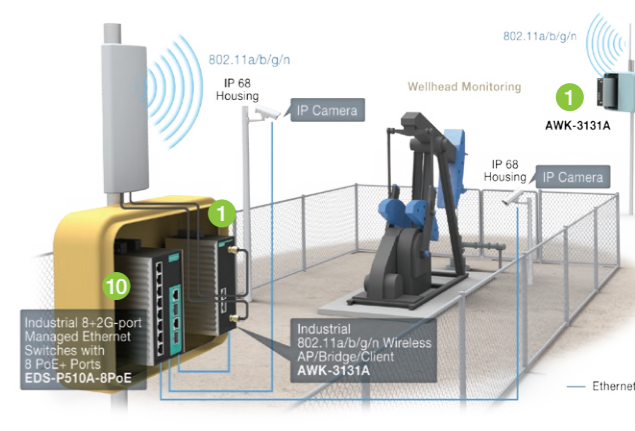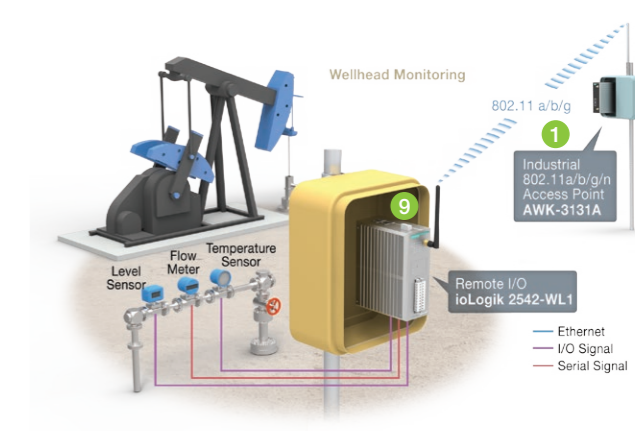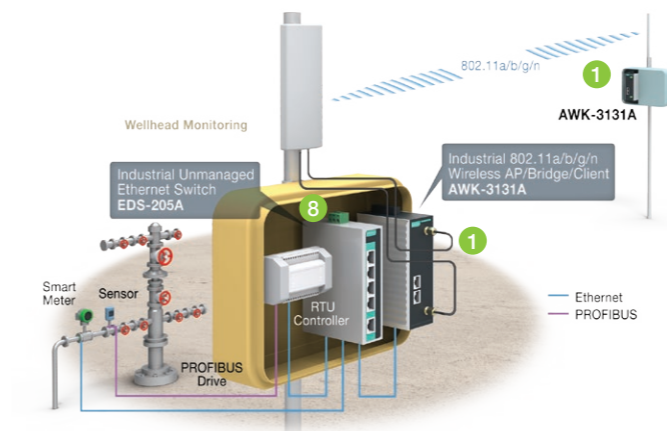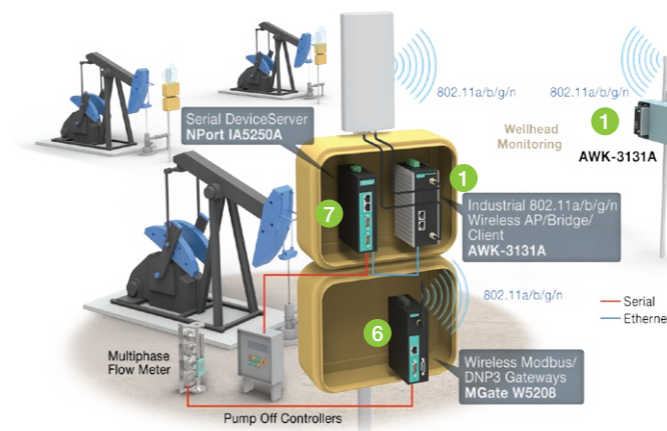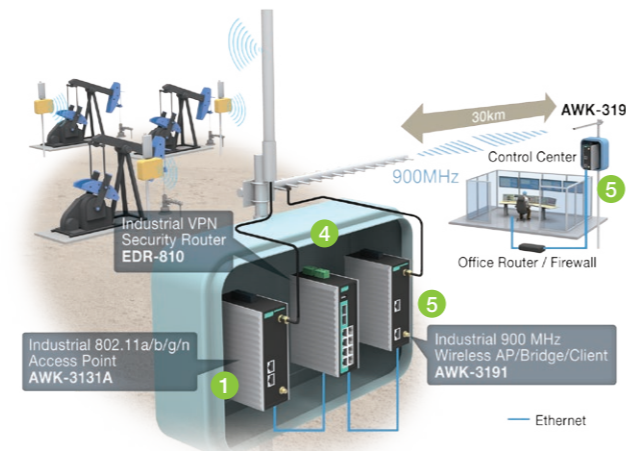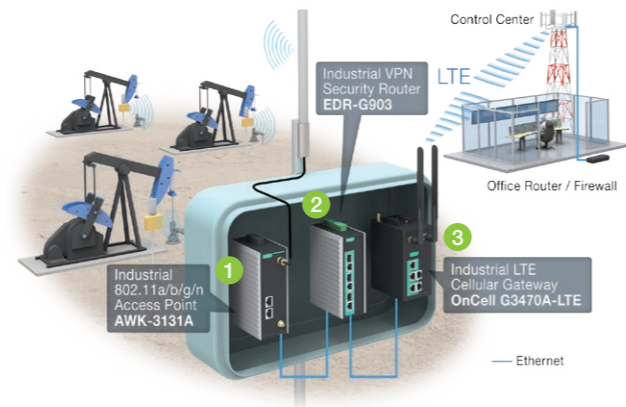
Site-to-Center

1 AWK-3131A — Industrial IEEE 802.11n Wireless AP/Bridge/Client
See item 6 on page 4

2 EDR-G903 — Industrial VPN/Firewall/NAT Secure Routers
See item 12 on page 6

3 OnCell G3470A-LTE — Industrial LTE Cellular Gateway
• Higher LTE bandwidth and built-in high speed 4-port Ethernet switch
• Industrial design with dual power input and built-in DI/DO support
• Antenna and power isolation design for higher device protection against interference

4 EDS-810 — Industrial 8+2G Multiport Secure Router
See item 8 on page 4

5 AWK-3191 — Industrial 900 MHz Wireless AP/Bridge/Client
• 900 MHz transmission for long distance wireless communication
• Power and antenna isolation design for higher operation stability
• -40 to 75°C operating temperature range (T models) * Only for U.S.

Oil Well Pad Aggregation

6 MGate W5108/5208 — Wireless Modbus/DNP3 Gateways
• Retrieve Modbus and DNP3 serial data through a wireless network
• Embedded Modbus protocol analyzer
• -40 to 75°C wide operating temperature range (T models)
• C1D2, ATEX, and IECEx certified for harsh industrial environments

7 NPort IA5000A Series — 1/2/4-port Industrial Serial Device Servers
• Triple surge protection (serial/power/Ethernet)
• 2kV isolation for serial signals
• Redundant power inputs and -40 to 75°C operating temperature range
• Approved for C1D2, ATEX and IECEx standards

8 EDS-205A Series — Industrial 5-Port Unmanaged Ethernet Switch
• 10/100BaseT(X) (RJ45 connector), 100BaseFX (multi/single-mode, SC or ST connector)
• Redundant dual 12/24/48 VDC, 18 to 30 VAC power inputs
• IP30 aluminum housing
• -40 to 75°C operating temperature range (T models)
• C1D2, ATEX Zone 2, and IECEx certified for harsh industrial environments

9 ioLogik 2542-WL1 — Smart WLAN Remote I/O with Click&Go® Plus
• New Click&Go Plus logic provides powerful front-end intelligence
• Optimized I/O expansion port for daisy chaining up to 8 ioLogik E1200 units
• Transforms Modbus RTU into Modbus TCP or Active Tags
• C1D2, ATEX Zone 2 certified for harsh industrial environments

10 EDS-P510A-8PoE — 8+2G-port PoE+ Managed Ethernet Switch
See item 6 on page 6

Real-Time Monitoring of Oil Pipeline Systems

The role of oil pipelines is to distribute the crude oil from drilling rigs to oil storage tanks and then to refineries. Typically, pipelines span several thousand miles over harsh terrain and require a central SCADA system based on Synchronous Digital Hierarchy (SDH) and microwave architecture to measure, monitor, and control the status of field instruments across the entire oil flow. Multiple pumping stations, such as block valve stations and compressor stations, keep the pressure in the pipeline constant. Operators can quickly detect, locate, and prevent or resolve leaks, damages, and breaks by deploying a rugged, extendable fiber-optic Ethernet network. The network must be robust, highly available, and include an integrated remote monitoring and surveillance service for pipeline operation to improve safety and reliability and reduce the total cost of the pipeline.

Network Requirements

- The SCADA system and network management software at the control center receive and monitor the pipeline's operational status
- A reliable wired or wireless network that seamlessly connects the remote data monitoring system to the control center
- Network with Gigabit performance and fiber support for real-time long-haul video, voice, and data transmission over vast distances
- Flexible and extensive network with easy deployment and expansion for large-scale and changeable pipeline applications
- Industrial-grade devices that operate in hazardous locations, to guarantee system safety

Moxa Solutions

- Moxa offers highly integrated network solutions, including Ethernet switches, wireless LAN and WAN products, Ethernet gateways, RTU controllers, embedded computers, and network management software
- Easily troubleshoot the entire network with Moxa's MXview industrial NMS to maximize system uptime
- Gigabit-performance Ethernet switches with single-mode and multi-mode fiber optic interfaces available
- Turbo Ring and Turbo Chain network redundancy technologies deliver integrated Ethernet rings that recover in 20 ms* or less
- All of Moxa's solutions feature a wide temperature operating range, high MTBF, fanless operation, high-EMI noise immunity, and industrial design to ensure long-term operations

*Note: 10G/1G Ethernet recovery time < 50 ms
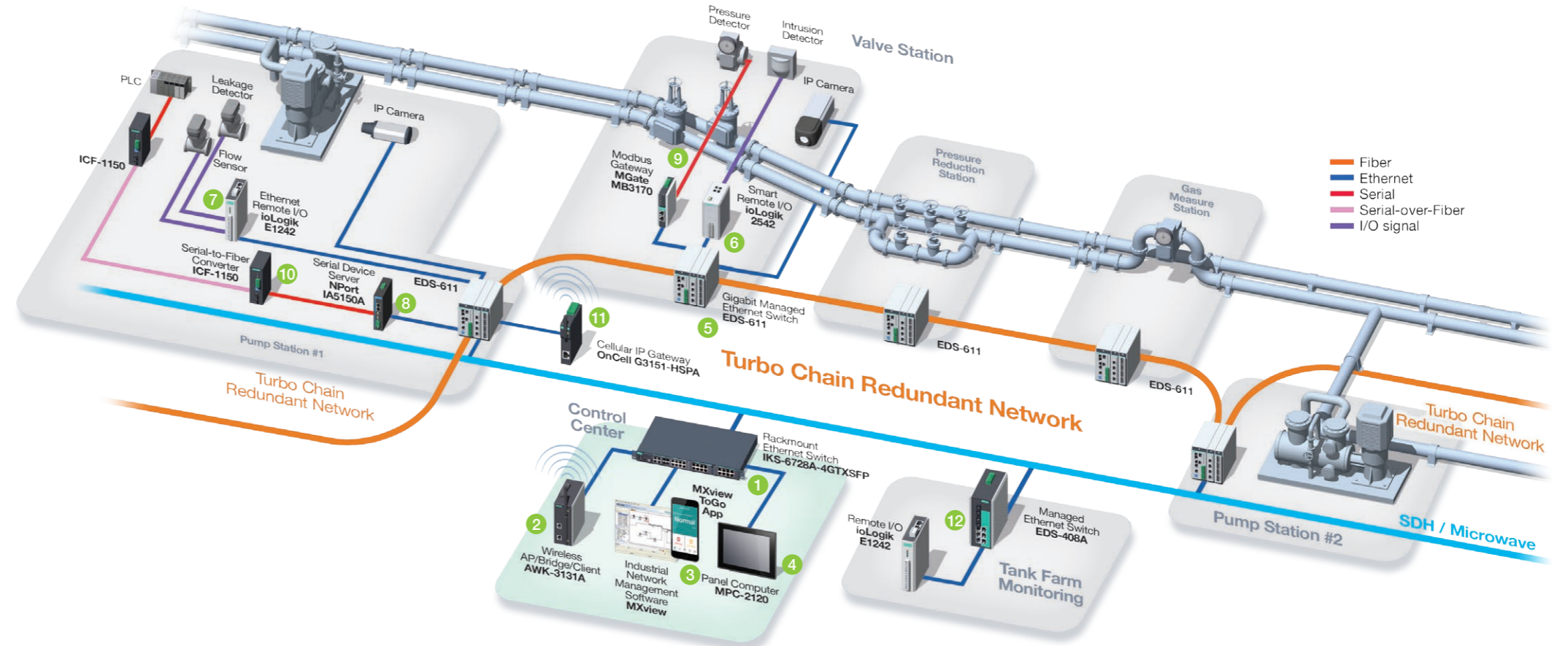
Control Center

1 IKS-6728A-4GTXSFP — **24+4G-port Modular Managed Ethernet Switch**
- Up to 4-port GbE and 24-port FE uplink
- Turbo Ring and Turbo Chain (recovery time < 20 ms*) for network redundancy
- Isolated redundant power inputs
- Fanless, -40 to 75°C operating temp. range
*Note: 10G/1G Ethernet recovery time < 50 ms

2 AWK-3131A — **Industrial IEEE 802.11a/b/g/n Wireless AP/Bridge/Client**
See item 6 on page 4

3 MXveiw — **Industrial Network Management Software**
See item 9 on page 4

4 MPC-2120 — **12-inch Industrial Fanless Panel Computers**
- Intel® Atom™ Processor: E3845 1.91 GHz or E3826 1.46 GHz
- -40 to 70°C wide-temperature design, no fan/no heater
- 1000-nit sunlight-readable LCD
- Class 1 Division 2, ATEX Zone 2, and IECEx certified*
*Pending in 2018

Pump Station and Pipeline Monitoring

5 EDS-611 — **8+3G-port Compact Modular Managed Ethernet Switch**
- Up to 3 Gigabit ports for Gigabit redundant ring and uplink
- Modular form factor with up to 11 fiber ports
- Turbo Chain and Turbo Ring (recovery time < 20 ms*) for network redundancy
- -40 to 75°C operating temperature range
*Note: 10G/1G Ethernet recovery time < 50 ms

6 ioLogik 2542 — **Smart Ethernet Remote I/O with Click&Go Plus, 4 AIs, 12 DIOs**
- Supports Ethernet and serial communication
- Supports Click&Go Plus IF-THEN-ELSE logic
- Builds in 4-port unmanaged switch
- 2 serial ports (RS-232/422/485) for connecting field devices

7 ioLogik E1242 — **Ethernet Remote I/O with 4 AIs, 4 DIs, and 4 DIOs**
- Built-in 2-port Ethernet switch for daisy-chain topology
- Support Moxa's MX-AOPC UA Server for connecting to SCADA systems
- User-defined Modbus/TCP addressing
- Class I Div. 2/ATEX Zone 2 approvals

8 NPort IA5000A — **1/2/4-port Industrial Serial Device Servers**
See item 7 on page 8

9 MGate MB3170/MB3270 — **1/2-port Serial-to-Ethernet Modbus Gateways**
See Item 3 on page 3

10 ICF-1150 — **Industrial Serial-to-Fiber Media Converter**
- 3-way communication: RS-232, RS-422/485, fiber
- UL508, Class I Div. 2/ATEX Zone 2 approvals
- -40 to 85°C operating temperature range

11 OnCell G3151-HSPA — **Compact five-band GSM/GPRS/EDGE/UMTS/HSPA IP gateways**
- High speed 3G HSPA cellular connection
- Private IP communication with OnCell Central Manager
- GuaranLink 3-tiers cellular connection check

Tank Farm Management

12 EDS-408A — **8-port DIN-Rail Managed Ethernet Switch**
- Turbo Ring and Turbo Chain media redundancy (recovery time < 20 ms*)
- Easy management with SNMP, Modbus TCP, EtherNet/IP, and PROFINET
- -40 to 75°C operating temperature range
*Note: 10G/1G Ethernet recovery time < 50 ms

Legend:
- Fiber
- Ethernet
- Serial
- Serial-over-Fiber
- I/O signal

# Ensure 24/7 Sustainable Production with Industrial Ethernet

Oil refineries are large-scale plants that process large quantities of crude oil and feature a complicated production process with a great number of intelligent equipment devices. Because of the high capacity, many of the units operate continuously for long periods of time. The distributed control system (DCS) is the main control system, and is connected to the controller elements by Ethernet networks to manage and monitor the plant's output and performance. Since non-stop 24/7 operation is crucial to the entire process, the Ethernet network system must have reliable redundancy to achieve high data availability and optimal productivity. In addition, a reliable and secure auxiliary system is used to detect and track unsafe events such as leaks to maintain safe operations.

Network Requirements

- A highly reliable and flexible industrial Ethernet communication network for the entire DCS
- Dual redundant network for SCADA system, controllers and field devices to provide maximum uptime
- IP video surveillance and remote automation solution integration are required to enable remote monitoring
- Cellular solutions to easily connect field devices at remote sites for mobile management
- Enable secure network access and critical device protection

Moxa Solutions

- Full Gigabit Layer 3/Layer 2 rackmount switches supporting up to 4 10GbE ports and Turbo Ring/Turbo Chain redundant technology
- Comprehensive device networking solutions, such as cellular IP gateways, fieldbus-to-Ethernet gateways, and media converters
- A vast range of industrial Ethernet switches, including high-port-density rackmount switches for control centers, Gigabit Ethernet switches for video surveillance, and PoE+ solutions for high power PoE sensors
- Event-based RTU controllers, and remote I/Os provide integrated service for real-time data acquisition and monitoring
- Gigabit performance secure routers to protect critical devices and remote access from broadcast packets and unauthorized access
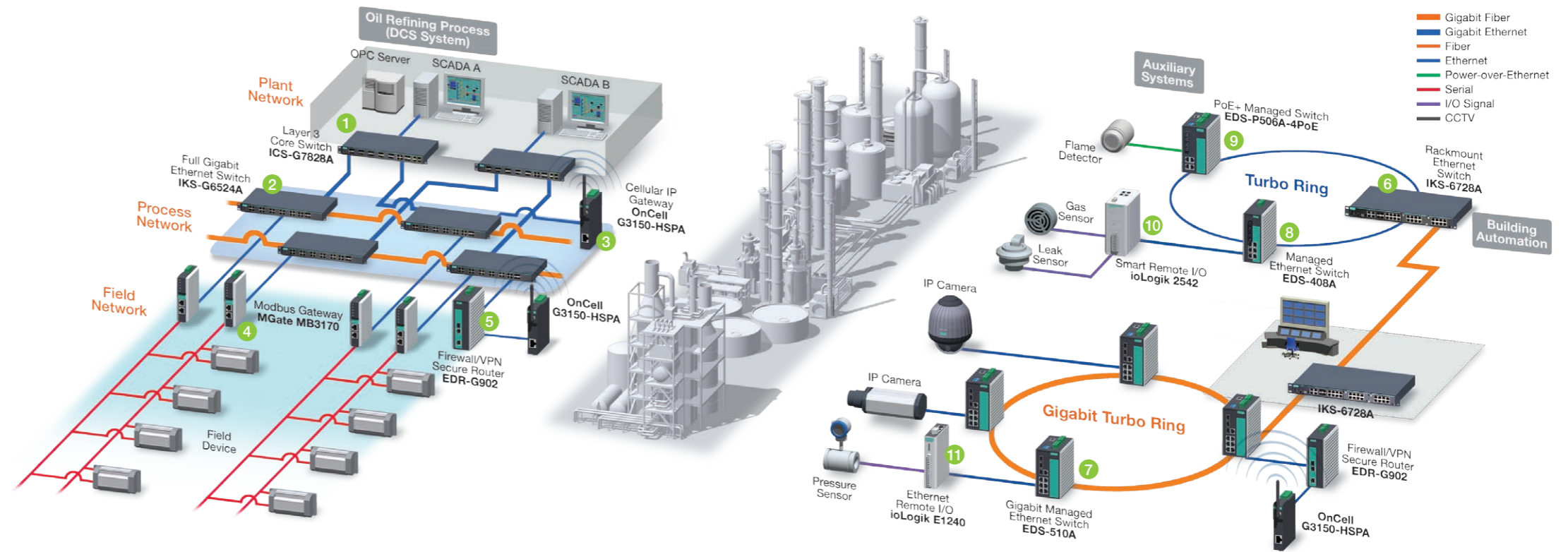
Oil Refinery Process

1 ICS-G7828A — **24G+4 10GbE-port Layer 3 Full Gigabit Switch**
- Layer 3 routing interconnects multiple LAN segments
- Turbo Ring and Turbo Chain (recovery time < 20 ms*) for Ethernet redundancy
- Isolated redundant power with universal 110/220 VAC power inputs
*Note: 10G/1G Ethernet recovery time < 50 ms

2 IKS-G6524A — **24G-port Full Gigabit Managed Switch**
- Up to 24 SFP connections
- Gigabit Turbo Ring and Turbo Chain (recovery < 50 ms)
- Isolated redundant power inputs
- Fanless, -40 to 75°C operating temperature range

3 OnCell G3150-HSPA — **Industrial Five-Band HSPA High Speed IP Gateway with VPN**
- High speed 3G HSPA cellular connection
- Build-in VPN IPSec PSK client
- GuaranLink 3-tiers cellular connection check

4 MGate MB3170/MB3270 — **1/2-port Serial-to-Ethernet Modbus Gateways**
- Slave mode supports 16 TCP masters and up to 62 serial slaves at the same time
- Master mode supports 32 TCP slaves at the same time
- Emergency request tunnels ensure QoS control
- Redundant dual DC power inputs

5 EDR-G902 — **Industrial VPN Secure Router, 1 WAN, Firewall/NAT, 10 VPN Tunnels**
- Firewall/NAT/VPN/Router all-in-one
- Gigabit copper/fiber combo port
- Firewall with Quick Automation Profile for Fieldbus protocols

Auxiliary Control Systems

6 IKS-6728A-4GTXSFP — **24+4G-port Modular Managed Switch**
- Up to 4-port GbE and 24-port FE uplink
- Turbo Ring and Turbo Chain (recovery time < 20 ms*) for Ethernet redundancy
- Isolated redundant power inputs
- Fanless, -40 to 75°C operating temp. range
*Note: 10G/1G Ethernet recovery time < 50 ms

7 EDS-510A — **7+3G-port Gigabit Managed Ethernet Switch**
- 2 Gigabit ports for redundant ring and 1 Gigabit port for uplink
- Long distance fiber transmission of up to 80 km
- -40 to 75°C operating temperature range

8 EDS-408A — **8-port Managed Ethernet Switch**
- Plug-n-play Turbo Ring and Turbo Chain, and RSTP/STP for Ethernet redundancy
- Easy management with SNMP, Modbus TCP, EtherNet/IP, and PROFINET
- -40 to 75°C operating temperature range

9 EDS-P506A-4PoE — **6-port PoE+ Managed Ethernet Switch**
- 4 IEEE 802.3at/af compliant PoE ports (up to 30 W per port)
- 24/48 VDC wide range power input
- Intelligent power consumption detection, PD failure check function
- -40 to 75°C operating temperature range

10 ioLogik 2542 — **Smart Ethernet Remote I/O with Click&Go Plus, 4 AIs, 12 DIOs**
- Supports Ethernet and serial communication
- Supports Click&Go Plus IF-THEN-ELSE logic
- Builds in 4-port unmanaged switch
- 2 serial ports (RS-232/422/485) for connecting field devices

11 ioLogik E1240 — **Ethernet Remote I/O with 8 AIs**
- Built-in 2-port Ethernet switch for daisy-chain topology
- Supports Moxa's MX-AOPC UA Server for connecting to SCADA systems
- User-defined Modbus/TCP addressing
- Class I Div. 2/ATEX Zone 2 approvals

Certified for Hazardous and Offshore Sites

Oil & gas facilities are faced with the constant risk of explosion and leakage that not only jeopardizes business operations, but also puts human lives in danger. For this reason, equipment and systems used in these settings must be held to rigid standards to guarantee the highest level of security and reliability.

Moxa's industrial products are designed in strict accordance with globally accepted standards for explosion protection in hazardous locations. Approved certifications include UL/cUL Class I Division 2, ATEX Zone 2, IECEx, and DNV GL/ABS/LR/NK.

Environmental Hazards and Ratings

Class I Division 2 / ATEX Zone 2

Equipment in a hazardous location where ignitable concentrations of gases, vapors, or liquids are located (such as a pipeline) must be specially designed and tested to meet Class I Division 2 / Zone 2 standards to avoid explosions. Moxa products have been tested for safe and reliable operation in hazardous locations in accordance with strict, internationally recognized UL/cUL Class 1 Division 2, and ATEX Zone 2 standards.

IECEx Certification

IECEx, the IEC system for certification to international standards related to equipment used in explosive atmospheres, is a new global compliance certification for the oil & gas industry. Moxa's industrial serial device servers, media converters, and Ethernet gateways have obtained certifications to meet the required level of safety and quality for use in hazardous areas. All of these products must pass a rigorous battery of tests and quality assessment regimens before they can be awarded a certificate of conformity.

Maritime Certification

Offshore oil rigs and drilling platforms place high demands on their equipment since they are more likely to be exposed to a wide variety of environmental damage, such as salt mist and humidity. For this reason, equipment used in these settings must conform to maritime standards to provide the highest level of onsite security. The maritime standards, which include DNV GL, ABS, LR, and NK for individual regions, confirm a device's ability to withstand temperature, humidity, vibration, EMC, and other stresses, as well as its suitability for specific, well-defined classes of marine environments. Moxa's industrial Ethernet and computing solutions have passed several marine certifications to guarantee the reliable and safe operation of equipment used on ships or at offshore sites.

Moxa's Rigorous Testing Ensures High Reliability

Design-Phase Tests Maximize Operational Stability

ESD Test Surge/EFT Test Wide Temperature Test

Vibration Test Shock Test Freefall Test

Production-Phase Tests Optimize Hardened Quality

Board-level Test Burn-in Test

System Level Test Hipot Test

To verify their reliability and longevity, all Moxa products must pass a rigorous set of design and production tests, including wide temperature, ESD, surge/EFT, vibration/shock, and burn-in tests.

Wide Operating Temperature Range

Oil & gas environments can be excruciatingly hot or unbearably cold, and require network devices to operate under wide temperature conditions. Moxa's products are subjected to rigorous testing beyond industry standards to ensure their suitability for a wide operating temperature range. For instance, while regulatory standards require only a temperature change of 1°C/minute during cycling testing, Moxa conducts stricter testing using 3°C/minute. In addition, all Moxa products must pass a 20-hour dynamic burn-in test to ensure the best industrial-grade quality and reliability. Moxa products can not only operate in a wide-ranging temperature but also boot up in extremely low temperatures.

Conformal Coating Services

Offshore oil drilling platforms, onshore oil wells, and refineries must cope with moisture, salt, and airborne chemicals that can react with and damage the electronics on printed circuit boards. Conformal coating is a thin, even layer of non-conductive material applied over electronics to protect against moisture, contaminants, and corrosion, and resists extreme temperatures, vibration, salt spray, and chemical vapors, ensuring a longer lifecycle. Moxa provides conformal coating services with strict coating and inspection processes to help customers construct more reliable and rugged network systems. Please contact a Moxa sales representative for information.
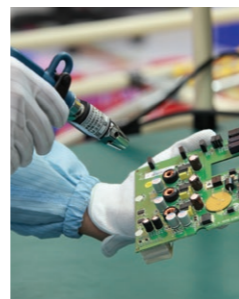
Product Selection Guide

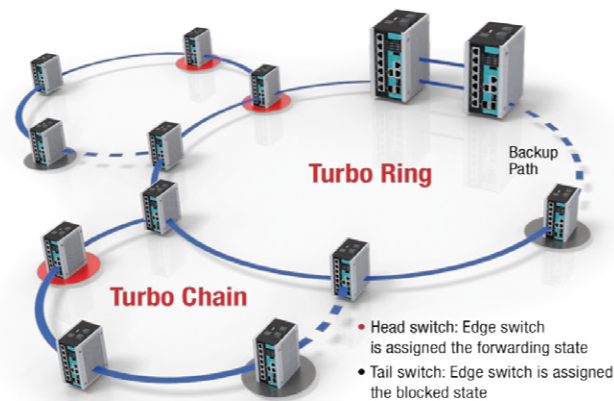| Models	Interface	Certifications				Operating Temperature (T Models)	Highlights
		Class I Div. 2	ATEX Zone 2	IECEx	DNV GL		
Industrial Ethernet Switches							
EDS-608/611/616/619	8, 8+3 GE, 16, 16+3 GE ports	✓	✓	–	✓	-40 to 75°C	Modular, managed, up to 3 Gigabit ports
EDS-G508E/G512E/G516E	8 GE, 12 GE, 16GE ports	✓	✓	–	✓	-40 to 75°C	Managed, Gigabit performance
EDS-510E /518E	7 + 3 GE ports/14+4 GE ports	✓	✓	–	✓	-40 to 75°C	Managed, up to 4 Gigabit ports
EDS-505A/508A/516A	5, 8, 16 ports	✓	✓	–	EDS-516A ✓	-40 to 75°C	Managed
EDS-405A/408A	5, 8 ports	✓	✓	✓	✓	-40 to 75°C	Managed, entry-level
EDS-305/308/309/316	5, 8, 9, 16 ports	✓	✓	–	EDS-316 ✓	-40 to 75°C	Unmanaged, advanced
EDS-205A/208A	5, 8 ports	✓	✓	–	✓	-40 to 75°C	Unmanaged, best price-to-performance
EDS-G205-1GTXSFP/G308	5 GE, 8 GE ports	✓	✓	–	✓	-40 to 75°C	Full Gigabit, unmanaged
IEX-402-VDSL2	2 VDSL2 ports	✓	✓	–	–	-40 to 75°C	Managed VDSL2 Ethernet extenders
Industrial Secure Router							
EDR-810	8+2 G ports	✓	–	–	–	-40 to 75°C	Firewall/NAT/VPN/switch all-in-one
EDR-G902/G903	1 WAN (Combo), 1 LAN (RJ45)	–	–	–	✓	-40 to 75°C	Industrial Secure Routers with Firewall/NAT/VPN
Industrial Wireless AP/Bridge/Clients							
AWK-3131A	802.11a/b/g/n	✓	✓	✓	–	-40 to 75°C	60 Concurrent Clients Communication
AWK-4131A	802.11a/b/g/n	–	–	–	–	-40 to 75°C	IP68 protection
AWK-3191 (US Only)	900MHz	✓	–	–	–	-40 to 75°C	High Bandwidth 30km Point to Point Communication
Media Converters							
IMC-101	–	✓	✓	✓	✓	-40 to 75°C	Ethernet-to-fiber
IMC-101G	–	✓	✓	✓	–	-40 to 75°C	Ethernet-to-fiber, Gigabit
ICF-1150/1150I	–	✓	✓	✓	✓	-40 to 85°C	Serial-to-fiber, 3-way communication (RS-232, fiber, RS-422/485)
ICF-1180I	–	✓	✓	✓	–	-40 to 75°C	PROFIBUS-to-fiber
ICF-1280I	–	✓	✓	✓	✓	-40 to 75°C	PROFIBUS-to-fiber, dual fiber ports
Industrial Ethernet Gateways							
MGate MB3170/MB3270	1, 2 ports	✓	✓	✓	✓	-40 to 75°C	Modbus RTU/ASCII-to-Modbus TCP
MGate EIP3170/EIP3270	1, 2 ports	✓	✓	✓	–	-40 to 75°C	DF1-to-EtherNet/IP
MGate 5101-PBM-MN	1 port	✓	✓	✓	–	-40 to 75°C	PROFIBUS-to-Modbus TCP
MGate 5102-PBM-PN	1 port	✓	✓	✓	–	-40 to 75°C	PROFIBUS-to-PROFINET
MGate 5103	1 port	✓	✓	✓	–	-40 to 75°C	Modbus RTU/ASCII/TCP/EtherNet/IP to PROFINET gateway
MGate 5105-MB-EIP	1 port	✓	✓	✓	–	-40 to 75°C	Modbus-to-EtherNet/IP
MGate 5111	1 port	✓	✓	✓	–	-40 to 75°C	Modbus RTU/ASCII/TCP/PROFINET/EtherNet/IP to PROFIBUS slave gateway
MGate 5118	1 port	✓	✓	✓	–	-40 to 75°C	J1939 to Modbus/PROFINET/EtherNet/IP
MGate W5108/W5208	1, 2 ports	✓	✓	✓	–	-40 to 75°C	WiFi Modbus/DNP3 Gateway
Industrial Serial Device Servers							
NPort IA5150/5250	1, 2 ports	✓	✓	✓	–	-40 to 75°C	Patented ADDC (Automatic data direction control)
NPort IA5150A/5250A	1, 2, 4 ports	✓	✓	✓	–	-40 to 75°C	2 kV isolation, surge protection, metal housing
NPort S9450I	4 ports	✓	–	–	–	-40 to 85°C	Rugged device server with managed Ethernet switch and DNP3/Modbus protocols supported
Computers and Panel Computers							
EXPC-1519 Panel Computer	2 GE ports, 2 Fiber ports, 3 USB 2.0, 2 RS-232/422/485	✓	✓	✓	–	-40 to 70°C	19-inch Multi-touch with glove friendly; Sunlight readable 1,000 nits LCD design, cable gland
MPC-2070 Panel Computer MPC-2120 Panel Computer MPC-2150 Panel Computer	2 RJ-45 ports, 2 USB 2.0*, 2 RS-232/422/485 * MPC-2150: 4 USB2.0	✓	✓	✓	✓	-40 to 70°C	7-inch, 12-inch and, 15-inch multi-touch with glove friendly; sunlight viewable 1,000 nits LCD design
MC-1100 Computer	4 GE ports, 2 USB 2.0, 2 RS-232/422/485	✓	✓	✓	✓	-40 to 70°C	x86 computer w/ din rail form factor, 9~36VDC wide power input
Smart Remote I/O							
ioLogik 2542-HSPA	4 AIs, and 12 DIOs	✓	✓	–	–	-30 to 70°C	Click&Go Plus control logic, data logging
Ethernet Remote I/O							
ioLogik E1240	8 AIs	✓	✓	–	–	-40 to 75°C	2 Ethernet ports, peer-to-peer
ioLogik E1242	4 AIs, 4 DIs, 4 DIOs	✓	✓	–	–	-40 to 75°C	2 Ethernet ports, peer-to-peer

The Most Dependable Network Connectivity with Smart Redundancy

Unexpected system downtimes and failures to respond in real time can cause significant damage to oil and gas facilities, threatening assets and even lives. For this reason, it is highly important to keep systems functional at all times, even during emergency situations. To create dependable network connectivity, Moxa's industrial Ethernet switches and wireless AP/bridge/client products support redundancy features to ensure that communication systems are always available and can respond in real time. Moreover, Moxa offers up to 10Gigabit high-bandwidth Ethernet solutions to facilitate a converged network of data, voice, and video.

Millisecond-Level Resilience with Moxa's Turbo Ring and Turbo Chain

To maximize system reliability and uptime for Ethernet networks, Moxa offers Turbo Ring and Turbo Chain redundancy technologies, which can be effectively employed across a wide range of industrial Ethernet switches, for strong protection against node and segment failures.

Turbo Ring is a proprietary self-healing protocol that supports three topology options: ring-coupling, dual ring, and dual homing. At a full load of 250 switches, each Turbo Ring topology gives fast fault recovery in under 20 ms. (10G/1G Ethernet recovery time < 50 ms). Turbo Chain, a highly flexible self-healing Ethernet redundancy technology, extends the limitations of redundant ring technology by allowing the easy chaining of additional devices to the core ring, all the while maintaining full redundancy. Combining Moxa's Turbo Ring and Turbo Chain simplifies the deployment and management of industrial Ethernet networks while delivering superior availability, reliability, and flexibility.

Turbo Ring
Turbo Chain
Backup Path

- Head switch: Edge switch is assigned the forwarding state
- Tail switch: Edge switch is assigned the blocked state

Network-Level Wireless Redundancy

Moxa's innovative AeroLink Protection provides smart failover technology for your networks along with fast recovery time. This scalable technology makes it easy to enable multiple levels of wireless connection redundancy to maximize uptime for your mission-critical systems by keeping your entire network alive to allow the continuous transmission of data.

With AeroLink Protection, a network has two or more AeroLink Protection-enabled wireless client nodes connected to a single access point. One of them serves as the active node, while the others are passive backup nodes. If the active node stops sending or receiving data for any reason, AeroLink Protection completely restores the communication link within milliseconds by bringing the backup nodes online. Furthermore, the passive node can be connected to a different access point on a different frequency, providing frequency-level redundancy. This capability prevents system downtime caused by device failures and frequency interruptions, thereby providing comprehensive wireless redundancy for your networks.

AP
AeroLink Protection

Client 1 — Active
Client 2 — Backup
Client 3 — Backup
Ethernet Switch
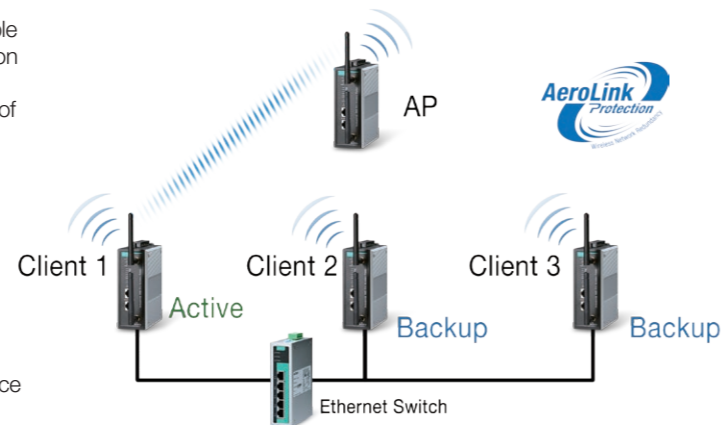
Optimal Bandwidth for Converged Networks

10GbE Uplink
3.5G HSPA
Industrial secure routing
802.11n
36W PoE

Moxa's high-bandwidth industrial Ethernet devices let you transmit real-time voice, video, and data over both wired and wireless links.

- Gigabit and 10-Gigabit uplinks
- 3.5G HSPA for mobile streaming (up to 5.7 Mbps upstream)
- 802.11n for wireless streaming (up to 300 Mbps)
- Industrial secure routers (up to 500 Mbps throughput)
- High power PoE+ switches (up to 36 W per port)

Enhanced Network Security for Oil & Gas Sites

Now, as PLCs, RTUs, sensors, and SCADA systems in oil & gas facilities are connected over Ethernet, mission-critical infrastructure has become a high-priority target for cyberattackers. Any intrusion into an industrial control system will potentially reduce production quality, or cause significant damage, so protecting the network from these intrusions must be a top priority. Moxa's industrial routers all feature firewall, NAT, and VPN technology that greatly reduces safety risks by significantly enhancing network security.

Defense-in-Depth Cybersecurity

Moxa's all-in-one EDR industrial secure routers are capable of critical asset protection and secure remote access to construct multilayer cybersecurity in multiple industrial protocols and harsh environments such as oil wellheads.
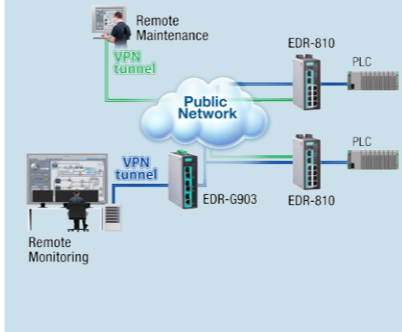

Cell
Zone
Site
WAN/DMZ WAN VPN
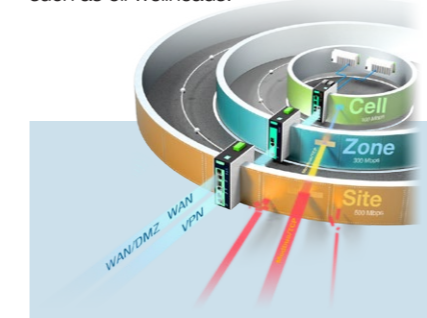
Transparent Firewalls

The EDR Series provides a transparent firewall function that allows you to protect control networks and critical devices, such as PLCs and RTUs, without the need to reconfigure the network settings, making the deployment faster and easier.

PLC Firewall
EDR-810
PLC
EDR-810 Firewall
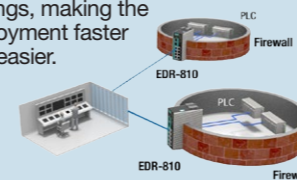
Secure Remote VPN Access

Using IPSec, L2TP over IPSec, or OpenVPN technologies, the EDR Series can set up encrypted IPSec VPN tunnels or five OpenVPN clients for secure remote access between industrial networks and remote applications, such as oil and gas.

Remote Maintenance
VPN tunnel
EDR-810 PLC
Public Network
VPN tunnel
EDR-G903 EDR-810 PLC
Remote Monitoring

Device Embedded Security

With firmware, Moxa adds device security capabilities based on the IEC 62443 standard to its product lines of industrial Ethernet switches, secure routers, and wireless devices to strengthen the cybersecurity of mission-critical infrastructures.

Password Authentication
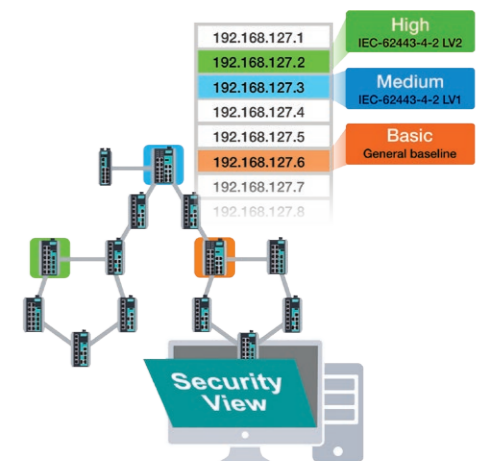Authentication Management
Account Management

Product Portfolio with Security Features based on the IEC 62443 standard

- Industrial Secure Routers
- Industrial Ethernet Switches
- Industrial Wi-Fi
- Industrial Cellular
Please check www.moxa.com for the latest update.

Security Management

With MXview's Security View and MXconfig's Security Wizard, network administrators can see a full picture of the security status of Moxa's network devices, allowing for quick responses to any vulnerabilities that are identified on a network.

192.168.127.1	High IEC-62443-4-2 LV2
192.168.127.2	
192.168.127.3	Medium IEC-62443-4-2 LV1
192.168.127.4	
192.168.127.5	Basic General baseline
192.168.127.6	
192.168.127.7	

Security View

| Industrial Secure Routers	Dual WAN	FW Bridge	Multiport
	EDR-G903	EDR-G902	EDR-810
Target Requirements	• Dual WAN redundancy • Gigabit bandwidth of up to 500 Mbps	• Network security between a WAN and LAN • Gigabit bandwidth of up to 300 Mbps	• Front-end secure routers with Layer 2 switch functions • Multiple ports for accessing device connections
Interface	2 WANs (combo); 1 LAN (combo)	1 WAN (combo); 1 LAN (RJ45)	1 WAN; 15 LANs
Throughput	500 Mbps (40,000 fps)	300 Mbps (25,000 fps)	110 Mbps (10,000 fps)
VPN	100 IPSec tunnels	50 IPSec tunnels	10 IPSec tunnels
Firewall/NAT	512/256 policies	256/128 policies	256/128 policies
DMZ	1	—	—
Operating Temperature	0 to 60°C, -40 to 75°C (T model)	0 to 60°C, -40 to 75°C (T model)	-10 to 60°C, -40 to 75°C (T model)

Bring the Data to the Control Center-Instantly and Reliably

It is a huge technical challenge for the control center to effectively manage a network remotely located and widely distributed. As oil and gas facilities grow more complex, safety and reliability become even more important: that means more monitoring devices in the field, requiring even greater integration and interoperability.

With Moxa's industrial networking, monitoring, and computing products as well as ready-to-run software, network administrators can easily overcome the challenge of integrating a variety of OT protocols like PROFIBUS, EtherNet/IP, and Modbus TCP with central HMI/SCADA systems, and to combine them in ways that enable the receipt and response of field data with high efficiency.

## ThingsPro™ Gateway - An Intelligent Data Acquisition Platform

In order to achieve real-time remote monitoring, oil and gas service companies started to develop their own data acquisition and asset management software programs using IIoT gateways. Moxa's IIoT Gateway solution is comprised of a UC-8100 edge computer and ThingsPro Gateway data-acquisition software. The ThingsPro Gateway enables the integration of Modbus communications, computing, data acquisition, and wireless networking in a few simple steps.
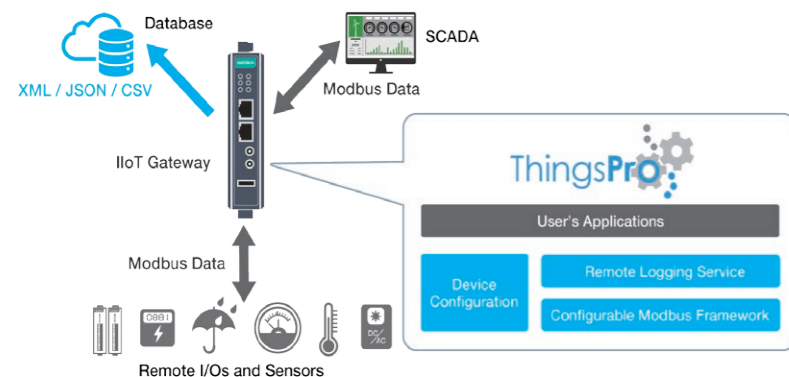
The ThingsPro Gateway provides the ability to transfer field data directly to remote databases without any additional programming on the edge computer. Users can easily configure protocol polling tables and upload data to the back-end database because ThingsPro Gateway includes generic Modbus protocol support. This way, oil and gas service companies can focus on developing applications without having to worry about how to get and transfer their data to back-end databases.

Secure Edge Devices and Data by Deploying Trusted Platform Module (TPM)

While oil and gas companies are reaping the benefits of oilfield digitalization, they are also faced with data security risks. Furthermore, wellheads are often located in hard-to-reach, distributed areas, so it is very essential to guarantee the physical security of edge devices by deploying Trusted Platform Module (TPM). Bringing TPM and RISC computers together gives system integrators and industrial engineers a powerful new tool in their security arsenal. By creating a specific cryptographic key for each individual device, hardcoded within the platform itself, the data stored in the computing is secured and protected from being read by an unauthenticated party. Moreover, the OS of the computing is locked from being overwritten to secure edge devices and data in distributed areas.
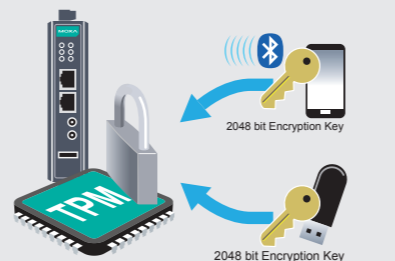
MX-AOPC UA Server – First OPC UA Server that Supports Both Push and Pull Communication

Moxa has pioneered the concept of "active type" OPC software in the automation industry. The patented MX-AOPC UA Server offers both polling and non-polling architectures alongside the standard OPC UA protocol, giving users the choice of pull or push-based communication between the server and Moxa's devices.
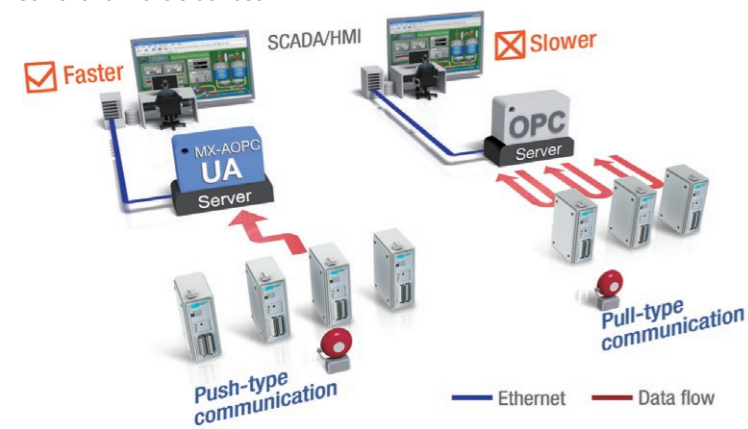
With push technology, I/O statuses are updated in the MX-AOPC UA Server only when there is a change in the status, a pre-configured interval is reached, or when the user issues a request. This allows the data logs to be accurately and efficiently pushed from the I/O to the SCADA systems in the control center. This application of push technology cuts metadata overhead, resulting in faster I/O response times and more accurate data collection than traditional pull-based architectures. With Moxa's "active" technology, oil and gas companies can now instantly receive alarms and real-time updates, enabling efficient fault responses.

Deploy, Operate, and Maintain with Easy-to-Use Software

Oil and gas facilities are increasingly located in remote and hazardous environments where a sustained human presence is costly. It is critical for system administrators to minimize the need for on-site personnel, both during deployments as well as for routine maintenance and monitoring. For Therefore, software optimizations for device deployments and preventive maintenance become extremely valuable.

Moxa provides a number of easy-to-use software optimizations for remote administration. Whether you are deploying real-time network management controls, CCTV surveillance at the wellhead, or remote telemetry units across an entire pipeline, Moxa software gives you unique, innovative enhancements for your SCADA, HMI, or NMS that you can use to achieve greater excellence in operations.

1 Network Objects: Full Status Parameters for SCADA Monitoring

For seamless integration of network monitoring in a SCADA environment system, Moxa's industrial Ethernet switches support EtherNet/IP EDS files, AOI objects, and PROFINET GDS files, together with a number of network parameters, switch faceplates, and programming objects to ensure that you get an accurate reading of your network's status.

2 MXstudio: Automation-Friendly Network Management Software

MXstudio is Moxa's integrated network management and diagnostics tool for Ethernet products. The software suite includes three tools: MXconfig, the network configuration tool; MXview, the network management software; and N-Snap, the network troubleshooting tool. With MXstudio, users can speed up the process of field device configuration and troubleshooting.

• Fast setup and deployment time with mass configuration functionality
• Smart visualization of your network status: real-time topology, VLAN/IGMP grouping, and event playback
• SCADA systems and third-party NMS integration
• Real-time remote monitoring and event push notification via smart phones

3 MGate Manager: Automated Fieldbus Configuration and Management Platform

Use the automation functions provided by Moxa MGate Manager together with Moxa's industrial Ethernet gateways to integrate fieldbus devices with an industrial Ethernet network in just minutes. With MGate Manager, you can monitor I/O data and easily troubleshoot critical events with event logs.

Features and Benefits
• AutoScan lets you detects PROFIBUS devices with just one click
• QuickLink provides automatic and error-free I/O mapping by passively detecting Modbus requests
• AutoCalibration ensures one-click detection of response timeout settings for Modbus connections
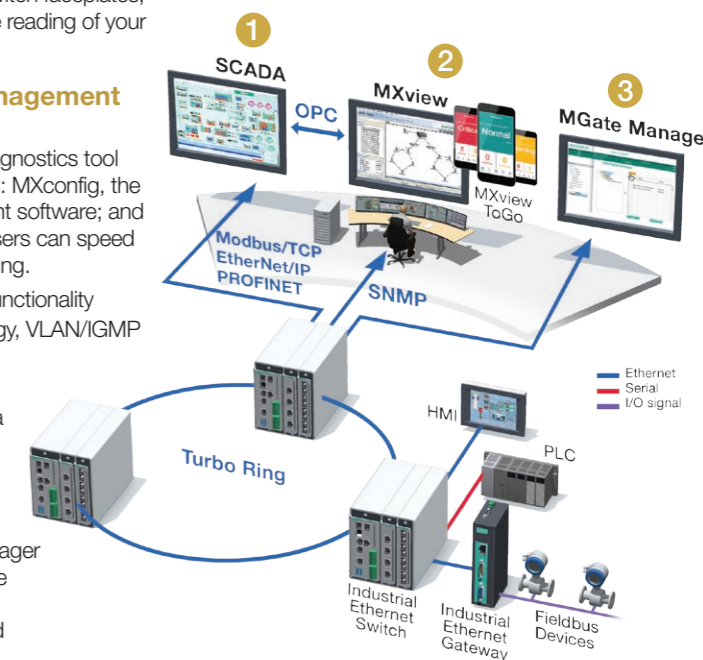
## More Tools for Easy System Configuration and Maintenance

Oncell Central Manager

Moxa's OnCell Central Manager lets our customers access our cellular devices from the open Internet, even if they are using private IP addresses, allowing users to securely configure, monitor, and maintain our cellular devices over the Internet from the central control station. central control station.

ThingsPro™ Server: A Device Management Tool

Moxa's ThingsPro Server is a software service for device management, which can be hosted on common cloud service providers, such as Amazon Web Services (AWS). The ThingsPro Server provides a map view to locate and manage ThingsPro Gateways. It allows performing remote firmware upgrades, configuration changes, or user application upgrades on demand or as per a schedule that you define.
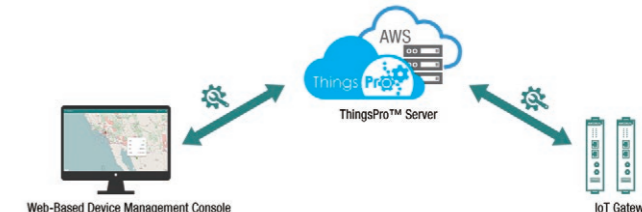
Upstream

Highly Reliable Remote Wellhead Monitoring Networks

Location: USA

Twenty wellhead applications link directly to a remote central server and control center, allowing for remote operations control, surveillance, and systems diagnostics from miles (or even continents) away. Field technicians and site managers are notified of critical wellhead events by SMS or email, and may access remote video feeds and sensor readings from the field using any web-enabled smartphone, laptop, or tablet. The legacy SCADA is fully integrated with the customer's industry-standard flow meters, sensors, and IP cameras over both wireless and serial links, allowing for detailed monitoring of site production. Detailed real-time overviews of injection, pipeline, or water and fracking fluid processes are all available. At the control center, a central cellular modem receives feeds from a network of UL Class 1, Division 2 IP cameras, automatically storing event-driven images and video feed to the network server.

Network Requirements
- Self-contained power with backup
- C1D2 certifications for hazardous oil and gas environments
- Persistent 24-7 connections
- Real-time delivery of exception notifications and key metric readouts
- Flexible, cloud-based data infrastructure for redundancy and accessibility
- Remote monitoring and data logging
- Low power consumption
- -40 to 70°C temperature tolerance with no fans
- Remote configuration
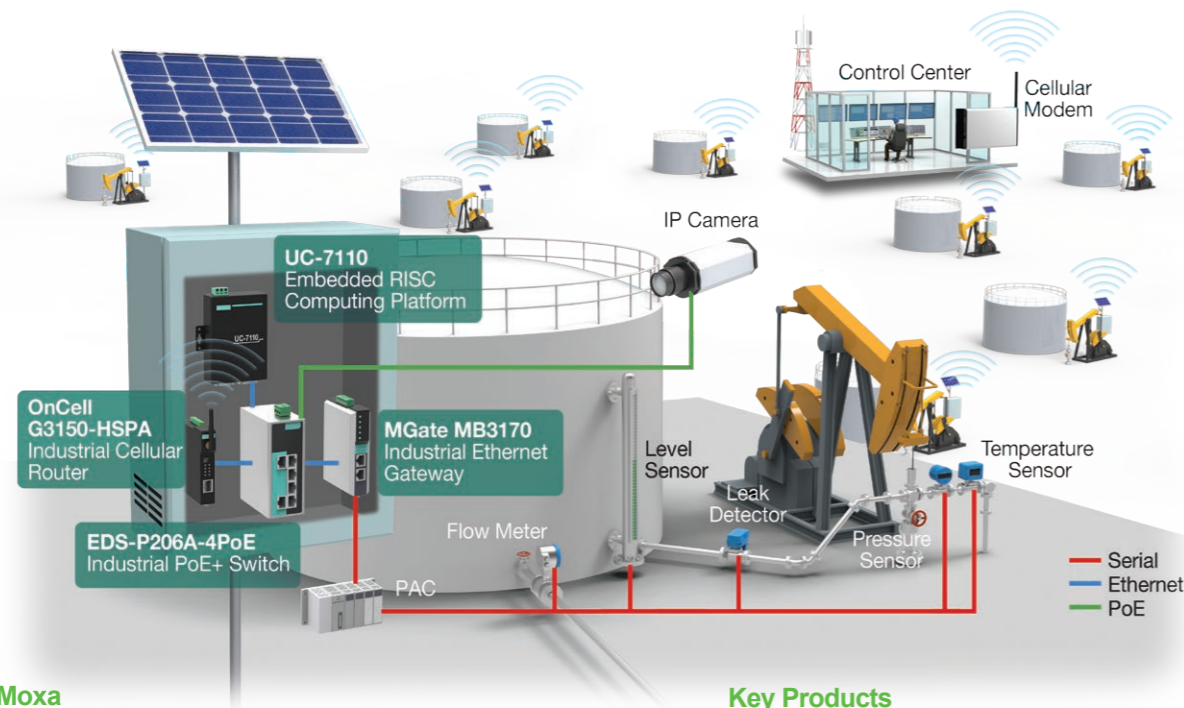
Why Moxa
- Moxa's vertically integrated oil and gas products provide a variety of end-to-end solutions that all feature strong certifications for harsh environments.
- Flow meters, sensors, and IP cameras are fully integrated into a legacy SCADA

Key Products

OnCell G3150-HSPA
Advanced five-band GSM/GPRS/ EDGE/UMTS/HSPA IP gateways

UC-7110
Mini RISC-based ready-to-run computer with two serial ports, dual LANs, SD

Upstream

# Secure Wireless Communications at Fracturing Sites

Location: USA

A fracturing service company has a fleet of trucks that they send to a site when someone pays them for it. Traditionally, they used wired cables, which were getting broken and cut regularly, and were very expensive to replace. So they started to look into wireless options.

In addition to wireless communications, the company needed a network that was highly secured without compromising on the bandwidth of data transmission to ensure that the critical devices on the trucks and vans can transmit and receive error-free data. Moreover, a panel computer with high processor capacity and wireless communication capability was required to acquire and store data from devices installed on the trucks and vans. All the devices were also required to be able to operate under extreme operating temperatures and to boot up at extremely low temperatures.

Network Requirements
- Must tolerate temperatures from -40 to 75°C, with C1D2, ATEX Zone 2 and UL approvals for hazardous environments
- A wireless architecture suitable for mobile locations spanning long distance
- Real-time data acquisition from the blending truck and pumping truck
- Real-time monitoring and control in the data van
- Highly stable network for reliable data communication
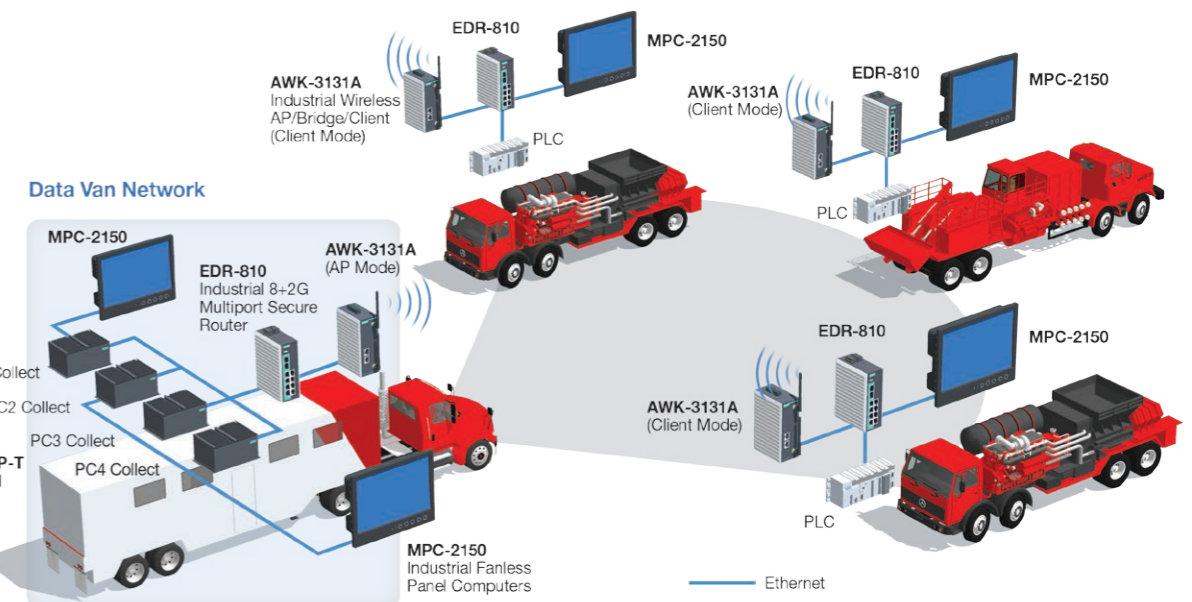
Why Moxa
- Reliable industrial wireless radios to replace traditional cable connection
- Full compliance with C1D2/ATEX Zone 2 certifications
- Wide temperature model support: -40°C to 75°C

Key Products

AWK-3131A
Industrial IEEE 802.11 a/b/g/n wireless AP/Bridge/Client

MPC-2150
15-inch industrial fanless panel computers

EDS-810
Industrial 8+2G Multiport Secure Router

Upstream

# Highly Reliable Remote Wellhead Monitoring Networks

Company: Aramco Location: Saudi Arabia

Saudi Aramco, the world's largest oil corporation, needed a reliable high bandwidth wellhead monitoring system for data, voice, and video communications. This project involved 500 distributed oil and gas wells situated in the Khurais region of Saudi Arabia. The company installed remote RTUs at the wellheads to link to the SCADA system that controls field instruments.

Each field site must link a video encoder to a CCTV camera, and an MGate MB3170I Modbus gateway that connects a multi-phase flow meter to a PLC. The SCADA system is located at the Gas-Oil Separation Process (GOSP) plant, so for video, voice, and data communications, each station is connected to a gigabit fiber backbone by an EDS-510A Gigabit Ethernet switch. Finally, in the SCADA center's communication room, Moxa's modular PT-7828 series managed Layer 3 Ethernet switches were installed to handle data transmissions across different LAN networks.

Network Requirements

- Network redundancy to guarantee highly available data communication
- Remote long-haul communications
- Physically hardened, durable devices capable of reliable operations in severe conditions
- Layer 3 switches that optimize routing control across multiple LAN segments
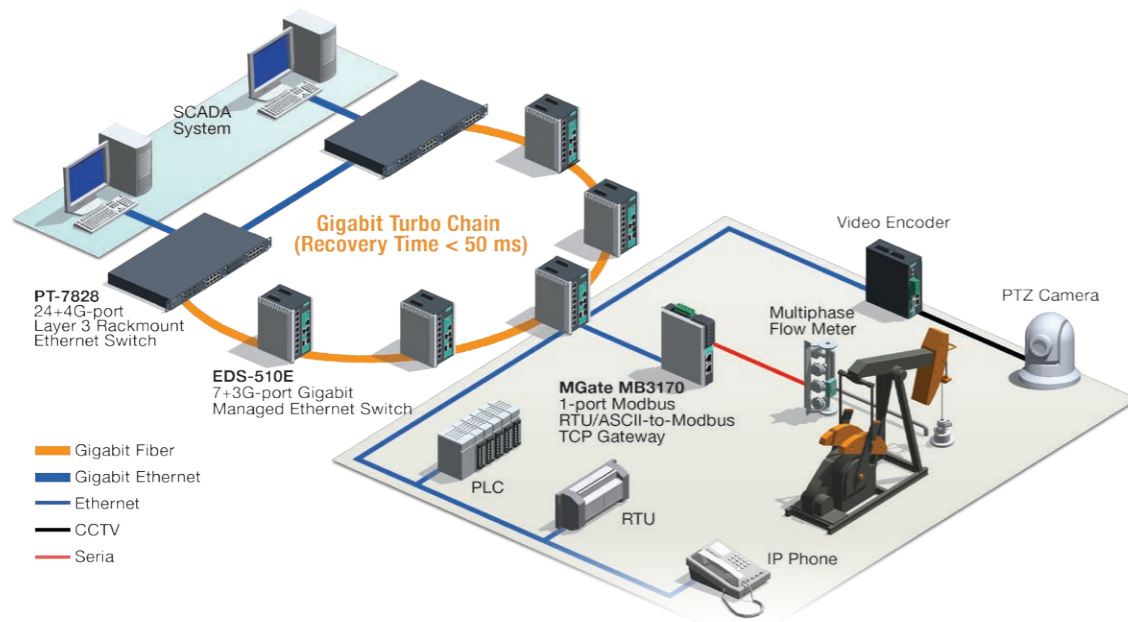
Why Moxa

- Full Turbo Chain redundancy, delivering network recoveries from link failures in less than 50 ms
- A gigabit-capacity fiber backbone to ensure highly reliable long-haul video, data, and voice communications
- Conforms to a wide range of international certifications for hazardous conditions
- Wide temperature tolerance, delivering stable operations from -40 to 75°C
- Layer 3 switching makes network administration more efficient and convenient

Key Products

EDS-510E Series
7+3G-port Gigabit managed Ethernet switches

MGate MB3170 Series
1-port advanced serial-to-Ethernet Modbus gateways

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Upstream

Mobile Networking for Oil Well Pump Trucks

Location: USA

Modern real-time wireless networking is being used to further automate the oil and gas industry, making it more efficient in both energy usage and operational optimization. In this case, an oil and gas well service company in the United States uses a fleet of pump trucks to pump massive volumes of cement and water-based fracturing fluids into wells to prevent groundwater contamination and reduce fracture stimulation expenses in its shale gas service work. The company uses Moxa's wireless and cellular solutions to build a reliable remote control and telemetry system that connects oil well pump trucks at the wellheads to a local, mobile control center housed in a van, which itself uses wireless technology to connect to the central control center.

Network Requirements

- A wireless solution for widely distributed remote sites
- Must tolerate temperatures from -40 to 75°C, with ATEX and UL approvals for hazardous environments
- A wireless architecture suitable for mobile locations spanning long distances
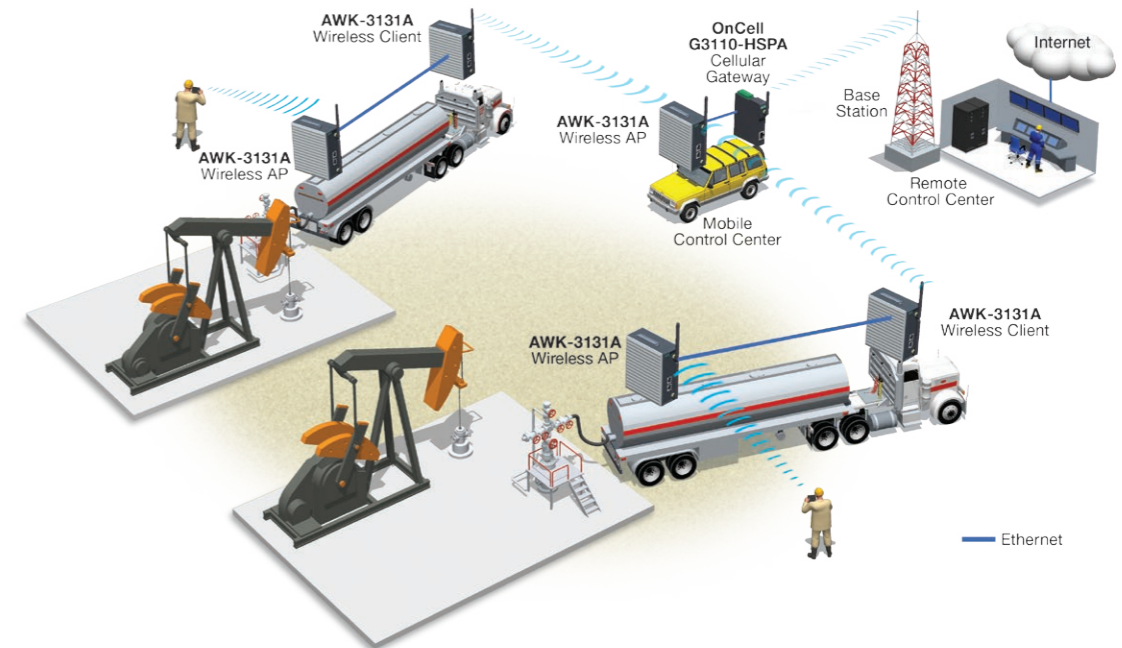
Why Moxa

- Proven mastery of industrial-grade 802.11 and cellular solutions, including IEEE 802.11a/b/g/n standards, and GSM/GPRS/EDGE/WCDMA/UMTS cellular technology
- Full compliance with C1D2/ATEX Zone 2 certifications
- Established reputation as an integrator of TCP/IP and cellular for industrial automation
- The OnCell G3110-HSPA supports OnCell Central Manager technology to unlock remote access to devices behind a private IP address, making it possible to manage and monitor the system over the web

Key Products

AWK-3131A Series
Industrial IEEE 802.11a/b/g/n wireless AP/Bridge/Client

OnCell G3110-HSPA
Industrial five-band HSPA IP gateways with VPN

Upstream

### Enabling Predictive Maintenance in Artificial Lift Monitoring Systems
Location: USA

A leading oil and gas service company is building telematics solutions for its customers to run smooth operations and conduct predictive maintenance for artificial lifts in oilfields. With the trend of oilfield digitization, telematics has been tremendously useful in understanding equipment status so as to avoid problems, also called predictive maintenance. The data generated by the equipment during the operations is the key to achieve this goal. As a result, this oil and gas service company needs a reliable and secure solution to ensure that the data needed is brought back to the control center for further analysis.

Moxa's UC-8100-ME-T communication-centric RISC computing platform allows oil companies to aggregate data from variable speed drives (VSDs) and PLCs for their pumping systems and to transfer the data back to the control center through LTE communication in the harshest environments. The UC-8100-ME-T series, serving as a reliable and secure IIoT gateway, is featured Trusted Platform Module (TPM), so each individual device is hardcoded by a cryptographic key to ensure the data is only accessible by authenticated parties. Moreover, the UC-8100-ME-T is also an open platform for customers to deploy second-time development, increasing the application flexibility.

Network Requirements
- Low power consumption because oil wellheads are often located in harsh environments where powering is sometimes difficult.
- Reliable 4G LTE connectivity in high operating temperatures for constant data aggregation
- Computers must feature Trusted Platform Module (TPM) to ensure data integrity
- Open platform for customers to do 2nd time development for their applications
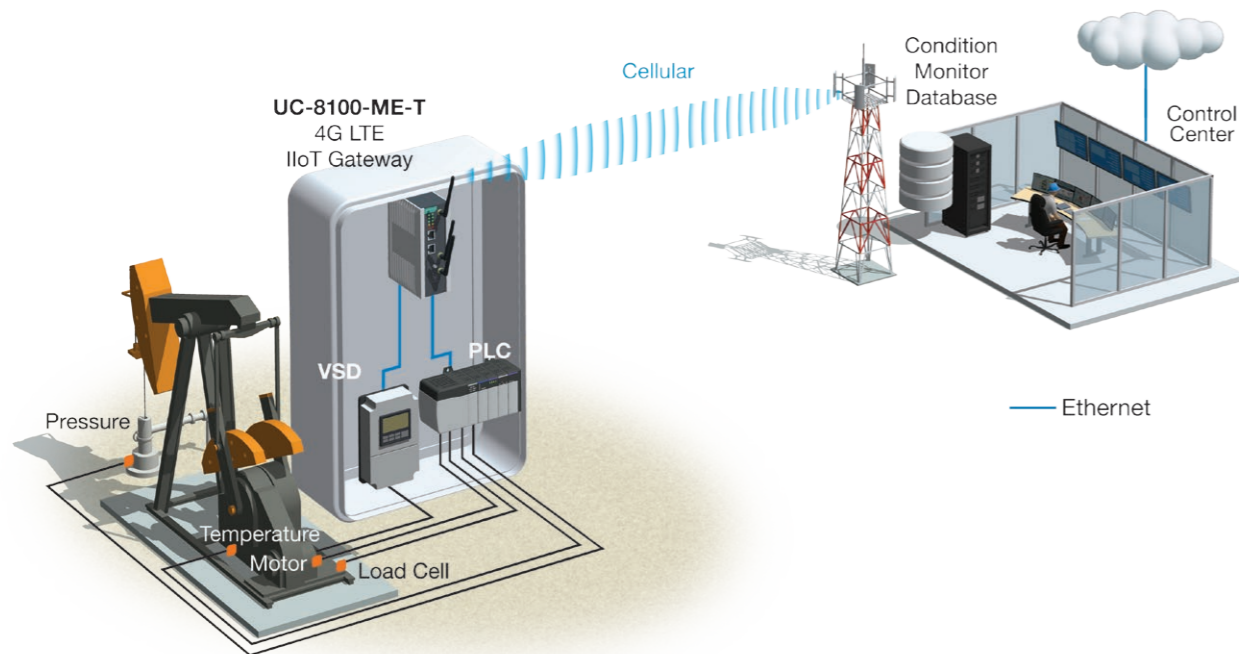
Why Moxa
- Compact RISC-based IIoT gateway in compliance with Class 1 Division 2 certification
- Deliver reliable 4G LTE connectivity in wide operating temperatures from -40 to 70°C
- Featuring Trusted Platform Module (TPM) and Linux Superior long term support on cybersecurity patches
- Open platform for rapidly developing customer applications for variable speed drives (VSDs) and PLC RMAC

Key Products

UC-8100-ME-T Series
Communication-centric RISC computing platform

Midstream

### Enhancing Network Efficiency and Security on an Oil Pipeline
Location: Russia

A leading pipeline company in Russia deployed a fiber-optic SDH backbone to transmit data streams to a central monitoring and control station across a 1600 kilometer expanse. Along the way, the network integrates a variety of pipeline subsystems that include ventilation, air conditioning, and fire control. In order to transmit in real time a very large amount of data aggregated from numerous systems, the backbone must provide wide, sustainable bandwidth. For these reasons, optical fiber was chosen as the transmission medium, but the long distances covered by this cross-country pipeline presented a challenge to implementing the desired solution.

Strong redundancy to guarantee continuous high availability was achieved with a Gigabit ring topology, built from more than a thousand Moxa EDS-510E industrial Ethernet switches. The EDS-510E provides up to three Gigabit Ethernet ports, making it ideal for building a backbone with gigabit bandwidth. Furthermore, at each node along the pipeline a Moxa ioLogik 2512 Smart Ethernet I/O is installed to allow for communications between the sensors and the Ethernet network, so that actions can be taken automatically during unexpected events.

Network Requirements
- Long-distance transmission of data across famously grim Russian terrain
- Redundant gigabit-capacity ring topology for strong network resilience and high availability
- Rugged, reliable devices durable enough for use in harsh industrial environments
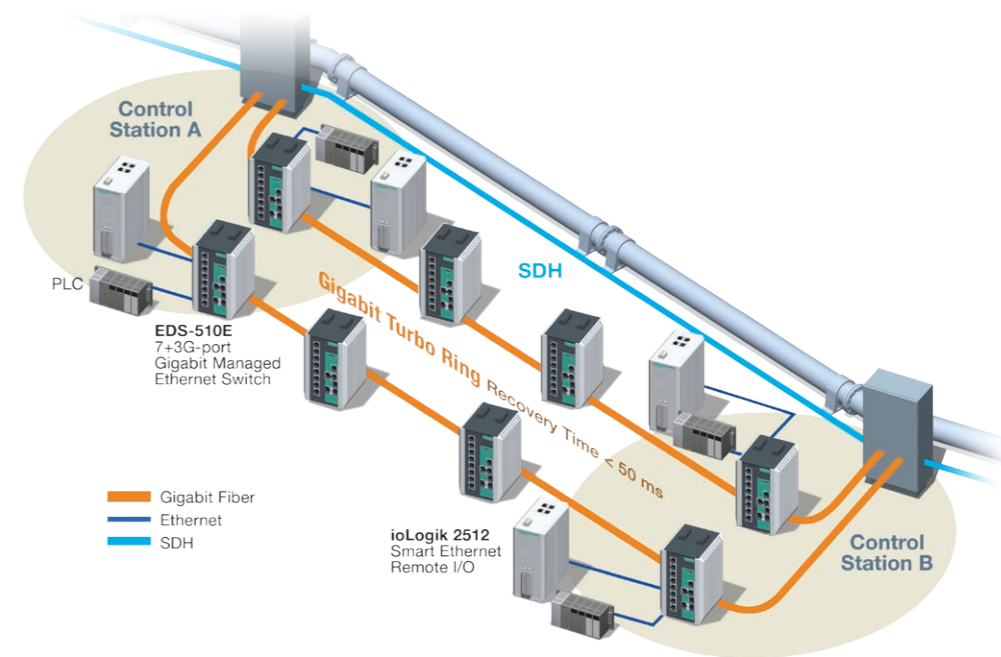
Why Moxa
- Fiber-optic communications capable of spanning 80 km segments
- Optical fiber networks in a ring topology deliver proven improvements in reliability, scalability, and network uptime
- Extreme -40 to 75°C temperature tolerance
- Ethernet micro controllers actively deliver event-driven reporting for real-time alarm management

Key Products

EDS-510E
7+3G-port Gigabit managed Ethernet switches

ioLogik 2512
Smart Ethernet remote I/O with Click&Go Plus, 8 DIs, 8 DIOs

Midstream

Securing Gas Transfer Stations Against Cyber Attacks
Location: USA

High-capacity natural gas pipelines are highly volatile and span thousands of kilometers, necessitating the installation of secure monitoring and control systems that are strongly protected from cyber attacks that may be either opportunistic phishing attempts or targeted attempts to crack the system. In this project, gas transfer stations along a pipeline use Moxa's EDS-508A managed switches to connect gas analyzers and PLCs to a remote SCADA system. To ensure local security and data authenticity, Moxa's EDR-G903—a gigabit-capacity industrial VPN router—was used to build highly secure VPN tunnels between the transfer stations and the central SCADA system. A router with both a network address translating (NAT) firewall and a VPN client, the EDR-G903 not only shields devices on the internal LAN from unauthorized access, but also maintains strongly secure communications with remote stations that link up across public networks.

Network Requirements
- Secure, reliable data transmissions with strong authentication, encryption, and integrity protections
- Strong firewall protections and access controls on the internal network to protect critical devices, such as PLCs
- A rugged, industrial design capable of functioning reliably in harsh environmental conditions
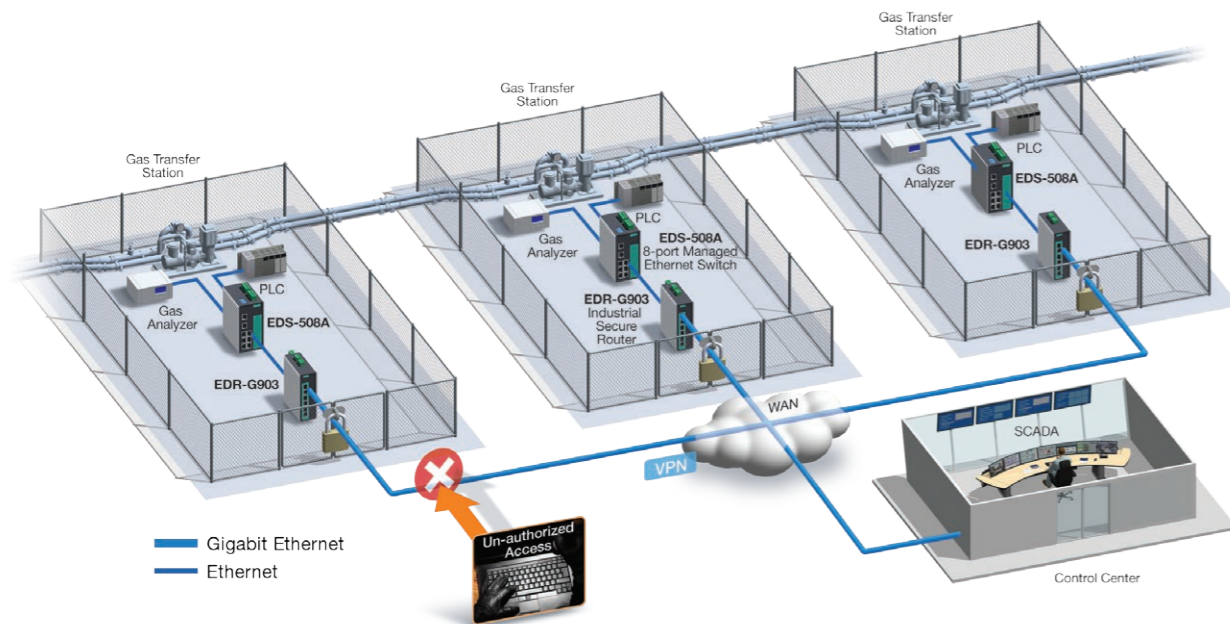
Why Moxa
- Ample gigabit bandwidth with copper/ fiber combo ports
- Strong VPN client with redundant WAN ports for increased reliability
- A router with native NAT-capable firewall and VPN client
- Simple and intuitive configuration interface
- Suitable for operations in temperatures from -40 to 75°C

Key Products

EDR-G903 Series
Industrial VPN secure routers,
2 WAN/1 DMZ, Firewall/NAT,
100 VPN Tunnels

EDS-508A Series
8-port managed Ethernet switches

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Downstream

Delivering IDAS and CCTV to a Refinery Security System
Location: Saudi Arabia

An Aramco refinery in Yanbu, Arabia, wanted an Intruder Detection Alarm System (IDAS) and IP CCTV security system that covered both their field and administrative sites. To meet the demands of video, voice, and data transmission over a wide area network, high-bandwidth gigabit capacity optical fiber was used in a redundant ring topology for the backbone, while at field sites the industrial video encoders linked analog cameras to the Ethernet ring, and ioLogik 2542 Smart Ethernet I/O were used to automate intrusion sensors. In this way, the SCADA system and video management system (VMS) were reliably integrated with I/O events and distributed data collectors into a reliable, real-time security and alarm system. With Moxa's expertise in the design of rugged industrial products, and key enhancements such as active, intelligent alarms, CGI command communications, and automated deployment utilities, Moxa's products provided a one-stop-shop solution.

Network Requirements
- Operate reliably in outdoor cabinets with no cooling system that, because of the desert environment, sometimes rise to temperatures of 75°C
- Use open interface architectures compatible with any third party VMS or SCADA/DCS system
- Products must have a long MTBF and rugged design to reduce overall costs and maintenance administration
- I/O devices that feature a versatile combination of I/O channels, an alarm system that can actively send reports, and can process CGI commands
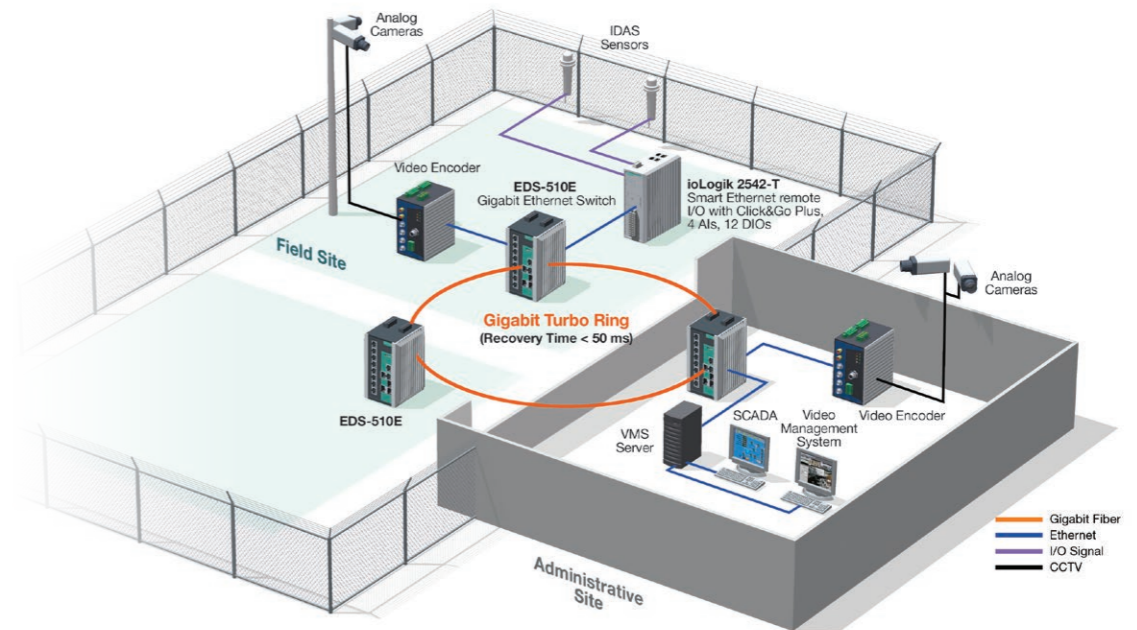
Why Moxa
- A fanless design that tolerates operating temperatures from -40 to 75°C
- Smart Ethernet I/O with innovative Click&Go™ control logic that push active warning messages to the VMS
- Smart Ethernet I/O that support CGI commands, extending control logic for key instruments like IP cameras, thus allowing for easily customized event handling
- Redundant gigabit capacity optical fibers ensure high capacity, always-available networks that are never overloaded

Key Products

ioLogik 2542-T
Smart Ethernet remote I/O with
Click&Go Plus, 4 AIs, 12 DIOs

EDS-510E
7+3G-port Gigabit managed
Ethernet switches

Your Trusted Partner in Automation

Moxa is a leading provider of edge connectivity, industrial computing, and network infrastructure solutions for enabling connectivity for the Industrial Internet of Things. With over 30 years of industry experience, Moxa has connected more than 50 million devices worldwide and has a distribution and service network that reaches customers in more than 70 countries. Moxa delivers lasting business value by empowering industry with reliable networks and sincere service for industrial communications infrastructures.

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