

# Optimizing Network Performance for Oil Refinery DCS Integration



## Product Highlights



### EDS-4012 Series Managed Ethernet Switches

- PROFINET CC-B compliant for comprehensive network diagnostics and management via PROFINET interfaces
- -40 to 75°C wide-temperature models for harsh operating environments
- Modular, rotatable design for easier installation and maintenance

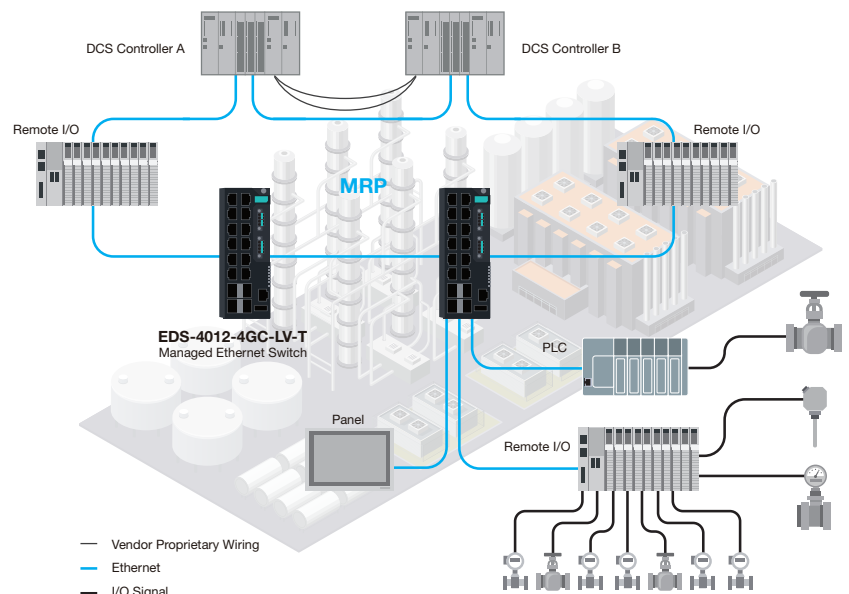
Oil refineries are complex industrial facilities that play a crucial role in converting crude oil into valuable petroleum products such as gasoline, diesel fuel, and a variety of chemical products. The different refining processes such as distillation, cracking, and blending often involve high temperatures, pressures, and hazardous materials. A sudden shutdown can result in significant safety concerns, environmental issues, and financial losses. Therefore, these processes are often technologically advanced and focused on safety to ensure production efficiency. A distributed control system (DCS) is crucial for engineers to continuously monitor and control industrial processes, ensuring high system availability. This helps prevent costly downtime, enhance plant safety, and optimize productivity.

## System Requirements

- Reliable connectivity to keep all processes running safely and efficiently
- Real-time monitoring and control for precise process management to maximize plant efficiency and productivity
- Failover mechanisms to guarantee high availability and prevent interruptions to critical systems

## Why Moxa

Our industrial-grade EDS-4000 Series managed switches are designed specifically for demanding applications such as DCS. These PROFINET CC-B compliant Ethernet switches ensure seamless interoperability with other PROFINET devices within the refinery system, including controllers and I/O devices. They also enable precise, low-latency data exchange for seamless coordination between DCS, remote I/Os, and field devices, allowing for efficient and synchronized process control. Moreover, the EDS-4000 Series supports Media Redundancy Protocol (MRP) to provide fault-tolerant network redundancy. This mechanism provides seamless failovers in case of link failures to prevent costly downtime in continuous process operations. Considering the hazardous operating environment, our EDS-4000 Series complies with UL Class I Division 2 and ATEX certifications, making them capable of safe and reliable operation in the harsh refinery conditions.



# Achieving Seamless Real-time Performance for Semiconductor Equipment



## Product Highlights



### EJS-08 Series

#### Industrial EtherCAT Junctions

- 8 100BaseT(X) full-duplex RJ45 ports for multiple slave connections
- Supports topology conversion for more flexible EtherCAT networks
- Compact size for easy installation



### MGate 5216 Series

#### Industrial Serial-to-EtherCAT gateways

- 2-port proprietary serial or modbus to EtherCAT protocol conversion
- Serial port with 2 kV isolation protection
- Supports EtherCAT Slave mode



### EDS-4012 Series

#### Managed Ethernet Switches

- Compact and flexible housing design to fit into confined spaces
- 12-port Ethernet switches with 4 1GbE port options
- IEC 62443-4-2 Security Level 2 certified

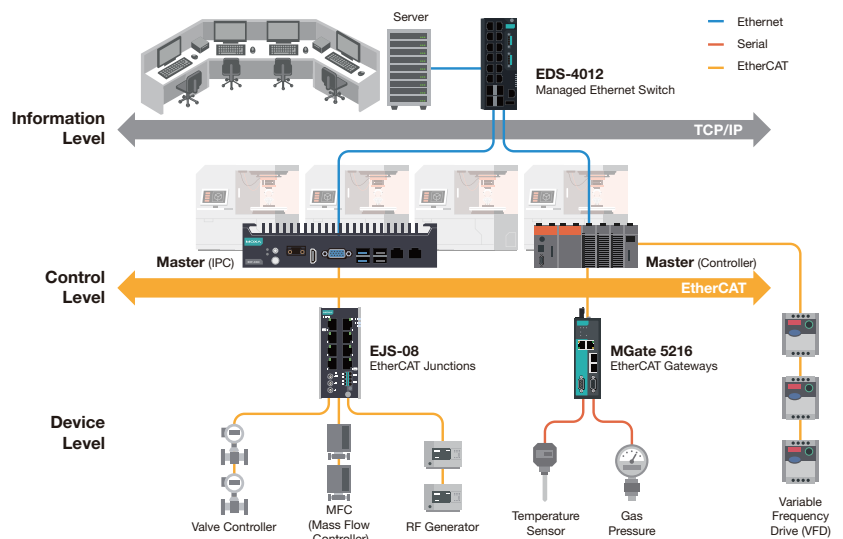
Semiconductor manufacturing demands high-speed, real-time communication and precise synchronization. EtherCAT protocol is becoming the mainstream technology for semiconductor equipment. It offers enhanced real-time performance, improved synchronization, flexible network topologies, and optimal bandwidth usage. Plasma enhanced chemical vapour deposition (PECVD) equipment is a crucial component in wafer fabrication. It is often very challenging to expand these space-constrained and interference-prone systems with new devices. On top of that, the equipment needs to connect multiple sensors, pressure gauges, and power controls. Compact EtherCAT devices that are resistant to interference and feature a high port density play a key role.

## System Requirements

- Compact devices for easy installation onboard semiconductor equipment
- High reliability to minimize process downtime and ensure continuous operations
- Easy integration to ensure smooth deployment and compatibility with existing systems

## Why Moxa

We provide customers with a range of EtherCAT products—including EtherCAT junctions and Serial-to-EtherCAT gateways—to empower real-time wafer fabrication applications with deterministic EtherCAT technology. The compact size of EJS-08 Series EtherCAT junctions makes them ideal for installation in tight spaces. Their industrial-grade design with high EMC and dual power inputs can withstand high levels of noise and prevent power instability in harsh environments. Together with the MGate 5216 Series gateways designed for legacy serial device integration, these devices help build flexible topologies and convert serial-based networks to EtherCAT, ensuring compatibility with existing systems. Our network solutions also ensure reliability by collecting and sending data from edge devices to the control center for real time control and monitoring.



# Deploying Reliable and Monitorable Networks in Automotive Plant



## Product Highlights



### SDS-G3016 Series Industrial Gigabit Smart Switches

- 16 full Gigabit Ethernet ports for high bandwidth
- Easy switch protocol profile configuration via web UI or DIP switch
- PROFINET CC-B compliant to provide better visibility via monitoring and management tools



### EDS-G2005-EL Series Industrial Gigabit Unmanaged Switches

- Ultra-compact size for space-constrained environments
- QoS configuration via DIP switch to process critical data in heavy traffic
- 5 1GbE high-bandwidth ports for fast connections

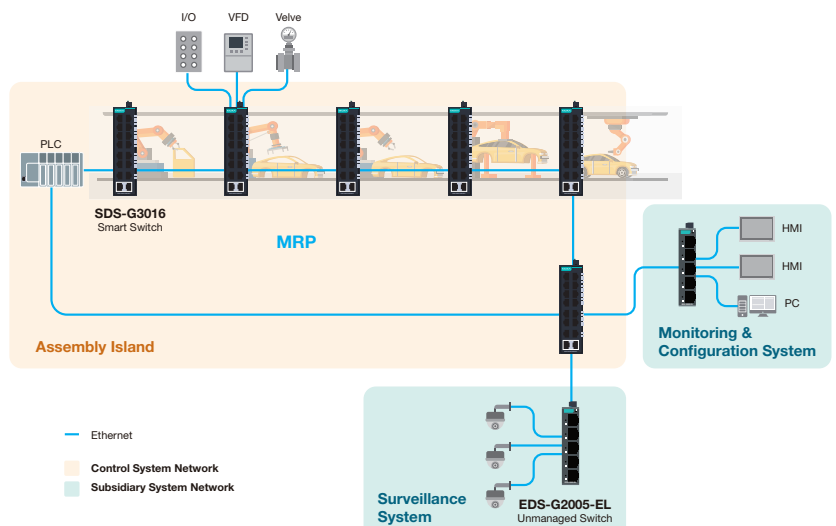
Automotive manufacturing relies on a variety of control and subsidiary systems to achieve high efficiency and uptime for maintaining high production output. Continuous real-time communication plays a key role, as any unplanned downtime will interrupt assembly lines, delay production, and reduce overall output. The control system has strict requirements for synchronized and timely communication to ensure non-stop operations. PROFINET is one of the most-used protocols to integrate and manage these systems in real-time. Besides PROFINET support, ruggedized devices are must for providing stable connectivity in the harsh conditions of automotive plants, where extreme temperatures, vibrations, and EMI are common.

## System Requirements

- Switches that support PROFINET and can be monitored through existing SCADA and HMI systems
- Robust network reliability to ensure uninterrupted real-time communication
- Devices that easily fit into small, crowded control cabinets

## Why Moxa

Our network solutions feature a ruggedized design with wide-temperature tolerance and high EMC resistance to ensure reliable operations in the harsh conditions of automotive plants. Our SDS-G3016 smart switches are PROFINET CC-B compliant and feature easy PROFINET profile configuration via the rotary DIP switch or web interface. This allows engineers to check the network status through existing SCADA or HMI systems to respond to events quickly and minimize potential downtime. The SDS-G3016 Series also supports MRP network redundancy to make sure critical control networks operate non-stop. For the subsidiary system network, our PROFINET CC-A compliant EDS-G2005-EL Series unmanaged switches with QoS support prioritize PROFINET packets to maximize operational performance. The ultra-compact design and full Gigabit bandwidth of both the SDS-G3016 and EDS-G2005-EL Series allow for easier installation in tight spaces and enable seamless transmission of high-volume production data.





# Achieving Real-time Remote Control for Oil Rig Drilling

## Product Highlights



### EDS-G4014 Series Managed Ethernet Switches

- IEC 62443-4-2 Security Level 2 certified
- Supports the EtherNet/IP, Modbus TCP, and PROFINET IO Device industrial protocols
- Compact and flexible housing design to fit into confined spaces



### EDR-G9010 Series Secure Router

- IEC 62443-4-2 Security Level 2 certified
- 10-port Gigabit all-in-one firewall/NAT/VPN/router/switch
- Examine industrial protocol data with Deep Packet Inspection (DPI) technology



### MGate 5135 Series Gateway

- Protocol conversion between Modbus and EtherNet/IP
- Embedded traffic monitoring and diagnostics tools for easy troubleshooting
- Supports EtherNet/IP adapter



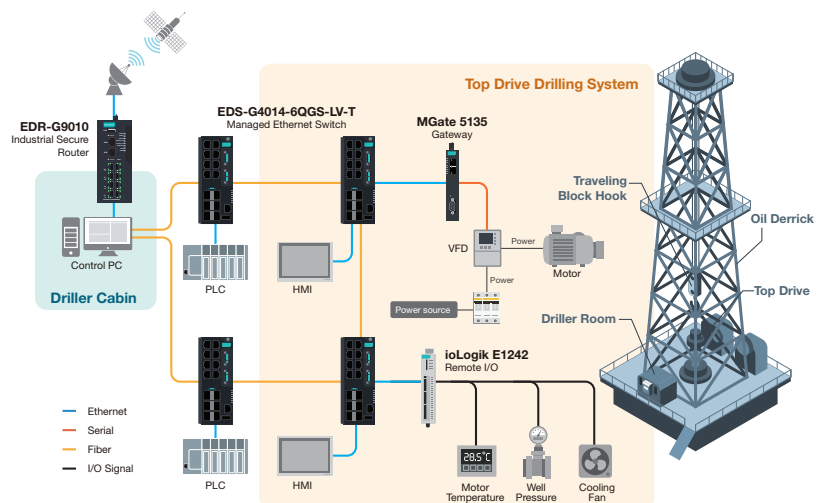
Drilling operations demand continuous monitoring of various parameters, including bit weight, rate of soil penetration, and drilling fluid properties. This data needs to be transmitted to the control room in real-time for analysis and decision-making. Given the potential for operational disruptions, network redundancy is critical. Fiber optic cables are the preferred medium due to their superior noise and electromagnetic interference resistance, and long wiring distance. With increasing automation and digitalization, protecting sensitive operational data from unauthorized access is also a key concern. In addition, the drilling control network needs to integrate with other systems on the rig, such as the mud logging system, safety systems, and wellbore management systems. This requires interoperability with the existing infrastructure running on industrial protocols such as EtherNet/IP.

## System Requirements

- High bandwidth and low latency to enable real-time data exchange for instant analysis and decision-making
- Robust network resilience for demanding drill site applications
- Data protection to prevent cyberattacks and maintain system integrity

## Why Moxa

Our networking solutions are designed to withstand extreme temperature ranges, rain, dust, and other harsh environmental conditions typical in oil drilling fields. Our EDS-G4014 Series managed switches and MGate 5105-MB-EIP Series gateways are CID2, ATEX, and IECEx certified, guaranteeing safe operation in explosive atmospheres. On the data level, the MGate 5135 Series collects and converts Modbus data from field devices to EtherNet/IP format seamlessly. Our EDS-G4014 Series natively supports EtherNet/IP, ensuring smooth integration with existing systems. To achieve real-time remote monitoring and control from the driller's cabin, the IEC 62443-4-2 Security Level 2 certified EDS-G4014 Series securely connects the field site networks and the cabin. Additionally, the EDR-G9010 Series secure routers help create a security perimeter to protect any critical assets.



# Empowering Substation Resilience With Strengthened Network Reliability



## Product Highlights



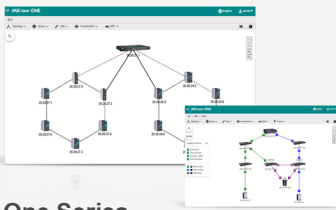
### MDS-G4000 Family Modular Managed Ethernet Switches

- Serves as a station-level core switch for PRP networks or as a RedBox node for integrating HSR rings into PRP backbones<sup>1</sup>
- Up to 28 ports, including 10GbE options
- IEC 61850-3 and IEEE 1613 certified for substation environments



### EDS-G4008 Series Managed Ethernet Switches

- Supports RSTP, Turbo Ring, Turbo Chain, and MRP for network redundancy
- IEC 62443-4-2 Security Level 2 certified
- IEC 61850-3 and IEEE 1613 certified for substation environments



### MXview One Series Network Management Software

- Real-time topology visualization, alerts, and status monitoring
- MXview Power add-on for PRP/HSR link path analysis and diagnostics
- Easily back up and restore device configurations and perform firmware updates

<sup>1</sup>PRP/HSR modules available in Q3, 2025.

<sup>2</sup>MNC (Multiple Network Coupling) functionality available for the MDS-G4000 Family in Q3, 2025.

The electric power industry is undergoing a major transformation driven by decarbonization, decentralization, and digitalization. As part of this evolution, utilities companies worldwide are upgrading their aging substations. Many of these—built decades ago with analog or serial communication systems—are being transformed into digital substations that use Ethernet-based IEC 61850 communication for real-time control, security, and monitoring. To ensure a smooth transition, substation networks require robust network redundancy and reliability to achieve seamless IEC 61850 communication.

## System Requirements

- Instant recovery times for critical protection and control traffic
- Seamless interoperability between multivendor IEDs
- Compliance with IEC 61850-3 and IEEE 1613 standards

## Why Moxa

The utilities company leveraged Moxa's IEC 61850-3 certified switches to deploy a fully redundant communication backbone, integrating both HSR (High-availability Seamless Redundancy) and PRP (Parallel Redundancy Protocol) topologies to achieve instant recovery times. These measures helped ensure uninterrupted data transmissions in the event of a cable or switch failure. In addition, our MDS-G4000 Family modular switches support proprietary MNC<sup>2</sup> (Multiple Network Coupling) technology for seamless interoperability by allowing administrators to integrate HSR and RSTP networks with IEDs that only support RSTP.

To enhance network security, our switches support advanced security features like IEEE 802.1X, SNMPv3, and ACL, aligning with evolving NERC CIP and local cybersecurity regulations. For daily operations, MXview One provides substation operators with intuitive management software to easily monitor and manage Moxa switches. With the MXview Power add-on for MXview One, engineers can quickly analyze PRP/HSR link paths and perform package diagnostics, saving time on troubleshooting and daily maintenance.

