Modularity for Future Scalability

One modular platform for diverse applications

Field Monitoring
for Oil and Gas Pipelines

Moxa Solution

The MDS-G4020 Series offers a fully modular platform that can be outfitted with fiber interfaces to connect pipeline subsystems to a remote control center over long distances, while providing wire-speed Gigabit bandwidth to aggregate and process video, voice, and data transmissions from the field equipment smoothly.

Featuring a fanless, rugged design that is ATEX Zone 2 and C1D2-certified, the MDS-G4020 Series can withstand the extreme environmental conditions common in oil and gas applications. To consistently monitor remote pipelines, the solution provides 50 ms Gigabit network recovery times to ensure network resilience and reliability. In addition, the compact form factor enables installation in DIN-rail cabinets while the high-capacity PoE budget can be leveraged to deploy and power nearby substation field equipment including IP surveillance cameras and valve controls.

In the control center, the MXview network management software provides real-time network status information and makes it easy for engineers to monitor the network and provide timely information for field-site engineers, simplifying maintenance and maximizing uptime.
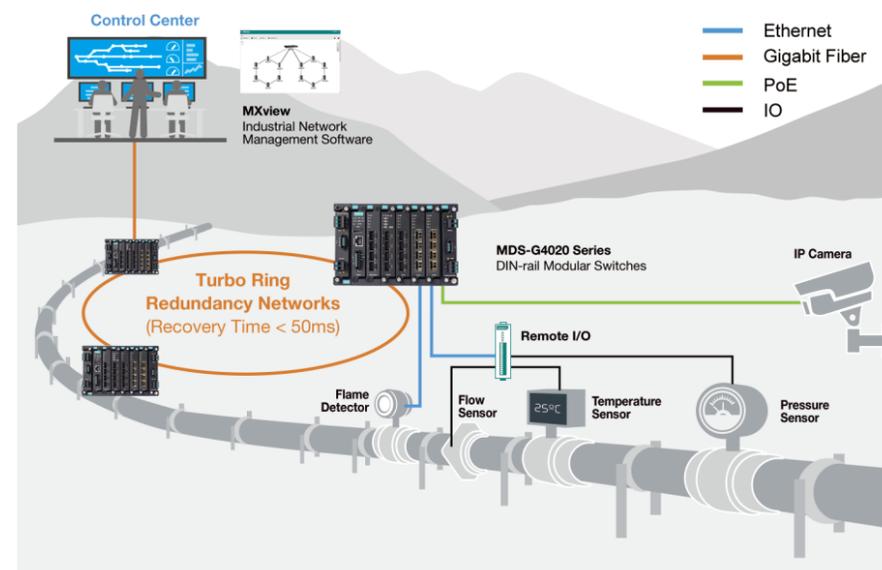
Background

In order for oil and gas companies to develop a fully digitalized oilfield, it is key to build a reliable network backhaul for monitoring the various integrated pipeline subsystems including IP surveillance, ventilation, and fire control.

As the pipeline extends many kilometers away from the control center, companies are looking for a reliable and sustainable solution that can aggregate all data from the field sites and establish a high-bandwidth communications backhaul connection to the remote compressor stations and network operation center.
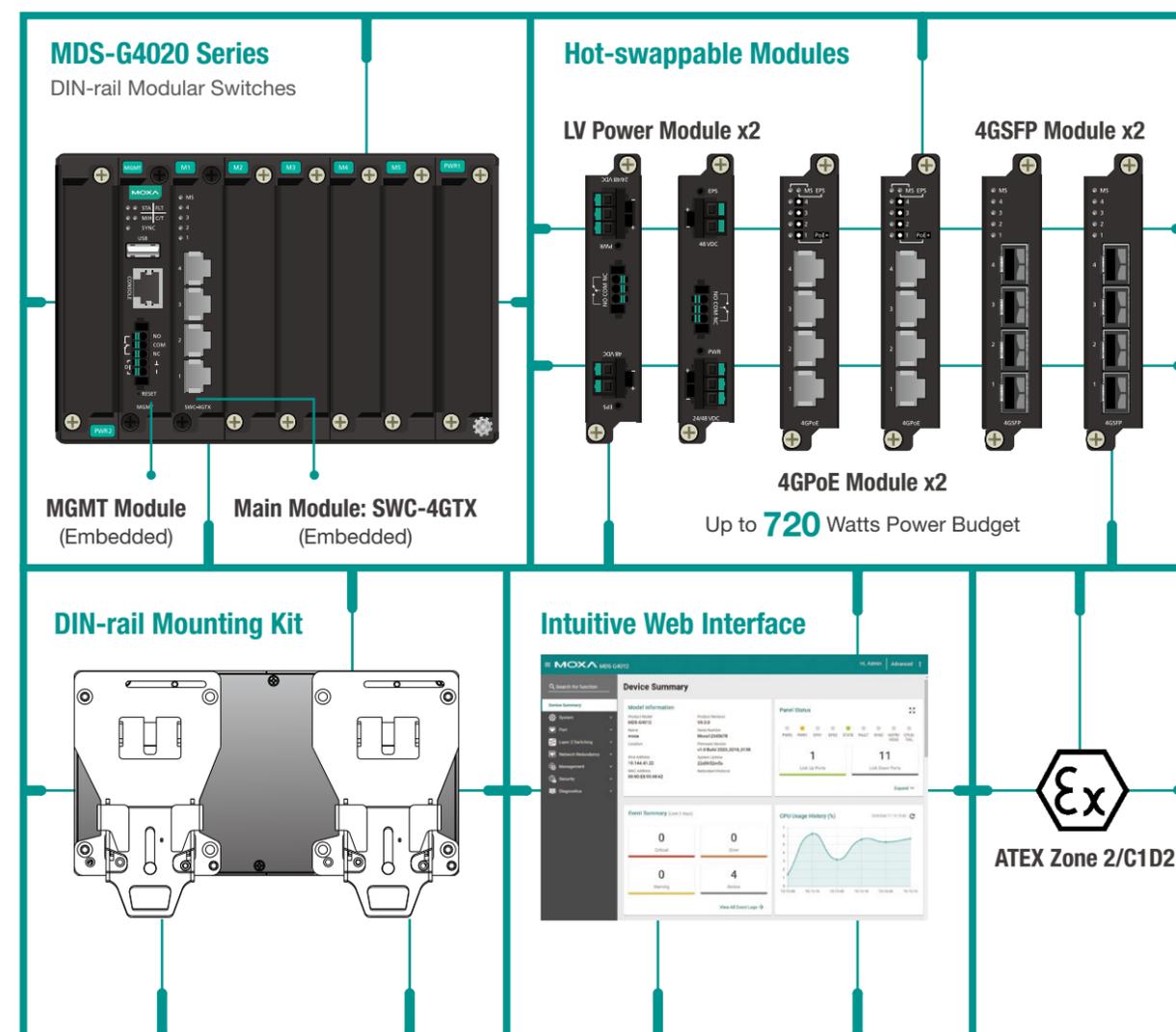
System Architecture

Control Center

MXview
Industrial Network
Management Software

Turbo Ring
Redundancy Networks
(Recovery Time < 50ms)

MDS-G4020 Series
DIN-rail Modular Switches

IP Camera

Remote I/O

Flame Detector
Flow Sensor
Temperature Sensor
Pressure Sensor

— Ethernet
— Gigabit Fiber
— PoE
— IO

System Requirements

- A Gigabit, long-distance network backhaul to connect the subsystems in the field

- Reliable Ethernet switches with multiple interfaces to aggregate real-time video, voice, and data from the remote subsystems

- Resilient industrial-grade devices that can operate in harsh environmental conditions

- Compliance with ATEX Zone 2 and Class I Division 2 industrial certifications

- DIN-rail design to fit inside cabinets

True Network Versatility With Just One Modular Platform

MDS-G4020 Series
DIN-rail Modular Switches

MGMT Module
(Embedded)

Main Module: SWC-4GTX
(Embedded)

Hot-swappable Modules

LV Power Module x2

4GSFP Module x2

4GPoE Module x2

Up to **720** Watts Power Budget

DIN-rail Mounting Kit
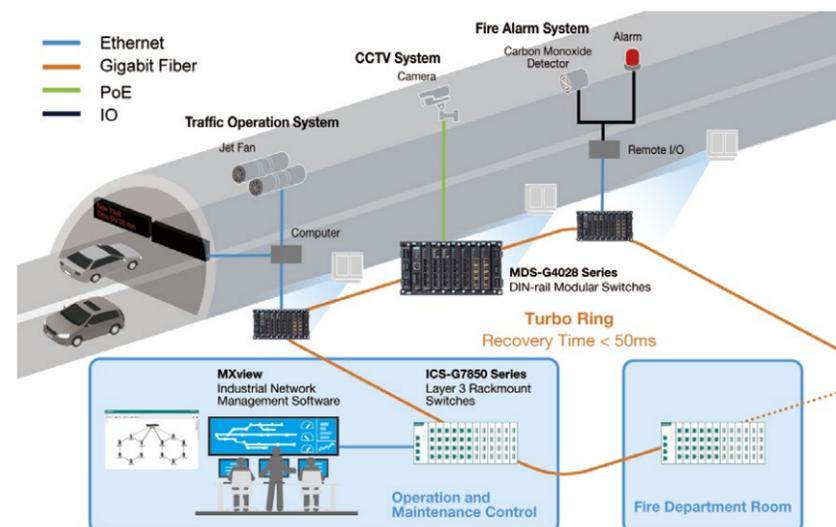
Intuitive Web Interface

ATEX Zone 2/C1D2

HD IP Surveillance for Tunnel Traffic Management

Background

Local authorities commonly deploy roadside surveillance systems to monitor traffic in tunnels from a remote traffic management center (TMC). The TMC not only manages vehicle traffic, but also controls multiple infrastructure systems. Nowadays, remote HD IP cameras are being deployed in large numbers to effectively monitor vehicle traffic and speed.

However, existing infrastructure is usually not equipped to provide the extra power output needed to sustain a large volume of surveillance devices. Being deployed in the field, the network equipment connecting these surveillance devices to the TMC are exposed to a wide variety of environmental conditions ranging from rain and snow to high temperatures and humidity. Therefore, having rugged networking devices with multiple interfaces and Power over Ethernet capabilities is key to facilitating the strenuous network and power demands. It is also vital that network operators have full visibility of the network status and are able to remotely manage the network via centralized software to avoid unnecessarily dispatching field engineers to perform high-risk maintenance tasks on highways and in tunnels.

System Requirements

- Combinations of SFP fiber and copper interfaces for network aggregation
- High-capacity PoE power source to power PoE field surveillance devices
- The ability to monitor and maintain the network easily
- Network devices that can operate reliably in outdoor environments
- DIN-rail design to fit inside cabinets
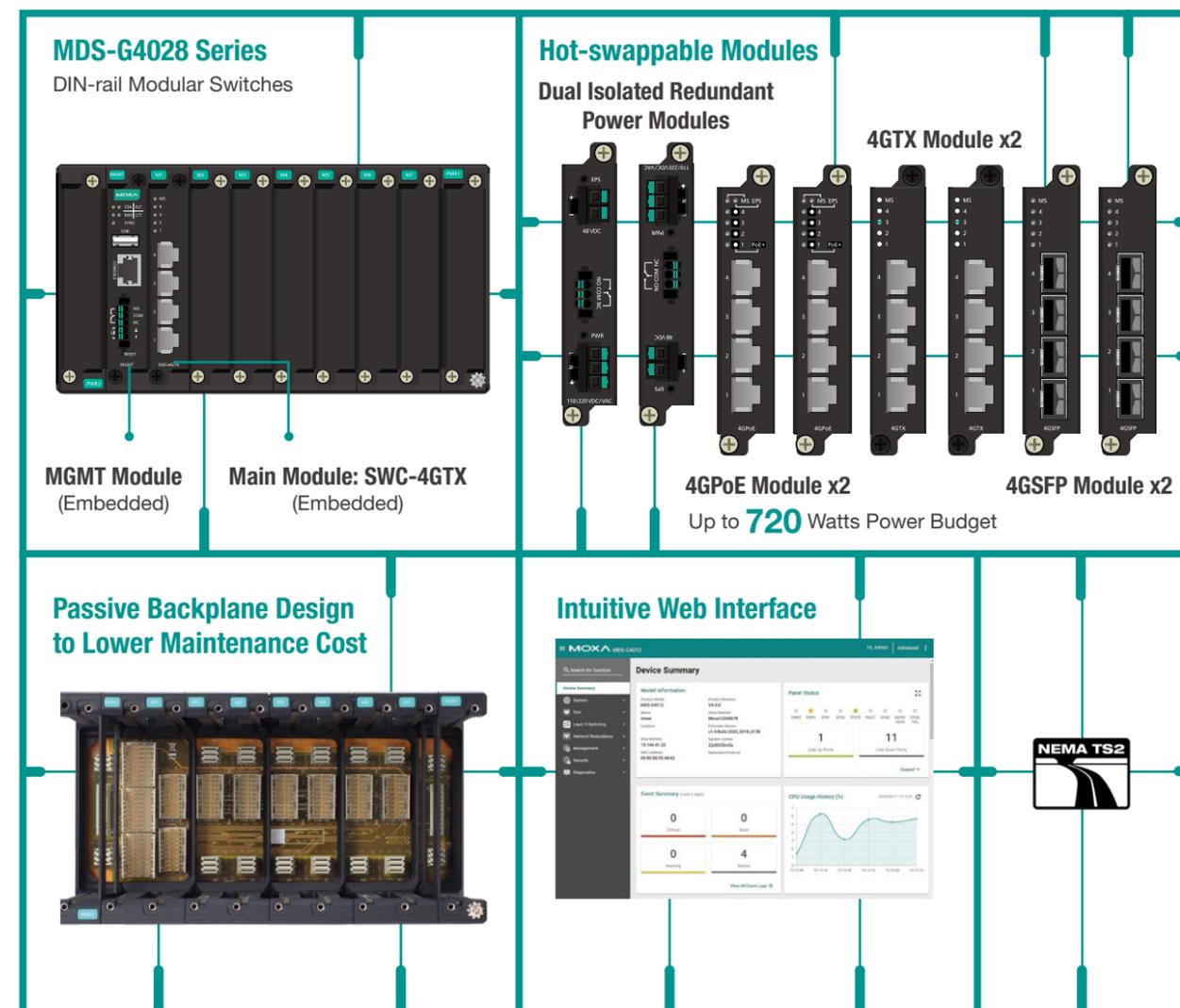
System Architecture

Moxa Solution

Traffic management centers (TMC) rely on real-time camera feeds to monitor multiple areas simultaneously. Traffic safety is not just managing vehicle traffic, but also covers systems such as traffic operation systems, CCTV detection systems, and fire alarm systems. The modular, high port density design enables the MDS-G4028 to be equipped with multiple types of media modules to accommodate the various connection requirements with just a single switch, reducing long-term TCO.

To fulfill the high power demands of HD IP cameras, PoE (Power over Ethernet) switches are used to easily deploy the network of surveillance devices in places with no direct power source, such as on street light poles and gantries. The MDS-G4028 Series offers a high-capacity Gigabit solution with up to 24 PoE+ ports and a total power budget of up to 720 watts, capable of powering field surveillance equipment and seamlessly streaming large volumes of video transmissions. Back in the TMC, engineers can remotely track the status of the surveillance network in real-time using the intuitive built-in web interface and MXview management software.

Since safety is a top priority, Moxa's solution offers Turbo Ring millisecond-level failover redundancy in combination with dual redundant power modules which ensure robust connections for uninterrupted traffic surveillance monitoring. The compact, resilient housing makes sure that the MDS-G4028 can be installed in roadside cabinets and can operate reliably in unpredictable weather conditions, including extreme temperatures, rain, and snow.

True Network Versatility With Just One Modular Platform

MDS-G4028 Series
DIN-rail Modular Switches

Hot-swappable Modules
Dual Isolated Redundant Power Modules

4GTX Module x2

MGMT Module (Embedded)   Main Module: SWC-4GTX (Embedded)

4GPoE Module x2   4GSFP Module x2

Up to **720** Watts Power Budget

Passive Backplane Design to Lower Maintenance Cost

Intuitive Web Interface

NEMA TS2

Centralized Underground Security Monitoring System

Moxa Solution

The mining security monitoring system includes both surface and underground communication systems. It is generally more difficult to replace devices that are deployed underground. The MDS-G4028 Series switches feature an expandable design that can be outfitted with a combination of different interface modules for up to 24 ports, providing network operators the flexibility to reserve unused ports for future expansion as connectivity demands soar.
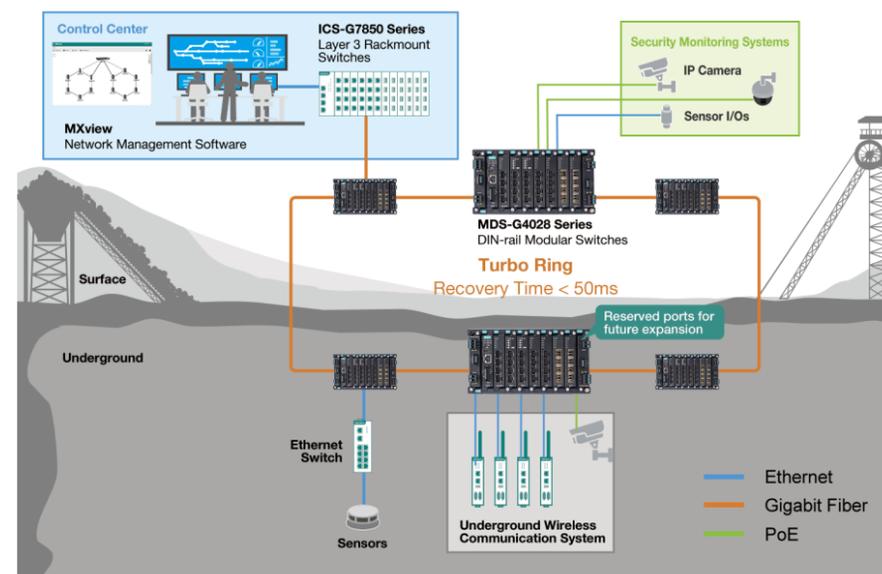
Because mining involves several machines and personnel working together, it is critical to ensure the safety of the whole system. Operators need to continuously monitor the network status and ensure uninterrupted on-site operations. The MDS-G4028 modular platform features hot-swappable media modules, making it possible to quickly replace modules without any tools, avoiding any downtime. Meanwhile, the dual isolated power supplies provide redundancy and guarantee operations are not affected in the event of a power failure. The rugged, compact housing equipped with a robust DIN-rail mounting kit fits in limited cabinet spaces and is built to withstand heavy vibration. The front-wired cabling together with panel display indicators further simplifies deployment and provides real-time status checking.

Background

In the open-pit mining industry, automated underground control systems are deployed and integrated to achieve optimal operational efficiency. There are numerous automated underground control systems to keep mining operations working smoothly and security monitoring systems to check on the staff and the status of machinery. As field personnel and machinery are constantly moving around between different sites across rough terrain, operators rely on a robust wireless communication system to connect personnel and machinery and capture multiple concurrent live image feeds to monitor underground activities.
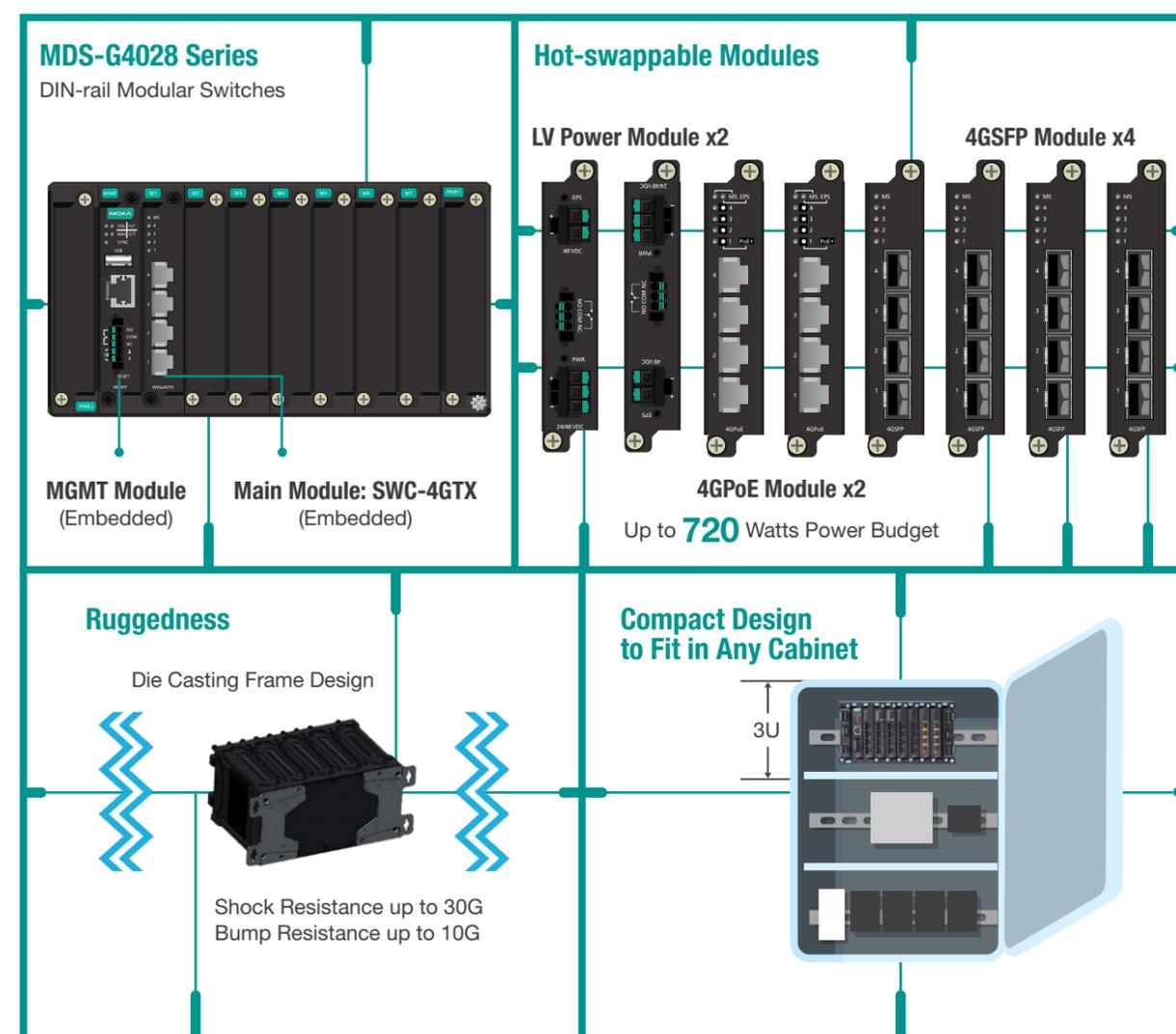
System Requirements

- Long-distance fiber connections to link field equipment to the control center
- Power over Ethernet to connect and power surveillance and security devices
- Compact devices that fit in narrow and confined spaces
- Rugged design with high vibration resistance to withstand the environmental hazards of mining sites

System Architecture

True Network Versatility With Just One Modular Platform

MDS-G4028 Series
DIN-rail Modular Switches

MGMT Module
(Embedded)

Main Module: SWC-4GTX
(Embedded)

Hot-swappable Modules

LV Power Module x2

4GSFP Module x4

4GPoE Module x2
Up to **720** Watts Power Budget

Ruggedness

Die Casting Frame Design

Shock Resistance up to 30G
Bump Resistance up to 10G

Compact Design to Fit in Any Cabinet
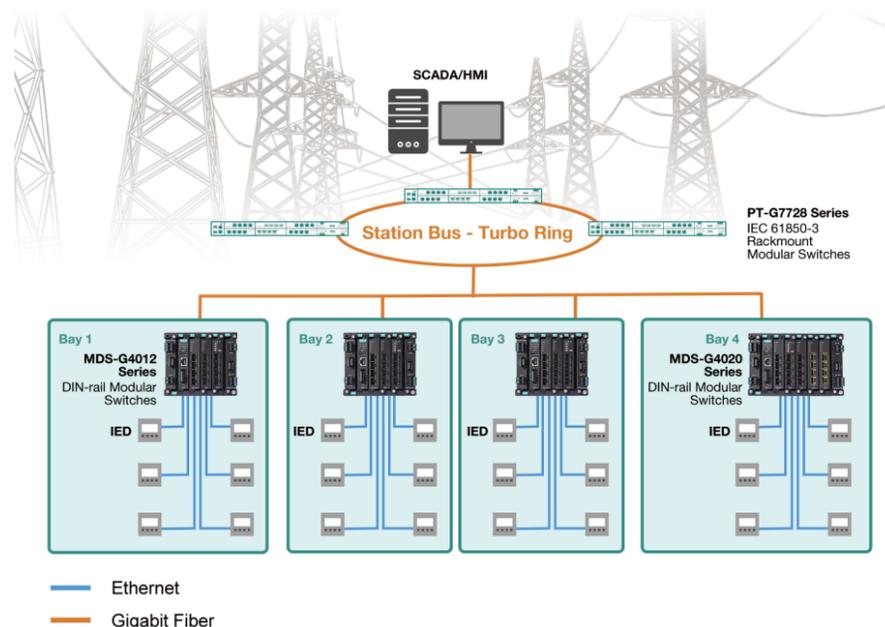
3U

www.moxa.com/MDS

Aggregating Ethernet-based Power Substation Infrastructure

Background

Traditional substations use hard-wired links between devices that run relatively low-speed serial connections over copper wiring. Today, IEDs (intelligent electronic devices) in modern substations are designed around the IEC 61850 standard and can connect to a high-speed Ethernet bus, making it easier to implement a comprehensive management, maintenance, and control strategy via a centralized power SCADA system.

System Architecture

- Ethernet
- Gigabit Fiber

System Requirements

- Devices compliant with the IEC 61850-3 and IEEE 1613 standards
- Options for isolated high-voltage power modules
- Highly reliable devices to ensure zero downtime
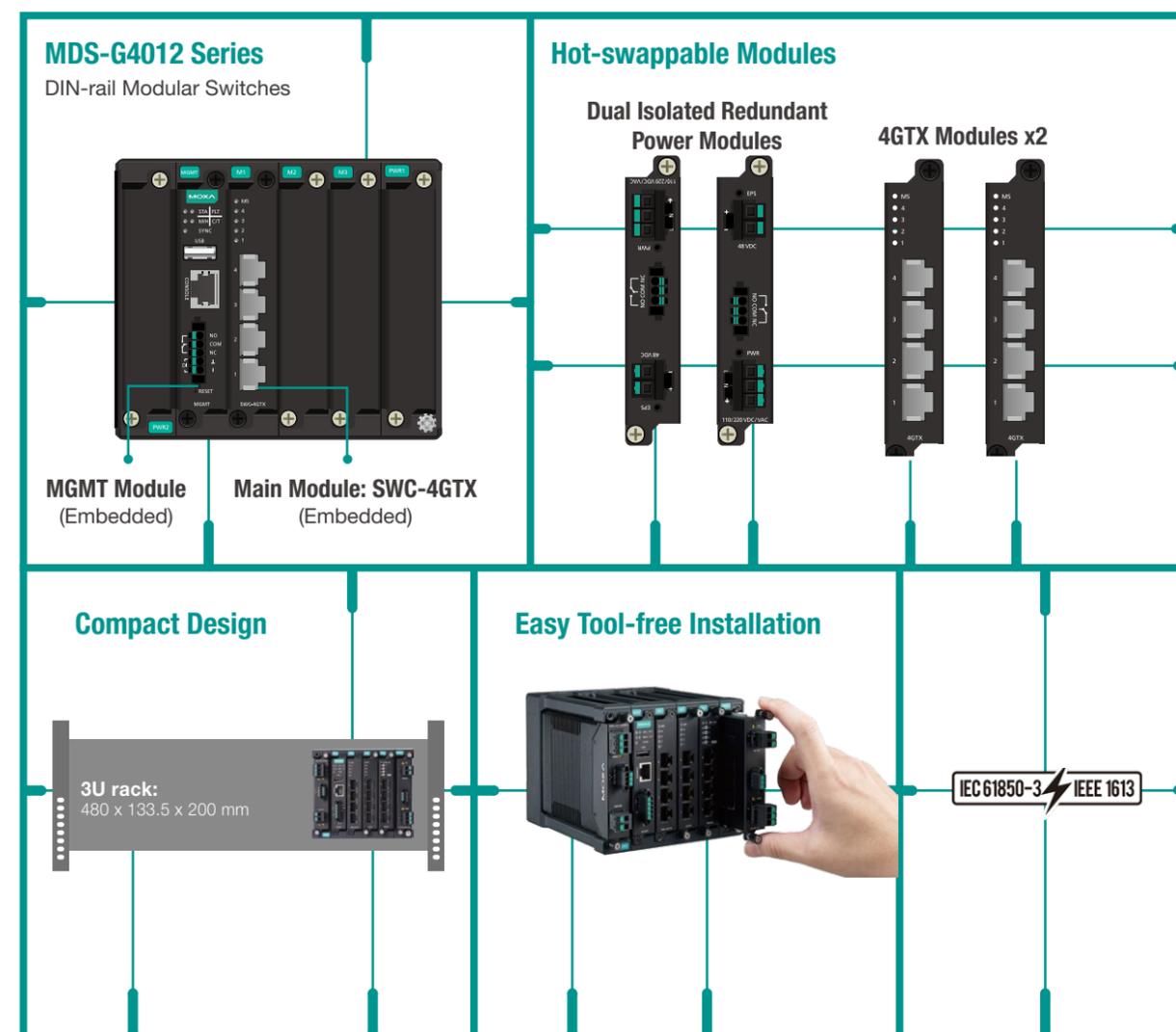- Enhanced security features

Moxa Solution

To accommodate the high volume of intelligent electronic devices (IED) in modern substations, the MDS-G4012 modular switches are the best choice to be installed at the bay level of the network infrastructure in distribution and enterprise substations.

The MDS-G4012 Series meets the requirements of the IEC 61850-3 and IEEE 1613 standards, offering industry-proven efficiency and reliability in power applications. An intelligent QoS engine ensures that critical data is transmitted with the highest priority while the reinforced hardware design guarantees reliable and smooth communication in areas with high environmental interference to ensure non-stop connections. The isolated power modules allow on-the-spot replacement without having to power down the switch and cause unnecessary downtime.

In addition, in light of increasing cybersecurity incidents occurring in critical infrastructure, it becomes fundamental for power applications to ensure the networking devices are equipped with enhanced security features and can rely on continuous security updates from the device supplier. The MDS-G4012 Series features security enhancements that bolster network security and prevent unauthorized access. Moxa has also established a dedicated Cyber Security Response Team to quickly respond to security vulnerabilities.

True Network Versatility With Just One Modular Platform

MDS-G4012 Series
DIN-rail Modular Switches

MGMT Module (Embedded) Main Module: SWC-4GTX (Embedded)

Hot-swappable Modules

Dual Isolated Redundant Power Modules 4GTX Modules x2

Compact Design

3U rack: 480 x 133.5 x 200 mm

Easy Tool-free Installation

IEC 61850-3 IEEE 1613

MDS-G4000 Series
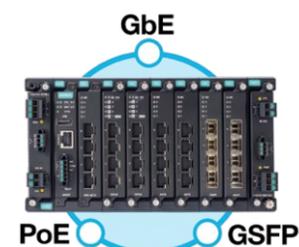
Layer 2 full Gigabit modular managed Ethernet switches

3U rack:
480 x 133.5 x 200 mm

Ⓐ Ⓑ Ⓒ

Ⓐ MDS-G4028 Series: 218 x 115 x 163 mm

Ⓑ MDS-G4020 Series: 176 x 115 x 163 mm

Ⓒ MDS-G4012 Series: 134 x 115 x 163 mm

Module Types

Gigabit TX, Gigabit SFP, Gigabit PoE, TX, PoE, 24/48 VDC Power Module, 110/220 VAC/VDC Power Module

The MDS-G4000 Series industrial switches offer 12/20/28-port Gigabit mix-and-match modularity, ideal for flexible network expansion. With a highly durable housing smaller than a 3U half-rack, these switches are designed to fit in confined spaces and operate in the harsh environments common in substation, mining, and oil and gas applications. The MDS-G4000 switches offer a variety of hot-swappable media modules (RJ45, SFP, PoE) and power units (24/48 VDC, 110/220 VAC/VDC) to provide even greater flexibility and availability, especially for continuity-critical operations.

GbE

PoE   GSFP

Flexibility

- Up to 28-port Gigabit scalability allowing for hundreds of media combinations
- Up to 24 GbE PoE+ / 24 GSFP media options
- Supports DIN rail, rack*, and wall-mounting options

* Only the MDS-G4028 supports rack-mounting

Continuity

- Hot-swappable power and port modules
- Passive backplane to minimize failure rates
- Power outage protection during firmware upgrades to avoid malfunction

Redundancy

- Gigabit redundancy under 50 ms
- Dual isolated redundant power modules

Security

- Device security based on the IEC 62443 standard
- 3-level user security
- MAC-based IP assignment

Reliability

- A robust, industrial-grade design with superior bump and shock resistance
- Compliant with multiple industry standards

Usability

- OT-friendly HTML5 dashboards for device summary, smart search, and configurations

	MDS-G4028	MDS-G4020	MDS-G4012
No. of Ports	28	20	12
Gigabit Ports	28	20	12
Fiber Ports	Up to 24	Up to 16	Up to 8
Fiber Type	LC	LC	LC
Certifications	CE/FCC, UL, EN 50121-4, NEMA TS2, IEEE 1613 Class1, IEC 61850-3 Edition 2 Class 1*, ATEX Zone 2*, C1D2*		

* IEC 61850-3 Edition 2 Class 1, ATEX Zone 2, and C1D2 certifications will be available in Q4, 2020.

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 (IIoT). With over 30 years of industry experience, Moxa has connected more than 65 million devices worldwide and has a distribution and service network that reaches customers in more than 80 countries. Moxa delivers lasting business value by empowering industries with reliable networks and sincere service. Information about Moxa's solutions is available at www.moxa.com.

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