MOXA®
Reliable Networks ▲ Sincere Service

### Cloud-Based VPN Platform

**MRC Solutions**

*Moxa Remote Connect Solutions for IIoT*

- Plug-and-play auto-configuration
- Firewall-friendly with IT policy compliance
- Smart IP Mapping for easy field IP management
- Smart Protection to secure remote access control and data privacy
- Smart Tunnelling to support general applications

### Industrial Smart Switches

**SDS-3008 Series**

*Industrial 8-port Smart Switches*

- Multi-protocols for SCADA/HMI monitoring
- Superslim and versatile mounting
- Dashboard-style UI for easy configuration
- IEC 62443-4-2 level 1 security

### Industrial LTE Cellular Gateway

**OnCell G3150A-LTE Series**

*Industrial LTE Cellular Gateway*

- Ethernet/serial to 4G LTE cellular
- Dual SIMs for redundant backhaul
- GuaranLink 4-tier check for cellular availability
- ATEX Zone 2/IECEx compliance for hazardous locations
- VPN tunnels with IPSec, GRE, and OpenVPN options
- IEC 62443-4-2 level 1-compliant cybersecurity

## 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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MOXA®
Reliable Networks ▲ Sincere Service

**Network Management Suite**

**Industrial Secure Routers**

**Full Gigabit Switches**

**Industrial Wireless**

**Industrial Smart Switches**

www.moxa.com

# Optimize Your Network Infrastructure for More IIoT Opportunities

While the Industrial Internet of Things (IIoT) with its wave of innovation ushers in immense opportunities for businesses, it also opens the door to new threats. The underlying network infrastructure, therefore, must overcome this ever-growing number of challenges to sustain truly reliable connectivity. Only reliable networks—defined by uninterrupted connectivity—will be ready to support new industrial applications as opportunities arise.

To turn challenges into opportunities, Moxa's solutions reinforce cybersecurity, interoperability, and the management of industrial network infrastructure (INI) to bring more legacy and disparate networks into one industry-grade Ethernet backbone. Furthermore, these solutions raise the security level of the entire network's communication to help customers drive nonstop productivity and cost reduction.

## Moxa Industrial Network Infrastructure

With a large Ethernet product portfolio, which is distinguished by innovative features and broad expertise, Moxa helps its customers and partners optimize industrial network infrastructures to achieve operational efficiency, availability and reliability in various industrial environments.

### Optimized Performance

- Seamless LAN and WLAN connectivity with a diverse combination of 10GbE/GbE/4G LTE/ 802.11n/PoE/Fiber/DSL interconnections

### Strengthened Security

- Firewall routing for secure LAN and WAN connections
- Standard VPN for IPSec/OpenVPN secure remote access
- Cloud-based VPN for site-to-site secure remote connections
- Centralized private IP management for secure cellular P2P connection
- Embedded IEC 62443-4-2-compliant device security
- Device-level cybersecurity monitoring and management

### Easy Management

- Configuration is 10 times faster than one-by-one deployment
- Live topology monitoring
- Easy event tracking
- Mobile app and alerts
- Informs SCADA about network health

### Seamless Mobility

- 4G LTE and 802.11n Gigabit wireless
- Millisecond-level roaming handovers
- AeroLink Protection for site-to-site redundant radio links
- Dual SIMs and GuaranLink for reliable cellular connectivity

### Powering Productivity

- Ethernet redundancy < 20 ms (@250 switches)
- Multicast routing redundancy < 300 ms
- Controller-based roaming < 50 ms
- Redundant radio links < 300 ms

**Security**
Edge-to-Cloud Industrial Cybersecurity

**Management**
Automation-Friendly Network Management

**Connectivity**
Industrial Ethernet Communication Backbone

Download
Cutting-Edge NetworK Infrastructure Applications

## Edge-to-Cloud Cybersecurity Enhancement

More connectivity creates more productivity but also more cyberthreats. Moxa extends its defense-in-depth cybersecurity from the edge to the cloud across private and public networks.

### Device-Level Defense

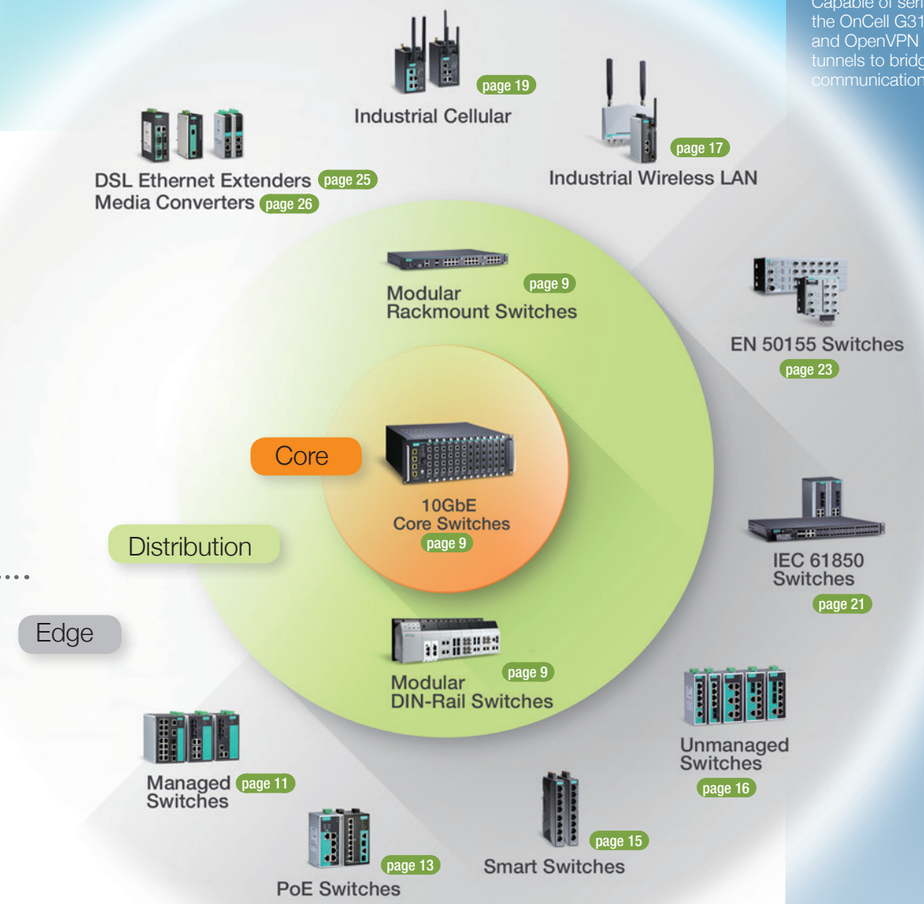
Moxa embeds IEC-62443-4-2-compliant standards in its edge-to-core industrial switches and wireless devices to enhance cybersecurity in all levels of a network infrastructure.

### Network System Security

Moxa's industrial secure routers provide an all-in-one firewall, VPN, NAT, and switch functionality; together with a wide variety of IEC 62443-4-2 embedded devices, Moxa provides flexible and powerful security building blocks to help system integrators construct IEC 62443-3-3-compliant security for their systems.

### Cloud-Based Secure Remote Access

Moxa's cloud-based secure remote connection solutions strengthen secure and transparent tunnels for industrial applications. These solutions also benefit OEM machine builders and service integrators when they perform remote services or data acquisition over the Internet for distributed field operations.




# 2017 Highlights

**Moxa Remote Connect** page 7

Moxa provides cloud-based VPN solutions for industrial customers to increase their remote application capabilities via VPN tunnels or mesh with no need for the involvement of IT experts or investment for a cloud system.

**Smart Switch** page 15

Designed for easy connections and SCADA/HMI monitoring, the superslim SDS-3008 enables smart connectivity with regard to multi-protocols interoperability, horizontal and vertical installations, and dashboard-style configuration.

**Security Upgrade** page 11

To meet more IIoT scenarios, Moxa releases firmware upgrades that offer IEC 62443-4-2-compliant security capabilities to secure routers, switches, and wireless product lines.

**Serial over Secure LTE** page 19

Capable of serial, Gigabit, and LTE connectivity, the OnCell G3150A-LTE supports IPSec, GRE, and OpenVPN protocols up to 5 concurrent VPN tunnels to bridge legacy to Ethernet over LTE cellular communication.

# Visualized Security and Mobility for Easy IIoT Network Management

- Mass Configuration to Save Time and Reduce Errors
- Live-View Topology Monitoring and Alerting
- Event Playback and N-Snap for Diagnostics
- MXview ToGo for Mobile Operation
- Device-Level Cybersecurity Management

## Visualize IIoT Network Complexity for Easy Management

A clear visibility of network status makes complex network administration simple and easy to operate. MXstudio is a suite of automation-friendly industrial network management software that presents all network settings, conditions, and traceable records on visualized, engineer-friendly interfaces for easy installation, operation, maintenance, diagnostics, and mobile monitoring and alerting. MXstudio includes MXview, MXconfig, N-Snap, and mobile MXview ToGo.

## Advanced Cybersecurity Management

To enhance cybersecurity management, MXstudio adds device-level cybersecurity to network management. A security view is built in to display the security level and status of Moxa's network devices. Flexible security settings are enabled with a newly added Security Wizard.

**Video**
Ramp Up Your Network Security

## Third-Party Support and Collaboration

### Easy SCADA Integration with Lower TCO

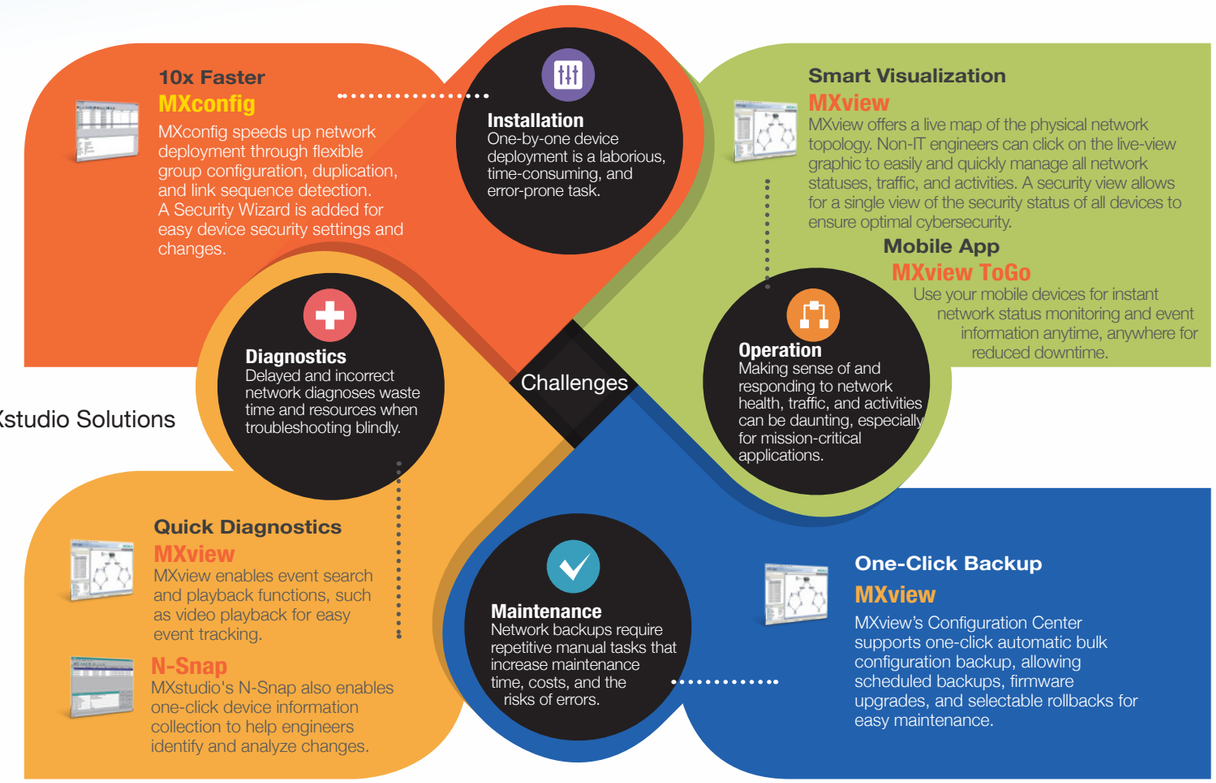
MXstudio can act as an OPC server to feed SCADA OPC tags with real-time network status, saving investment on thousands of OPC tags for SCADA communication.

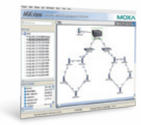
An example of this in practice is one leading semiconductor manufacturer that has taken full advantage of this feature to benefit from cost savings and optimal operational efficiency.

### Collaboration with Third-Party NMSs

MXview can operate with large network systems by setting trap receivers and sending SNMP traps to up to two other network management software platforms, which may focus on end-to-end service availability rather than physical network connectivity.

## MXstudio Solutions




| MXconfig | MXview | N-Snap | MXview ToGo |
|---|---|---|---|
| |  | | |
| **Industrial Network Configuration Tool** | **Industrial Network Management Software** | **Industrial Network Snapshot Tool** | **Mobile Monitoring Tool** |
| • Configuration is 10X faster than one-by-one deployment (with 100 switches)<br>• Link sequence detection eliminates manual configuration errors<br>• Security Wizard for easy device security setting | • Automatic topology discovery and visualization with VLAN/IGMP grouping<br>• Security view for the security status of devices<br>• Event playback for reviewable diagnostics<br>• Third-party devices supported by a MIB compiler and MIB browser<br>• OPC tags for easy SCADA/HMI management | • A standalone utility to take network snapshots for quick troubleshooting<br>• Automatically compares network and device data, and highlight the differences | • Real-time notification for reduced downtime<br>• Quick network and device status checking<br>• Only one click for easy device search and mapping |

**Security View**
Visualizing the Security Status of Network Devices

**Security Wizard**
Batch Configuration of Security Parameters

**MXview ToGo**
Keep Industrial NMS in Your Hands

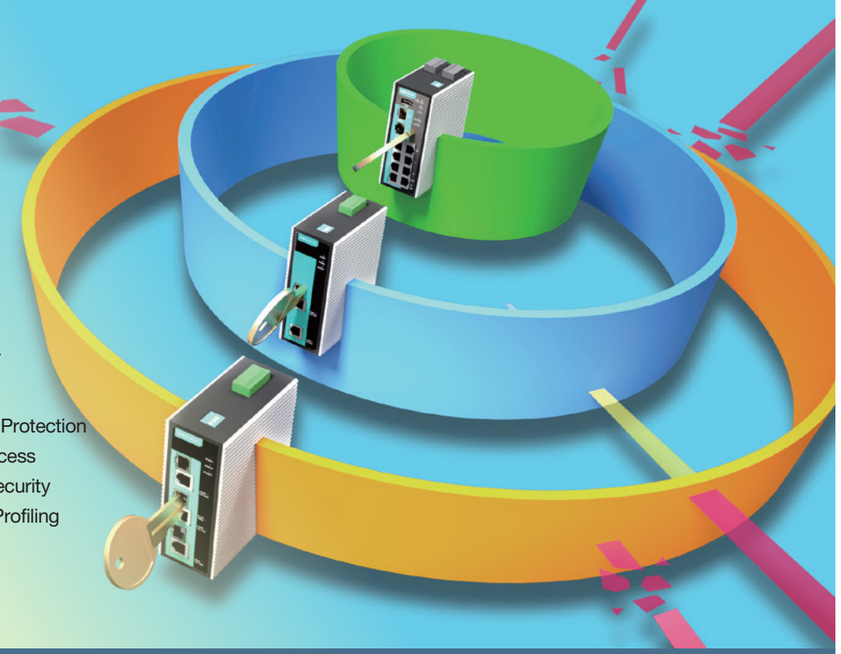
## Support List for Moxa's Networking Devices

| | Managed Ethernet Switches | Wireless AP/Clients | Secure Routers | PROFIBUS-to-PROFINET Gateway | Serial-to-Ethernet Device | Ethernet Extender | Remote I/Os | Third-Party SNMP Devices |
|---|---|---|---|---|---|---|---|---|
| MXview | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| MXconfig | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – | – |
| N-Snap | ✓ | ✓ | – | – | – | ✓ | – | – |
| MXview ToGo | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Industrial Cybersecurity

# Ramp Up Your Network Security

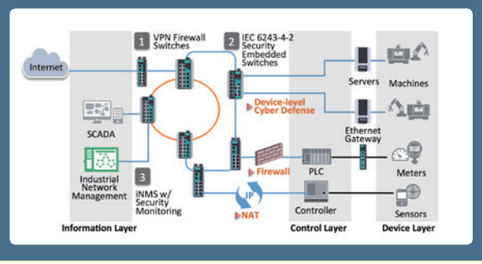
- Industrial Firewall for Critical Device Protection
- VPN Routing for Secure Remote Access
- IEC 62443-4-2-Compliant Device Security
- MXstudio for Easy Device Security Profiling and Monitoring



## IACS Defense-in-Depth Cybersecurity

With cyberattacks rife in the age of the Industrial Internet of Things, Industrial Automation and Control Systems (IACSs) require strengthened cybersecurity to ensure that mission-critical facilities and services are safe and secure.

Moxa provides a defense-in-depth framework with a wide variety of cybersecurity building blocks, which include industrial secure routers, IEC 62443-4-2-compliant Ethernet devices, and management tools, to help system integrators deploy systemwide cybersecurity that is compliant with the IEC 62443-3-3 standards required for industrial automation and control systems.




## An ITS Network in Europe

### Secure Infrastructure for Tramway Stations

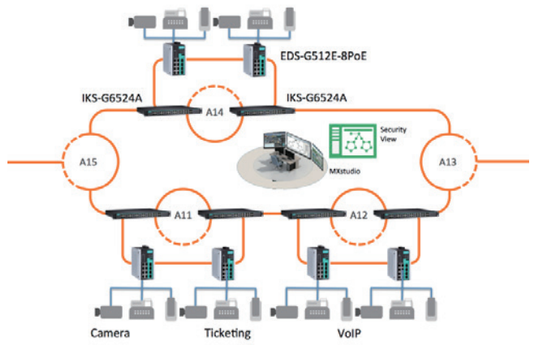
A tramway system adopted EDS-G512E-8PoE switches to implement security measures, and also MXstudio to deploy efficient large-scale network management.

#### Solution & Benefits

- The PoE+ switches provide IEC 62443-4-2 device-level password and account lockout mechanism, as well as TACACS + central authentication to prevent unauthorized access
- MXstudio for easy network deployment and maintenance

#### Future Upgrades

- Updates MXstudio with MXconfig's Security Wizard to complete the security parameter setup with just a few clicks
- Updates IKS-G6524A firmware to add IEC 62443-4-2 standards for the protection of aggregated switches




## An Energy Network in North America

### Remote Wind Farm Monitoring

The customer used the EDR-810 to deploy reliable field VPN gateways that protect communications between the wind farm's SCADA and Cloud SCADA systems.

#### Solution & Benefits

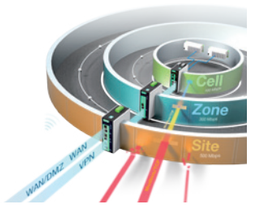
- The IPSec VPN gateway brings field information to the cloud with ease
- -40 to 75°C wide operating temperature range for low-cost

**White Paper**
How to Choose the Right Industrial Firewall

### All-in-One Secure Router

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.

- All-in-one design for flexibility and economical deployment
- Best-in-class VPN and firewall throughput
- Built-in Modbus TCP packet inspector




### Device-Embedded Security

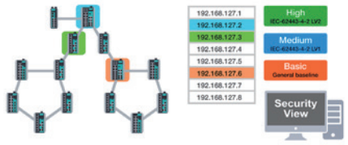
With firmware, Moxa adds device security capabilities, aligned with IEC 62443-4-2 standards, to the lines of Ethernet switches, routers and wireless devices to strengthen the cybersecurity of mission-critical infrastructures.

- Device identification and authentication for access control and management
- Prevents intrusions and attacks
- Protects sensitive data
- Audits network events

### Security Management

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

- Security status at a glance
- Security setup in 3 steps
- Faster time for deployment




**White Paper**
Tips on How to Ramp Up the Security of Industrial Networks

**Why 62443-4-2?**
Ramp Up Your Network Security

**IEC 62443-4-2-compliant portfolio**

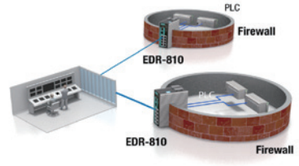
- Secure Routers
- Industrial Switches
- IEC 61850 Switches
- Industrial Wi-Fi
- Rail Wayside Wi-Fi
- Industrial Cellular

Please check www.moxa.com for the latest update.

## All-in-One Industrial Secure Routers

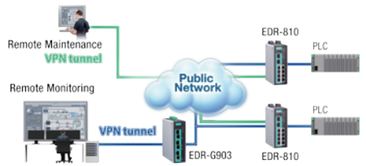
### Transparent Firewalls

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.




### 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 water treatment, oil and gas, power, or ITS networks.




### Modbus Packet Inspection

All EDR routers come with PacketGuard™ to perform deep Modbus TCP protocol inspection and execute control actions from Modbus Master Commands and Modbus Slave Response, and vice versa.

### Secure Routers

| | EDR-G903 | EDR-G902 | EDR-810 |
|---|---|---|---|
| **Target Requirement** | Dual WAN redundancy | Security between WAN and LAN communication | Multiple ports for direct device connections |
| **Interface** | 2 WANs (Combo); 1 LAN (Combo) | 1 WAN (Combo); 1 LAN (RJ45) | Configurable WAN/LAN for up to 16 interfaces |
| **Firewall Throughput** | 40,000 fps | 25,000 fps | 10,000 fps |
| **Firewall/NAT** | 512/256 policies | 256/128 policies | 256/128 policies |
| **IPSec VPN** | 100 IPSec tunnels | 50 IPSec tunnels | 10 IPSec tunnels |
| **IPSec VPN Throughput** | 150 Mbps | 60 Mbps | 17 Mbps |
| **WAN Backup** | Dual WANs | – | – |
| **DMZ** | 1 | – | – |
| **Layer 2 Switch Function** | – | – | VLAN, IGMP, RSTP, Turbo Ring V2 |

# Extend Industrial Applications over Secure Remote Connections

- Agility for Industrial Secure Remote Access
- Smart Features for Easy Deployments
- Web-Portal-Based Centralized Cellular Management

## Remote Automation Counts On Security and Connectivity

Reliable remote automation holds the potential to push the boundaries of industrial manufacturing and yield unprecedented levels of production. However, security and connectivity are the main barriers holding back remote industrial applications.

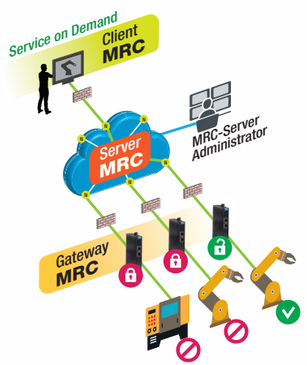
Moxa provides standard VPN secure routers and innovative cloud-based Secure Remote Access (SRA) solutions to ensure secure interconnections between machines, machine service engineers, and machine supervisory servers over the Internet. For both machine operators and machine service providers, the benefits are significant time and cost savings on remote monitoring and maintenance for improved efficiency and maximum uptime.

## 3 Scenarios for Industrial SRA Applications

Several scenarios exist in IIoT applications where OEM machine builders or service providers host machine monitoring and deliver maintenance services to machine operators.

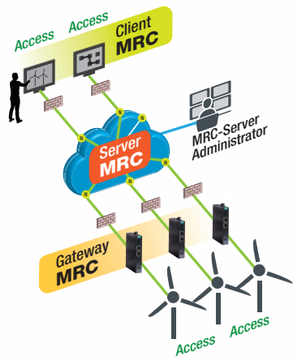
### 1-to-1/1-to-Many Interconnections

Machine assets owners, operators, and machine service engineers rely on SRA solutions to build up a secure and easy-to-use connection tunnel between the service engineer and the remote machines for remote diagnosis, maintenance, and troubleshooting.



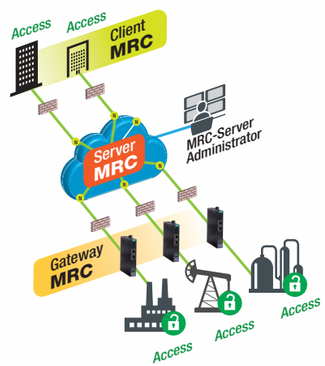

### Multiple-to-Multiple Interconnections

The SCADA server utilizes the connectivity platform to enable remote monitoring of field machines for predictive maintenance. Multiple machine service engineers can also access the remote machines and SCADA server at the same time to jointly perform a diagnosis and troubleshooting.




### Site-to-Site Network Infrastructure

A secure mesh-type tunnel infrastructure can be built to enable secure internetworking between the enterprise networks, factory networks, and field networks. The site-to-site mesh network allows all the interconnected networks to communicate with each other like within a local network.





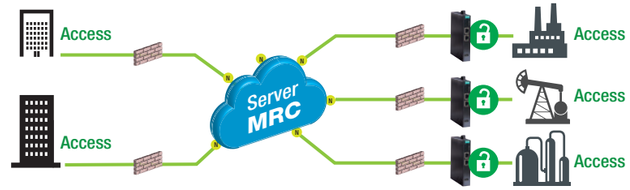

# 3 SRA Solutions

## Cloud-Based Secure Remote Access Solution

* Coming soon in 2017

The Moxa Remote Connect (MRC) solutions comprise VPN client software, industrial VPN gateways, and a VPN server platform. The MRC solutions provide an easily managed and secure connectivity platform that helps establish VPN interconnections between supervisory servers, field machines, and service engineers for remote monitoring, diagnosis, troubleshooting, and maintenance.

- Plug-and-play auto-configuration
- Firewall-friendly with IT policy compliance
- Smart IP Mapping for easy field IP management
- Smart Protection to secure remote access control and data privacy
- Smart Tunnelling to support general software applications




**MRC Client**
A Windows-based application installed in laptops/computers to build secure connections with an MRC server over the Internet.

**MRC Server**
A centralized secure connectivity platform that manages secure interconnection between MRC gateways and MRC clients over the Internet.

**MRC Gateway**
Connect Ethernet-based machines to a MRC server for secure remote connection over the Internet.

MRC Server

**MRC Server Software**

- Centralized secure connectivity software
- Supports general software applications

MRC Client

**MRC Client Software**

- Easy installation on servers or laptops
- Support Windows 7/8/10 (32- and 64-bit)
- Download from Moxa's website

MRC Gateway

**MRC Gateway Series**

- Ethernet or LTE WAN connectivity
- 25 local devices or site-to-site capacity
- -40 to 75°C operating temperature range

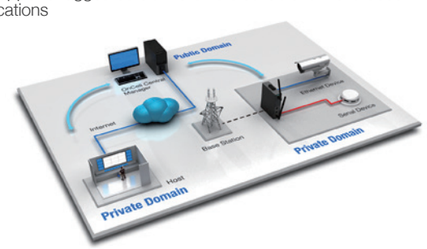
*Note: The LTE version is only available in the U.S.*

## Centrally Managed Cellular Solutions

Moxa provides 3G/4G-connected SRA solutions consisting of OnCell series cellular products and OCM (OnCell Central Manager) software.

The OCM offers a centralized private IP solution that allows easy mobile device management, secure data exchange, and access control over the Internet.

- A cost-effective private IP solution
- Enables secure data exchange and access control over the Internet
- Supports rugged cellular hardware suitable for hazardous locations




OnCell Central Manager See page 19

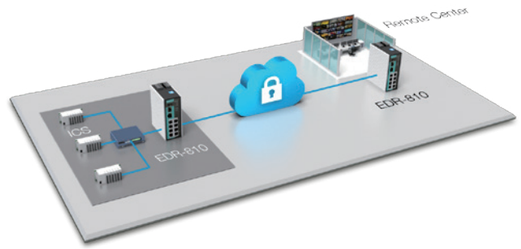
Centralized private IP software for large-scale OnCell device management

**Download LTE Gateways Applications**

## Standard VPN Solutions

Moxa provides industrial secure routers of standard VPN interfaces to help system intergrators deploy secure communication tunnels between remote fields with ease. The IPSec and OpenVPN technologies bridge different networks to secure interconnectivity that is required for industrial applications.

- Wired and wireless IPSec and OpenVPN products for flexible and secure network deployment
- Embedded firewall functionality



EDR series

Industrial secure routers with all-in-one firewall/NAT/VPN

See page 6

OnCell Series

Industrial 3G/4G cellular gateways/routers

See page 19

# Increased Security and Availability for High-Speed IIoT Networks

- 24 to 52-Port FE/GE/10GbE
- Multicast Routing Redundancy Under 300 ms
- Built-in IEC 62443-4-2-Compliant Security
- Built-In Industrial Reliability
- Lower Total Cost of Ownership

## Critical Security and Availability for High-Speed Networking

A high bandwidth and high port density help IIoT expansion in speed and scale, but they also raise the risk of cyberattacks and link failures. Moxa's 10GbE/GbE industrial rackmount switches provide modular flexibility with 24 to 52-port routing and switching capability, IEC-62443-4-2-compliant security, and millisecond-fast multicast traffic redundancy to strengthen mission-critical IIoT infrastructures, such as city/transportation/manufacturing surveillance applications, with improved cybersecurity, industrial-grade failover, and device reliability.

**White Paper**
Securing Network Devices with the IEC 62443-4-2 Standard

### Data Aggregation Security

To protect data aggregation and processing against cyberthreats, Moxa upgrades its IKS series of industrial rackmount switches with IEC-62443-4-2 requirements via firmware updates.

- IEC 62443-4-2-compliance for device-level cybersecurity*
- Sensitive data and access protection
- Supports MXstudio for easy device security profiling and monitoring

* Available around Q4/2017

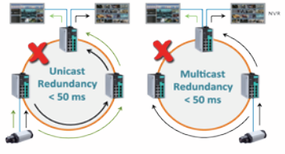
### V-ON Technology

Video-Always-On (V-ON) technology enables unicast and multicast traffic redundancy over layer 3 and layer 2 networks within milliseconds. V-ON combines Moxa's Turbo Ring and Turbo Chain redundant ring topologies and optimized video transmission to overcome the limitations of IGMP (Internet Group Management Protocol) and VRRP (Virtual Routing Redundancy Protocol).

### Multicast Availability

In response to the growing number of multicast scenarios, Moxa's rackmount switches are capable of V-ON protocol for millisecond-level multicast routing and switching redundancy.

- Layer 2 unicast and multicast traffic recovery < 50 ms
- Layer 3 unicast and multicast traffic recovery < 300 ms
- Millisecond-level router redundancy




Watch the lab test and see how the technology achieves millisecond-level network recovery upon media and node failure.

**Video**
A test and comparison video

### Industrial Reliability

Moxa's industrial rackmount switches provide built-in reliability that delivers superior EMI shielding and extreme temperature resilience without relying on a fan or heater.

- Wide operating temperature range
- High-level EMI/EMC shielding
- Hot-swappable operation (ICS-G7000A 4U series only)
- Redundant power supply with isolated protection

**White Paper**
Ensure nonstop IP surveillance with an optimized industrial Ethernet network

### Maximum Uptime and Lower TCO

*Ensures Control Room Reliability*

Does your control room provide enough protection to prevent network interruptions caused by electrical noise, power surge, EMI, or link failure?

Now, you can choose Moxa's industrial-grade switches that come with industrial-grade reliability and availability to protect your core networks against potentially adverse conditions.

| | Moxa Industrial Rackmount Switches | Commercial Rackmount Switches |
|---|---|---|
| ESD | ±8 kV | ±4 kV |
| Radiated RFI | 10 V/m @ 80 MHz to 1 GHz | 3 V/m @ 80 MHz to 1 GHz |
| Surge | 2 kV | 1.5 kV |
| EFT | 1 kV | 0.5 kV |
| Operating Temperature | -10 to 60°C / -40 to 75°C | 0 to 40°C |
| Heat Dissipation | Fanless | Fan |
| Industrial Certifications | EN 60950-1, EN 50121-4, FCC Part15, CISPR (EN 55022) class A | CE/FCC |

**Video**
Enhance control room reliability with industrial-grade rackmount switches

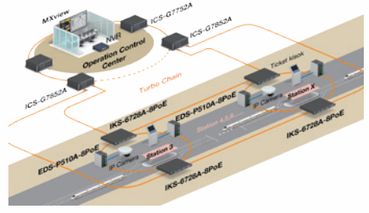
### Multicast Video Surveillance

*Building a Video-Optimized Network for a Major Tramway*

A city tramway needs a reliable communication network along a stretch of 22.4 kilometers that includes 37 stations and 11 electrical substations.

#### System Requirements

- More than 250 IP cameras with a multicast delivery across VLANs
- A multiservice infrastructure composed of layer 2 and layer 3 networks
- Millisecond-level redundancy is a must for both network switching and routing




#### Why Moxa

- V-ON™ technology guarantees layer 2 network redundancy under 50 ms and layer 3 multicast redundancy under 300 ms.
- MXstudio suite makes network installation, operation, maintenance, and diagnostics easy
- Industrial-grade design and a 5-year warranty

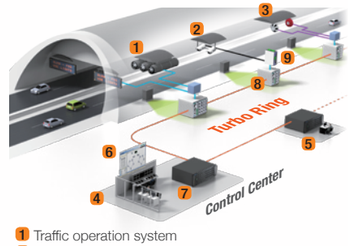
### Fully Integrated Tunnel Monitoring

*10GbE Core Backbone for Critical Tunnel Surveillance*

A U.S. tunnel used Moxa's edge-to-core Ethernet solutions to deploy a robust communication infrastructure for the real-time monitoring of IP surveillance, mass evacuations, variable message signs, and radio broadcast systems.

#### Solutions & Benefits

- MXview provides efficient event monitoring through live color visualization
- ICS-G7820 10GbE switches for real-time data and video aggregation
- EDS-611/619 modular switches for flexible and durable outdoor connectivity
- VPort 461 video encoders for cost-efficient H.264 IP video migration
- High reliability with built-in self-healing recovery and wide temperature operation




1 Traffic operation system
2 CCTV detection system
3 Fire alarm system
4 Operation and maintenance control
5 Fire department room
6 MXview industrial network management software
7 ICS-G7850: 48G+2 10GbE-port switch
8 EDS-611/EDS-619: Modular switches
9 VPort 461-T: 1-ch video encoder

## Layer 3 Switches

10GbE

10GbE

Full GbE

Full GbE

| | ICS-G7852A/G7850A | ICS-G7828A/G7826A | ICS-G7848A | IKS-G6824A |
|---|---|---|---|---|
| 10GbE | 4/2 | 4/2 | – | – |
| GbE | 48/48 | 24/24 | 48 | 24 |
| PoE+ | 48 PoE+ | – | 48 PoE+ | – |

## Layer 2 Switches

10GbE

10GbE

Full GbE

Full GbE

Best Value

Up to 24 PoE+

| | ICS-G7752A/G7750A | ICS-G7528A/G7526A | ICS-G7748A | IKS-G6524A | IKS-6728A/6726A | IKS-6728A-8PoE |
|---|---|---|---|---|---|---|
| 10GbE | 4/2 | 4/2 | – | – | – | – |
| GbE | 48/48 | 24/24 | 48 | 24 | 4/2 | 4 |
| 10/100 FE | – | – | – | - | 24 | 24 |
| PoE/PoE+ | 48 PoE+ | – | 48 PoE+ | – | – | 24 PoE+ |

# Extra Reliability for Edge Productivity

- Up to 28-Port FE/GE Links
- IEC 62443-4-2-Compliant Device Security
- Multiple Industrial Protocols for SCADA/HMI Monitoring
- Diverse Industry Certifications

## Productivity Counts on Network Reliability

Bolstering a network's reliability reduces downtime that translates into huge cost savings, especially in complex and remote industrial applications.

Moxa's EDS-E Series of industrial Ethernet switches reinforces edge infrastructure with high-density Gigabit bandwidth, level-four EMC protection, and IEC 62443-4-2-compliant cybersecurity. Furthermore, these switches are all compact and metal encased.

The EDS-E Series also offers multicast traffic redundancy, which is perfect for distributed surveillance applications that are required to minimize latency to milliseconds.

### EDS-528E Series

24+4G-port managed Ethernet switches

- 24+4G combo ports
- L2 multicast redundancy < 20 ms
- IEC 62443-4-2 security
- Diverse industrial protocols for SCADA/HMI monitoring
- Fiber link monitoring and alarm notifications

### Operational Security

The EDS-500E Series of switches is the first choice for IACS networks that require IEC 62443-3 systemwide security integration.

- IEC 62443-4-2 device-level data and access security
- Multiple protocols for plant-floor interoperability
- Supports MXstudio for easy device security profiling and monitoring

### Multicast Availability

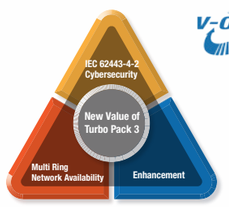
V-ON recovers multicast traffic from failures within milliseconds to minimize packet latency or loss for mission-critical data distribution.

- Layer 2 recovery time under 50 ms
- Layer 3 unicast and multicast traffic recovery time under 300 ms

### Extra Reliability

Enhances devices' robustness against environmental threats, including EMI, surge, noise, shock, vibration, and extreme temperature variations.

- Level-4 EMC immunity
- Fanless, -40 to 75°C operating temperature range
- Compliance with C1D2/ATEX, DNV, NEMA TS2, EN 50121-4, IEC 61850, IEEE 1613 standards




V-ON · Turbo Ring · Multicast Optimization · Turbo Chain

### Security and Availability Upgrades

- IEC 62443-4-2 device-level security for improved ICAS cybersecurity
- Centralized management of device identification and authentication
- High availability with multiple ring redundancy or high-bandwidth utilization

**Video**
EDS E Series Introduction

## The Next Generation of Industrial Ethernet Switches

| | EDS-528E | EDS-G516E | EDS-G512E | EDS-G508E | EDS-518E | EDS-510E |
|---|---|---|---|---|---|---|
| Max. No. of Ports | 4 G + 24 FE | 16 G | 12 G | 8 G | 4 G + 14 FE | 3G + 7 FE |
| Gigabit RJ45 Ports | 4 | 12 | 8 | 8 | 4 | 3 |
| Gigabit SFP Ports | 4 (Combo) | 4 | 4 | – | 4 (Combo) | 3 (Combo) |
| MTBF (hours) | 774,634 hrs | 805,491 hrs. | 816,823 hrs. | 808,970 hrs. | 723,953 hrs. | 723,532 hrs. |
| Cybersecurity | Device security with IEC 624443-4-2 compliance | | | | | |
| Industrial Protocols | EtherNet/IP, PROFINET, and Modbus/TCP protocols supported | | | | | |
| Certifications | EN 50121-4, IEC 61850-3, IEEE 1613 compliant | Class 1 Div. 2/ATEX Zone 2, DNV, GL, ABS, LR, NK, NEMA TS2, EN 50121-4, IEC 61850-3, IEEE 1613 compliant | | | | |



EDS 400A/500A/500E/600/700/800 Series

## SMART Edge Connectivity for Industrial IoT Applications

**S — Security**
EDS-500E: IEC 62443-4-2-compliant security
EDS 400A/500A/600/700/800: Enhanced security with TACACS+, IEEE 802.1X, HTTPS, and SSH support

**M — Management**
Easy network management with MXstudio management suite, local management by web browser, CLI, USB/serial console, ABC-02-USB, and Windows utility

**A — Availability**
Fast Ethernet redundancy under 20 ms with up to 250 switches

**R — Reliability**
Fanless and wide-temperature operation with RMA < 0.5%

**T — Integration**
Supports EtherNet/IP, PROFINET, and Modbus/TCP protocols for easy PLC and SCADA integration

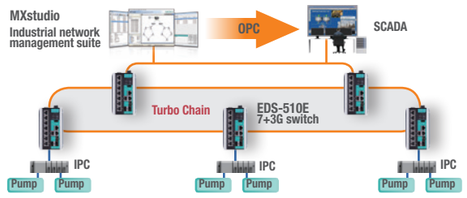
*An FA Network in Taiwan*

### Environmental Monitoring for Air Purification Systems

A semiconductor plant invested in thousands of dry pumps for an exhaust system to protect workers from toxic gases. They used the EDS-510E switches and MXstudio to simplify the pump system control and monitoring.

#### Solution & Benefits

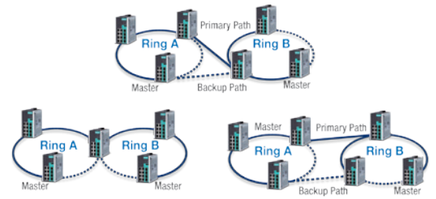
- MXstudio enables SCADA systems to monitor the network status
- The EDS-510E has 3 GbE ports for creating a GbE redundant ring and GbE uplink
- Turbo Ring and Turbo Chain achieve Gigabit redundancy < 50 ms




### Turbo Ring

Enable Ring and Media Redundancy

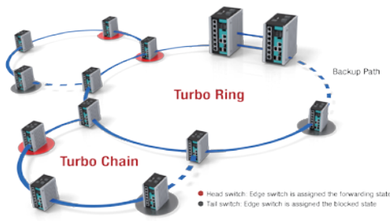
- Supports flexible ring topology: ring coupling, dual-ring, and dual homing
- Self-healing redundancy under 20 ms at a full load of 250 switches
- Reduced cabling and planning costs




### Turbo Chain

Increase Redundant Network Topology Flexibility

- Redundancy under 20 ms at a full load of 250 switches
- Unlimited redundant network expansions
- Live node expansion without network interruptions
- Tremendous savings on cabling costs




**Download 2017 ITS Brochure**

## Managed Ethernet Switches

**Modular Gigabit**
EDS-828 L3 4G+24
EDS-728 L2 4G+24

- Layer 3 routing (EDS-828)
- Up to 4 Gigabit uplinks
- Flexible modular deployment

**Modular Gigabit**
EDS-619 3G+16-port
EDS-616 16-port EDS-608 8-port
EDS-611 3G+8-port

- High density multifiber connections
- Hot-swappable module w/IEEE 1588 PTP support

**Gigabit & Fast Ethernet**
EDS-518A 2G+16-port
EDS-510A 3G+7-port

- 2 or 3 Gigabit ports for building redundant ring or uplink services
- Intelligent managed and security features

**Fast Ethernet**
EDS-516A 16-port
EDS-508A 8-port
EDS-505A 5-port
EDS-408A 8-port
EDS-405A 5-port

- 10/100BaseT(X) and 100BaseFX (multimode/single-mode)
- Up to 3 fiber ports (EDS-408A 3 fiber series only)

| | Layer 3 | | Modular | | | | GbE + FE | | Fast Ethernet | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EDS-828A | EDS-728A | EDS-619 | EDS-616 | EDS-611 | EDS-608 | EDS-518A | EDS-510A | EDS-516A | EDS-508A | EDS-505A | EDS-408A | EDS-405A |
| No. of Ports | 28 | 28 | Up to 19 | Up to 16 | Up to 11 | Up to 8 | 18 | 10 | 16 | 8 | 5 | 8 | 5 |
| Gigabit RJ45/SFP Ports | 4 | 4 | 3/3 | – | 3/3 | – | 2/2 | 3/3 | – | – | – | – | – |
| Max. 10/100TX Ports | 24 | 24 | Up to 16 | Up to 16 | Up to 8 | Up to 8 | 16, 14 | 7 | 16, 14 | 8, 6 | 5, 3 | 8, 6, 5 | 5, 3 |
| Max. 100FX Ports | – | – | Up to 16 | Up to 16 | Up to 8 | Up to 8 | 0, 2 | – | 0, 2 | 0, 2 | 0, 2 | 0, 2, 3 | 0, 2 |

# Power Up Heavy-Duty IP Cameras Over Ethernet

- IEEE 802.3af/at interoperability
- Up to 48G 36W PoE+ Links
- 3 kV LAN Surge Protection
- Easy and Efficient PoE Power Management

## High-Power, High-Bandwidth Delivery

Powering network devices can be challenging when it comes to power capacity, reliability, and monitoring. Moxa provides a broad range of PoE/PoE+ switches with up to 48-port fiber optic Gigabit PoE+ links to deliver high-speed data transmissions and carry high power over long distances.

Surge protection of 3 kV LAN and industrial features are designed to ensure operational reliability. A unique SmartPoE tool makes PoE network deployment and maintenance easy. All of its features help PTZ and outdoor IP cameras applications achieve high-power and high-speed connectivity with extreme reliability.

### Extra Power

- Up to 48-port Gigabit TX/SFP PoE+ links
- 15.4W / 30W / 36W / 60W PoE/PoE+ wide PoE output selection
- Supports a wide range of power inputs from 12V to 48VDC
- Wide selection of PoE/PoE+ switches, splitters,

### Full Spectrum of Hardware and Software

- Full PoE PSE portfolio of L3/L2 10GbE/GbE/FE switches
- Full range of PoE PD (powered devices)
- SmartPoE for easy PoE linking and power management

### Optimized Reliability

- 3 kV LAN surge protection
- -40 to 75°C operating temperature range
- Fast Ethernet redundancy under 20 ms (@250 switch)

### SmartPoE Technology

Through SmartPoE, Moxa's PoE/PoE+ switches can power any PoE-powered devices connected to your PoE network with ease and efficiency.

SmartPoE supports all types of PDs for smart configuration, efficient utilization, and easy maintenance.

#### Smart Diagnostics

- Auto PD detection of power class, status, and errors
- Smart suggestions for PD configuration

#### Smart Powering

- Power modes for IEEE 802.3af/at, legacy and nonstandard PDs

#### Smart Monitoring

- PoE output timetabling and monitoring
- Smart cutoff and active event warning
- LED indicators for easy maintenance

**Download**
10 PoE Applications

## Managed PoE+/ PoE Switches

Up to 48 PoE+ | Full GbE | Modular | 36 W | * 60 W | 3G Combo | EN 50155

| | ICS-G7852A/ 50A/48A | ICS-G7752A/ 50A/48A | EDS-G512E-8PoE | IKS-6728A-8PoE | EDS-P510A-8PoE | EDS-P506E-4PoE | EDS-P510 | TN-5508-4PoE TN-5516-8PoE |
|---|---|---|---|---|---|---|---|---|
| Ethernet Ports | 0 / 2 / 4 10GbE +48 GE | 0 / 2 / 4 10GbE +48 GE | 12 GE | 4 GE + 24 FE | 2 GE + 8 FE | 2 GE + 4 FE | 3 GE + 7 FE | 8/16 FE |
| PoE Ports | 48 PoE+ | 48 PoE+ | 8 PoE+ | 8 / 16 / 24 PoE+ | 8 PoE+ | 4 PoE+ | 4 PoE | 4/8 PoE |
| PoE Output | 36 W | 36 W | 36 W | 36 W | 36 W | 60 W | 15.4 W | 15 W |

* Available in Q4 2017



## An Application Note

### Smart Factory Automation

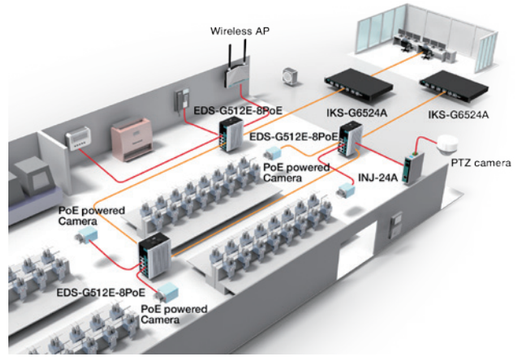
In a factory environment, a high density of devices, along with their specific power requirements, pose challenges with regard to interference avoidance and system maintenance. Moxa's PoE/PoE+ portfolio helps factory floors power, CCTV surveillance and Wi-Fi infrastructure for improved smart factory applications.

#### System Requirements

- Reduced cabling and interference
- High capacity and reliability for data and power transmission

#### Why Moxa?

- A wide selection of GE/FE copper/fiber PoE/PoE+ modules
- Up to Gigabit 60W, and 48G 36W PoE+ output
- -40 to 75°C operating temperature range
- Rich options of PoE-powered IP cameras and wireless devices




## An ITS Network in India

### 24×7 HD City Surveillance

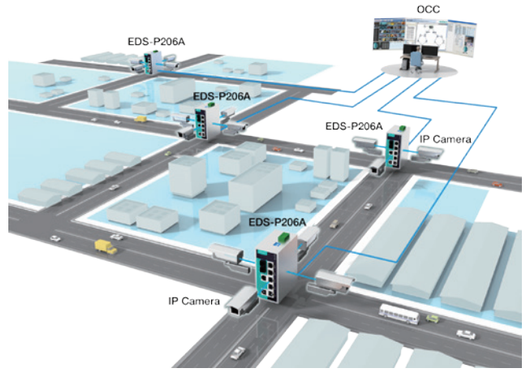
A safe-city project includes 1250+ HD IP cameras and covers 440 junctions to ensure public safety in a city.

#### System Requirements

- PoE capability for connecting PoE IP cameras
- Long-distance transmissions and durability to withstand harsh outdoor conditions

#### Why Moxa?

- EDS-P206A-4PoE switches were selected to support every IP cameras on the streets with high-power and high-speed video links with a zero drop rate
- Outdoor stability with diverse industry standards compliance
- -40 to 75°C operating temperature range and a humidity range of up to 95%




### PoE/PoE+ Showcase

#### EDS-G512E-8PoE Series

**12G full Gigabit PoE+ switches**

- 8-port 36 W PoE+ links
- V-ON for multicast Gigabit redundancy under 50 ms
- IEC 62443-4-2 compliance for higher device security
- Level-4 EMS immunity

Hot-Selling

#### IKS-6728A-8PoE Series

**24+4G-port modular PoE+ switches**

- Up to 24-port/720 W full loading
- Up to 36 W output per PoE+ port
- 3 kV LAN surge protection

60 W Output

#### INJ-24A Series

**60 W GbE PoE+ Injectors**

- Up to 60 W PoE+ output
- 3 kV LAN surge protection
- 24/48 VDC redundant power inputs

### Powered Device

-40 to 75°C

#### VPort 56-2MP VPort 36-1MP Series

**H.264 PoE Box IP camera**

- HD 1280 x 720 resolution
- -40 to 75°C operating temperature range
- Day-and-night viewing

IEEE 802.11n

#### AWK-3131A/4131A Series

**802.11n wireless AP/ bridge/client**

- 802.11n MIMO throughput
- Millisecond-level Turbo Roaming

See page 17

## Unmanaged PoE+/ PoE Switches

Full GbE | Good Value | EN 50155

| | EDS-G205A-4PoE | EDS-P206A-4PoE | EDS-P308 | TN-5308-4/8PoE |
|---|---|---|---|---|
| Ethernet Ports | 5 GE | 6 FE | 8 FE | 8 FE |
| PoE Ports | 4 PoE+ | 4 PoE+ | 4 PoE | 4/8 PoE |
| PoE Output | 36 W | 30 W | 15.4 W | 15.4 W |

60 W

| | INJ-24A | INJ-24 | IMC-P101 |
|---|---|---|---|
| Ethernet Ports | 1 GE | 1 GE | 1 FE |
| PoE Output | 60 W | 30 W | 15.4 W |
| PoE Input | 24/48 VDC | 24/48 VDC | 48 VDC |

Industrial Smart Switches

# The Best Fit for Your Control Cabinets

- Multi-Protocols for SCADA/HMI Monitoring
- Super Slim for Versatile Mounting
- Dashboard-Style UI for Easy Configuration
- IEC 62443-4-2 Level-1 Device Security

Industrial Unmanaged Switches

# The World's Best-Selling Industrial Unmanaged Switches

- Rugged Designs for Harsh Industrial Applications
- Redundant Dual Power Inputs
- MTBFs and Ultra-Low Failure Rates
- Diverse Industrial Standards Compliance

## Smart Field Experience and Efficiency

The beauty of complex factory automation and control systems lies in their ability to streamline processes. Moxa's smart switches simplify daily tasks with their easy configuration, installation, and field-site monitoring.

Designed for easy connections, SCADA/HMI monitoring, and higher controllability, the superslim SDS-3008 improves the factory-floor user experience with multiple major IA protocols (EtherNet/IP, PROFINET, ModbusTCP) capabilities, versatile mounting, LED display, and dashboard-style configuration.

The SDS-3008 switches also provide IEC 62443-4-2 level-1 security to devices to protect their performance and efficiency from cyberthreats.

**SDS-3008 series**

Industrial 8-port smart Ethernet switches

- Slim design for cabinets with confined spaces
- Dashboard-style UI for easy configuration
- Native EIP/PN/Modbus IA protocols
- Seamless HMI/SCADA monitoring
- Supports RSTP/STP redundancy
- LED display for easy maintenance
- ABC-02 backup for easy configuration restore

## A Stalwart of the Industrial IoT

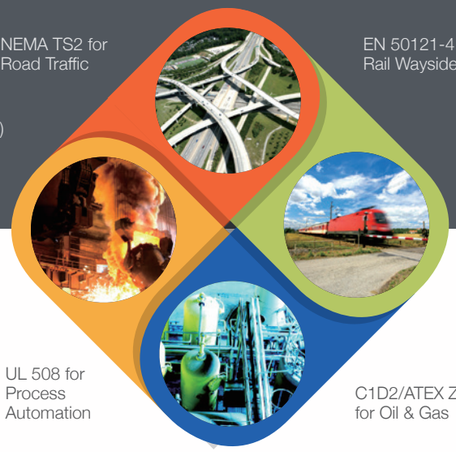
Moxa provides the world's most robust and best-selling unmanaged switches for industrial Ethernet infrastructure. (*)

Moxa's unmanaged switches uphold leading quality, including high MTBFs, low RMAs under 0.3%, and stringent standards that are required for operational reliability in harsh environments.

- Full Gigabit with fiber options
- Fanless and a -40 to 75°C wide operating temperature range
- Redundant power inputs
- High MTBFs and low RMAs (<0.3%)
- Diverse industry certifications
- 5-year warranty

NEMA TS2 for Road Traffic

EN 50121-4 for Rail Wayside



UL 508 for Process Automation

C1D2/ATEX Zone 2 for Oil & Gas

### Smart Monitoring

Seamless SCADA/HMI integration and monitoring through IA protocols, including EtherNet/IP, PROFINET, and Modbus/TCP

### Smart Mounting & Display

Best fit for control cabinets with upright mount/LED displays, or side mount/LED displays.

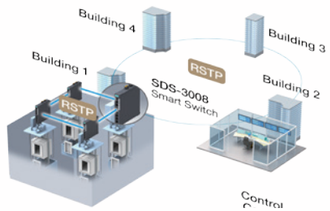
### Smart UI

A single-page user-friendly dashboard for easy navigation and configuration

## Best-Fit Applications

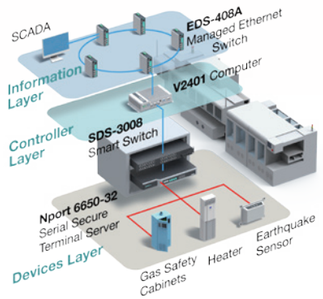
**Scenario:** Elevator Automation

**Needs:** Mechanic service engineers are not familiar with network deployment, management, and maintenance



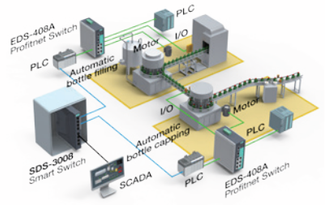

**Scenario:** Facility Management and Control Systems (FMCS)

**Needs:** Ensure the integrity of data collected from massive FMCS subsystems




**Scenario:** Bottling Process Plant

**Needs:** It is expected that the plant's SCADA/HMIs can monitor everything, including networking devices and network status.




### Why Moxa's Smart Switches?

- Smart UI simplifies operations during all phases
- Concurrent multiple IA protocols supported for spare parts and network design flexibility
- Profile-based monitoring allows remote monitoring for reduced downtime
- RSTP/STP for rapid network redundancy
- ABC-02 backup for configuration restore

**Video**
SDS-3008 Smart Switches

**Download**
Application Guide

+600 K Deployments

## EDS-205A/208A Series of unmanaged switches

The EDS-205/208A unmanaged Ethernet switches have proven to be durable winners that have stood the test of time in over 600,000 unit deployments.

The EDS-205A/208A switches offer the best value in terms of reliability and cost-efficiency for applications in harsh industrial environments (such as maritime, railway, highway, and mobile applications) and hazardous locations (such as oil and gas applications).

**Download**
2017 Smart Factory Solutions

*According to a report from IHS technology in December 2014.

## Unmanaged Ethernet Switches

**Full Gigabit**

EDS-G308 8G-port
EDS-G205 5G-port

- Fiber Gigabit connections
- 9K Jumbo frame supported
- Redundant dual 12/24/48 VDC inputs

**Gigabit & Fast Ethernet**

EDS-210A 8+2G / 9+1G-port

- Up to 4 10/100 FX or 8 10/100 TX Ethernet ports
- Redundant dual power inputs

**Fast Ethernet**

EDS-316 16-port
EDS-309 9-port
EDS-308 8-port
EDS-305 5-port
EDS-208A 8-port
EDS-205A 5-port
EDS-208 8-port
EDS-205 5-port

- Plug-n-play connections
- Broadcast storm protection
- Relay alarm for port and power failure (EDS-300 series only)
- Compact and cost-effective

| | Full GbE | | Fast Ethernet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | EDS-G308 | EDS-G205 | EDS-316 | EDS-309 | EDS-308 | EDS-305 | EDS-210A | EDS-208A | EDS-205A | EDS-208 | EDS-205 |
| No. of Ports | 8 | 5 | 16 | 9 | 8 | 5 | 10 | 8 | 5 | 8 | 5 |
| Gigabit RJ45/SFP Ports | 8/0, 6/2 | 4 RJ45 1 combo | – | – | – | – | 1/1, 0/1 | – | – | – | – |
| 10/100TX Ports | – | – | 16, 15, 14 | 6 | 8, 7, 6 | 5, 4 | 4, 8 | 8, 7, 6 | 5, 4 | 8, 7 | 5 |
| 100FX Ports | – | – | 0, 1, 2 | 3 | 0, 1, 2 | 0, 1 | 4, 1 (SFP) | 0, 1, 2 | 0, 1 | 0, 1 | – |

# Unbreakable Wireless Networks

- 802.11n MIMO Throughput
- Power and Antenna Input Isolation Protection
- AeroMag for Easy Wi-Fi Deployment and Maintenance
- AeroLink Protection for Wi-Fi Failover
- Millisecond-Level Handover

## Strengthen Wireless Connectivity

You don't need to put up with unreliable wireless connections anymore due to surrounding interference, obstacle links, or slow failover.

Moxa's WLAN solutions combine 802.11n speed and MIMO coverage with Turbo Roaming technology that enables fast roaming within milliseconds; AeroMag that provides easy and fast network deployment and maintenance; a dual isolation design that protects both power and antennas from electrical interference; and a set of industrial-grade designs such as anti-vibration and wide operating temperatures to achieve unbreakable wireless connection in challenging conditions.

### Easy Deployment and Maintenance

Moxa's AeroMag technology can save you significant time and effort with AeroMag device settings for easy and error-free wireless deployment and maintenance without affecting the network security.

- One-step configuration of multiple Wi-Fi device settings
- One click for device changes, channels refresh and optimization
- Zero configuration for adding new Wi-Fi devices into existing networks

### Maximum Availability

- Turbo Roaming for fast handoffs under 150 ms
- AeroLink Protection for redundant Wi-Fi links
- MXstudio management for live-view monitoring and alerts

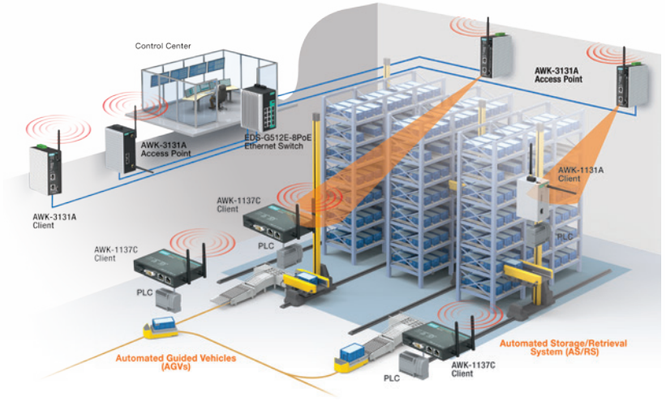
### Rugged Reliability

- 500 V insulation on power and antenna ports for noise avoidances against electrical interference
- Fanless, -40 to 75°C wide operating temperature range
- Anti-vibration design

## Construct Reliable AGV and AS/RS*Applications

### Challenges

- Wireless network deployment and maintenance is complex
- Surrounding EMI/RFI noise
- Signal obstructions in signal paths
- Harsh environments




*AGV stands for Automated Guided Vehicle; AS/RS for Automated Storage and Retrieval Systems

### AWK-3131A Series Wi-Fi Access Points

- AeroMag for easy and optimized configuration of APs
- 500 V insulation at the antennas ports against factory-floor noise
- 2 x 2 MIMO dual antenna for extended signal coverage
- -40 to 75°C wide operating temperature range

### AWK-1137C Series Wi-Fi Clients

- AeroMag for automatic AP-Client links and channel refresh
- 2 x 2 MIMO dual antenna for extended signal coverage
- Turbo Roaming for secure and fast handovers < 150 ms
- 500 V insulation against noise from AGV's onboard motors
- Anti-vibration with IEC 60068-2-6 standards
- -40 to 75°C capability for sub-zero temperature operations

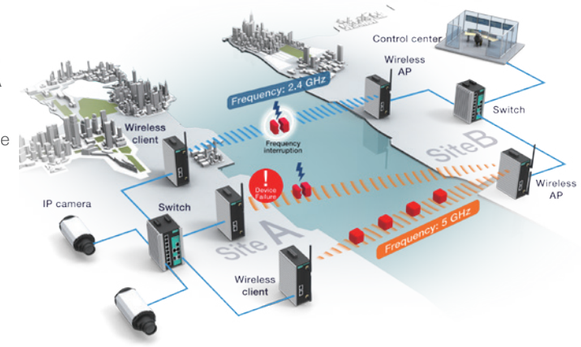


## AeroLink Protection

### Enables the Most Reliable P2P Connection

Moxa's AeroLink Protection harnesses the full speed of 802.11n MIMO throughput for mission-critical point-to-point connections in the AWK-A Series. AeroLink Protection provides the most reliable end-to-end communication by setting up multiple wireless backup connections at each client end, and then running auto switchover between the available backups once the active device or frequency is down.

- Auto switchover between active/backup radio links
- End-to-end recovery < 300 ms
- Supports two or more redundant radio links




White Paper
Redundant Wireless Bridges

### An FA Network in Japan

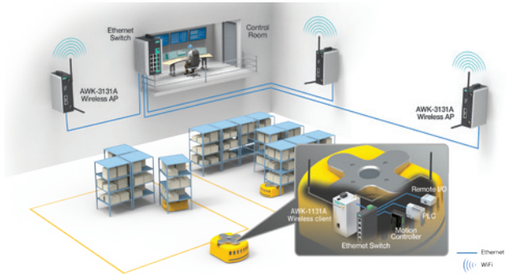
#### Smart Wireless AGV Warehouses

A wireless AGV system was built to improve inventory accuracy.

- Uninterrupted wireless operation
- Configurable roaming sensitivity to adapt to different-sized factories
- Device reliability withstands harsh environments

#### Solution & Benefits

- All AWK devices support fast roaming under 150 ms.
- Easy to adjust roaming parameters to fulfill different roaming requirements
- Dual isolation protects power and RF ports from an inrush current interference



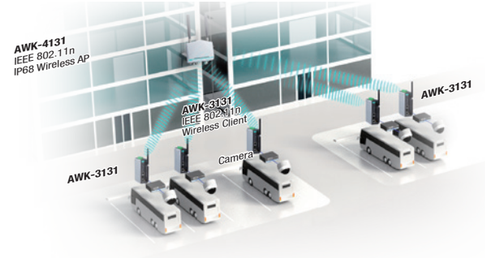

### An ITS Network in the US

#### Video Transmission for A Bus Surveillance

In order to provide a stable transmission of surveillance video of buses entering a bus depot, a rugged design was required for both on-vehicle clients and outdoor APs to ensure robust operations.

#### Solution & Benefits

The AWK clients and APs use IEEE 802.11n and MIMO (multiple in multiple out) technologies to achieve HD event video transmissions.




Download
Industrial Wireless Success Stories

### AWK-A Series Portfolio

**AWK-4131A Series**
Industrial 802.11n AP/Bridge/Client
- One SFP Gigabit combo
- IP68 protection
- AeroMag AP enablement

**AWK-3131A Series**
Industrial 802.11n AP/Bridge/Client
- One RJ45/SFP Gigabit combo
- AeroMag AP enablement

**AWK-1131A Series**
Industrial 802.11n AP/Client
- One Gigabit link
- Supports MAC clone for Ethernet client

**AWK-1137C Series**
Industrial 802.11n Client
- Two Ethernet ports
- One serial interface
- AeroMag client enablement

| | AWK-4131A | AWK-3131A | AWK-1131A | AWK-1137C |
|---|---|---|---|---|
| **Standards** | 802.11a/b/g/n up to 300 Mbps | | | |
| **No. of RFs** | 1 (2.4/5 GHz), capable of 5 GHz DFS for reduced channel congestion | | | |
| **AP Capacity** | Max 60 Clients/AP | Max 60 Clients/AP | Max 30 Clients/AP | n/a |
| **AeroMag** | AeroMag AP | | n/a | AeroMag Client |
| **Dual Isolation** | Power and antenna isolations | | | |
| **Wi-Fi Redundancy** | AeroLink Protection for redundant Wi-Fi links | | n/a | n/a |
| **Wi-Fi Handover** | Client-based Turbo Roaming < 150 ms handover | | | |
| **Stability** | Anti vibration with IEC 60068-2-6 compliance | | | |
| **Operating Temp** | -40 to 75°C | -25 to 60°C / -40 to 75°C | 0 to 60°C / -40 to 75°C | |
| **Approvals** | UL 60950-1, CE/FCC/TELEC with DFS | UL 60950-1, CE/FCC/TELEC with DFS<br>UL/cUL CID2, ATEX Zone 2 | UL 60950-1, CE/FCC/TELEC with DFS | |

Industrial 4G LTE Cellular

# Secure Remote Access over 4G Cellular

- Supports European and U.S. LTE Bands
- IEC 62443-4-2-Compliant Device Security
- Dual SIM and GuaranLink for Reliable Connectivity
- VPN Connection with IPSec, GRE, and OpenVPN Support
- Cost-Effective Private IP Connections

## Secure and Reliable 4G LTE Access

Cellular reliability is always a top priority in mission-critical applications. Moxa's industrial cellular products come with dual SIMs and four-tier GuaranLink to reinforce cellular redundancy. The OnCell products embed ICAS-required cybersecurity and VPN capability to secure data transmission over 4G LTE broadband. Together with OCM (OnCell Central Manager), which applies IP blocking to prevent unauthenticated IP attacks, OnCell LTE solutions ensure the security and stability of the remote connections monitored by you.

### OnCell G3150A-LTE Series

Industrial LTE Serial/Ethernet IP Gateways

- Up to 50 Mbps LTE uplink
- Serial-to-cellular for legacy bridging
- Dual SIMs and GuarantLink for uninterrupted connections
- Dual power inputs and isolation protection
- ESD level-4 antenna-port protection
- ATEX, IECEx certifications
- IPSec, GRE, and OpenVPN support
- IEC 62443-4-2 level-1-compliant cybersecurity

### Robust Connections

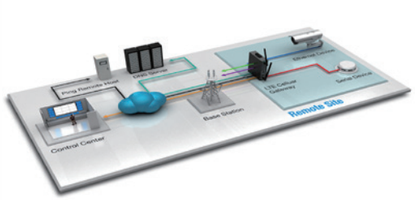
The OnCell Series of gateways comes with dual SIM for cellular service redundancy, and a GuaranLink mechanism that enables a four-tier connection check for maximum uptime and real-time alerts in the event of any link failures.

### Secure Connections

Built with IEC-62443-4-2-compliant security, the OnCell G3150A-LTE supports IPSec, GRE, and OpenVPN server/client to establish VPN tunnels between two networks. Together with OCM's private IP blocking, the OnCell G3150A-LTE prevents unauthorized IP access to secure

### Hardware Reliability

Coupled with dual power inputs and an extreme operating temperature range, the OnCell G3150A-LTE features power isolation and high-level EMS immunity to ensure operational reliability in harsh environments.



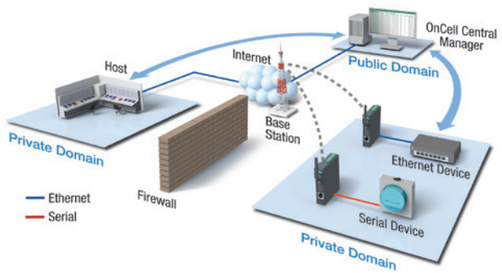
**Download**
LTE Gateways Applications

Watch over Your Cellular Access

## OnCell Central Manager (OCM)

Moxa's OCM hosts centralized private IP management to manage OnCell devices with easy-to-view and secure IP enrollment, configuration, monitoring, and firmware updates over the Internet. The OCM tool allows remote data pooling and forwarding via a private IP connection for secure data communication.

- Cost-effective and secure private IP connectivity
- End-to-end data exchange over the Internet
- Remote access for OnCell device management, grouping, monitoring, configuration, and firmware upgrade
- Easy-to-view device monitoring on various platforms






## An ITS Network in Europe

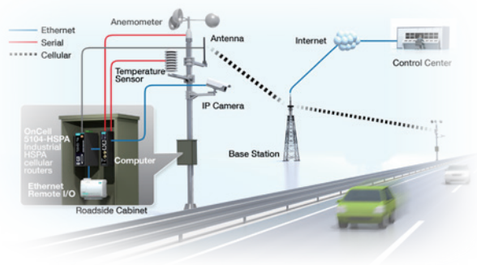
### Reliable Cellular for Real-Time Road Traffic Monitoring

System Requirements

- High-bandwidth cellular network for data and high-quality image transmissions
- Multiple LAN ports are required to connect several devices to ease cabinet installation
- Redundant mechanism to deliver real-time traffic information

Why Moxa?

- OnCell 5104-HSPA offers up to 14.4/5.76 Mbps (download/upload)
- Four built-in Ethernet ports for multiple device connections in a small cabinet
- Dual-SIM cards provide a backup option in case a link fails




## An Application Note

### Intelligent Transportation Systems

System Requirements

- High-bandwidth wireless network to transmit traffic information fast to the traffic control center
- Equipment that can withstand harsh environments and high temperatures inside roadside cabinets for 24/7 operations
- Easy deployment and maintenance of a large number of remote devices

Why Moxa?

- 4G-LTE data rates of up to 50 Mbps upload for smooth data transmissions
- Dual-SIM and GuaranLink feature for redundant cellular links
- Flexible serial/Ethernet-to-cellular link for flexible ITS network integration
- OCM provides web-accessible remote configuration and monitoring for easy deployment and maintenance with reduced downtime

## An Application Note

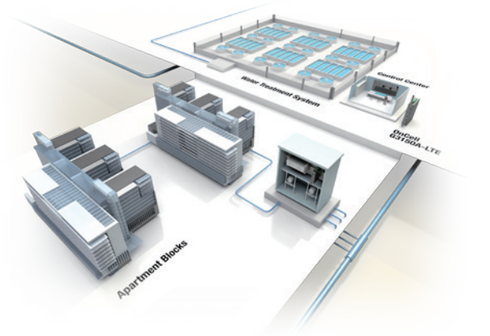
### Water Treatment Systems

System Requirements

- Secure and reliable long-distance transmissions of process parameters
- Access to private IP devices from the Internet for centralized management and control
- Easy to troubleshoot connection issues

Why Moxa?

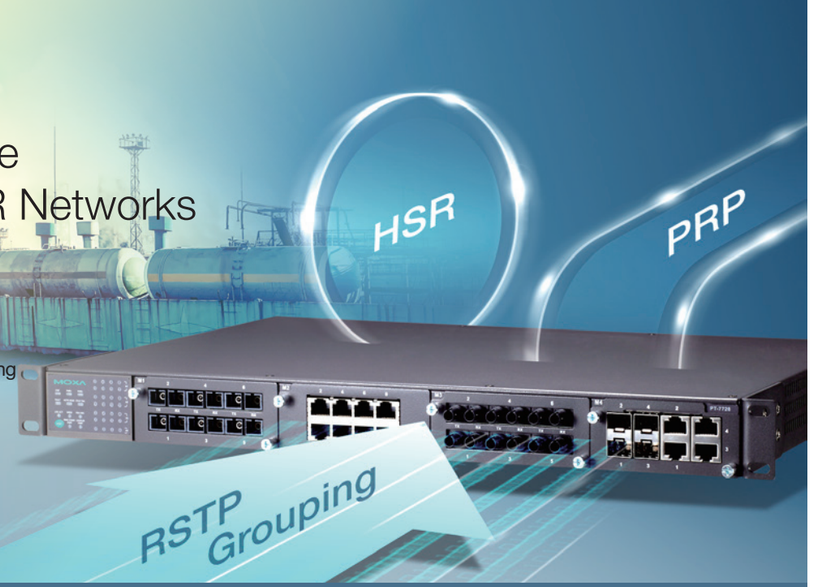
- IEC 62443-4-2-compliant cyberdefense to prevent unauthorized access
- Multiple VPN tunnel options for secure connections
- Front-panel LEDs for easy link diagnostics
- OCM makes mobile device management easy and secures data exchange and access control over the Internet through centralized private IP management



| | OnCell 3150A-LTE | OnCell 3470A-LTE | OnCell 5104-HSPA | OnCell G3150-HSPA | OnCell G3151-HSPA | OnCell G3151 | OnCell G3251 |
|---|---|---|---|---|---|---|---|
| **4G** | LTE | LTE | | | – | | |
| **3G** | UMTS/HSPA | | | | UMTS/HSPA | – | |
| **2G** | GSM/GPRS/EDGE | | | | | GSM/GPRS | |
| **Ethernet LAN** | 1 x 10/100M | 4 x GbE | 4 x 10/100M | 1 x 10/100M | 1 x 10/100M | 1 x 10/100M | 1 x 10/100M |
| **SIM** | 2 x 3 V | 2 x 3 V | | 1 x 3 V | 1 x 3 V | | 1 x 3V |
| **Serial** | 1 x RS-232/422/485 | – | – | | 1 x RS-232/422/485 | | 2 x RS-232/422/485 |
| **VPN** | IPSec, GRE, OpenVPN | IPSec | | | – | | |
| **I/O** | 2 DI, 1 DO | | | | – | | |
| **Power** | Dual 12-48 VDC | | | | Single 12-48 VDC | | |
| **Operating Temperature** | 0 to 55°C or -30 to 70°C | -30 to 55°C or -30 to 70°C | | | -30 to 55°C | | |

IEC 61850-3 Ethernet Switches

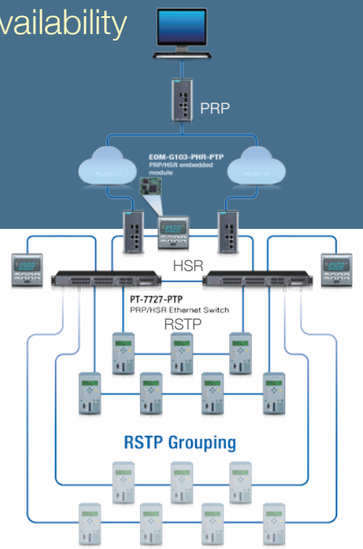
# A Switch to Migrate RSTP to PRP/HSR Networks




- PRP/HSR Zero-Time Recovery
- Up to 24+4G Modular Switching
- RSTP Grouping for HSR-RSTP Coupling
- IEC 61850-3, IEEE 1613 Class 2, IEEE 1588v2 Compliant

## A Flexible Topology and Budget for PRP/HSR Availability

Zero failover time is becoming the new standard for mission-critical industrial applications (such as power systems) to prevent downtime and costly losses. To leverage bumpless PRP (Parallel Redundancy Protocol) and HSR (High-availability Seamless Redundancy) protocols, which are defined in IEC 62439, Moxa's PRP/HSR solutions ensure more than zero packet loss and zero-time redundancy, as they also bridge legacy RSTP devices to PRP/HSR networks with flexible hybrid topologies and budget options for substations that want to construct new networks or add PRP/HSR segments to their existing RSTP




### Legacy Migration

Leveraging the interoperability between PRP, HSR, and RSTP protocols, the PT-7728-PTP switches allow groups of RSTP devices and SANs (Single Attached Nodes) to interconnect to enlarge the PRP/HSR network coverage at no extra costs.

### Advantage and Availability

Through couplings of RSTP and HSR rings, the PT-7728-PTP extends the lifespan of the legacy devices and infrastructures, and also enables zero-time failover to achieve the highest network availability with IEC 62439-3 PRP/HSR support.

### Proven Interoperability

The PT-7728-PTP switch demonstrated its redundancy and interoperability capabilities in the 2015 PRP/HSR Interoperability Test, conducted by UCAIug. Moxa's PT-7728-PTP and PT-G503 RedBox were the only DUTs (devices under testing) that provided dual connections between PRP/HSR and RSTP network segments.

### Moxa's PRP/HSR Portfolio

| PT-7728-PTP PRP/HSR Switch | PT-G503-PHR-PTP PRP/HSR RedBox | DA-820 PRP/HSR Computer | EOM-G103-PHR-PTP PRP/HSR Embedded Module |
|---|---|---|---|
| Connects multiple SANs and RSTP devices to a PRP/HSR network | Quickly enables legacy devices to connect with a PRP/HSR network | Visualizes management for PRP/HSR devices and network connection | Easy integration to turn a SAN device into a PRP/HSR connection |

### RSTP Grouping

The PT-7728-PTP features RSTP Grouping that enables multiple couplings of RSTP rings to HSR-based networks. A pair of PT-7728-PTP switches can migrate more than a thousand RSTP devices to HSR networks—far more than the maximum of 40 hops allowed in a typical RSTP ring.

The technology creates valuable flexibility for substations that want to add PRP/HSR segments to their legacy RSTP-based networks.

### PT-7728-PTP Series

24+4G PRP/HSR
Modular Rackmount Switches

- 4G-port PRP/HSR module for zero-time failover
- RSTP Grouping for multiple couplings of HSR and RSTP
- IEEE 1588v2 nanosecond-level synchronization
- Isolated redundant power inputs
- -40 to 85°C operating temperature range
- Built-in MMS data modeling for SCADA in power systems



## A Power Conversion System in South

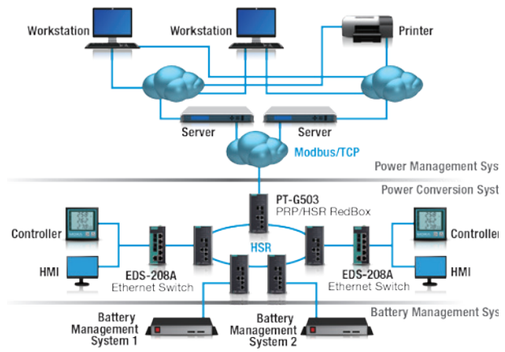
### HSR Redundant Solutions in an Energy Storage System

Project Requirements

Implementing an ESS (Energy Storage System) network that allows the remote monitoring of the battery status of a 345-kV power generation substation

Why Moxa?

- PT-G503 makes HSR network configuration easy
- One dedicated Ethernet console for monitoring and troubleshooting
- Fiber Check™ provides monitoring and diagnostic functionality on SFP fiber ports




## An Enterprise Substation in the North

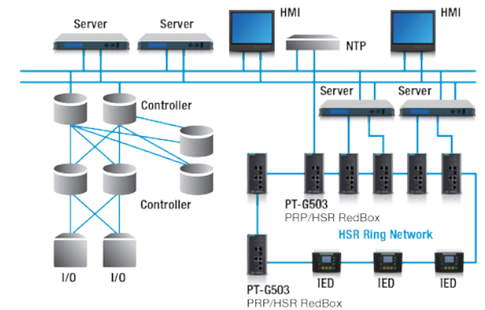
### PRP/HSR Solution for DCS of an Enterprise Substation

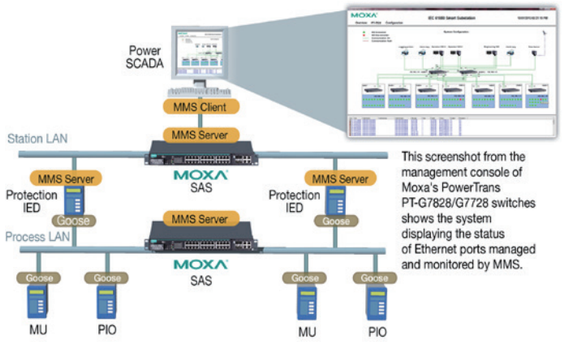
Project Requirements

The integration of an IEC 61850-3 Ethernet switch and Redbox into an Experion process server and IEC 61850 SCADA server for the underlying DCS of an enterprise substation.

Why Moxa?

- PT-G503 supports both PRP and HSR for flexible configuration
- Allows fiber port monitoring




This screenshot from the management console of Moxa's PowerTrans PT-G7828/G7728 switches shows the system displaying the status of Ethernet ports managed and monitored by MMS.

**Coming Soon**

### PT-G7728/G7828 Series

28-port Full GbE Layer 2/Layer 3 Modular Switches

- IEC 61850-3 Edition 2 Class 2 compliance
- Hot-swappable power modules and media modules
- Up to 28-port IEEE 1588v2 PTP
- IEC 61850-90-4 MMS data modeling for power SCADA
- 0.5U modular design with thumb screw
- Single-side cabling and dual-side LED displays

**Download**
**IEC 61850 Substation Guidebook**

### PowerTran IEC 61850-3 MMS Switches Portfolio

| | PT-G7828/G7728 (Availabile round Q2, 2017) | PT-7828/7728 | PT-7528 | PT-7728-PTP | PT-G503 |
|---|---|---|---|---|---|
| Max. No. of Ports | 28 | 28 | 28 | 28 | 3 |
| Max. Gigabit | 28 | 4 | 4 | 4 | 3 |
| Max. of PTP Ports | 28 | – | – | 14 | 3 |
| Layer 3 | PT-G7828 only | PT-7828 only | – | – | – |
| MMS Server | ✓ | PT-7728 only | ✓ | ✓ | ✓ |
| Standard Redundancy | RSTP/STP/MSTP | | | PRP/HSR, RSTP/STP/MSTP | PRP/HSR |
| Proprietary Redundancy | Turbo Ring, Turbo Chain | | | | ✓ |
| RSTP Grouping | ✓ | By request | By request | ✓ | ✓ |
| IEC 61850 QoS | ✓ | ✓ | ✓ | ✓ | – |
| Reliability | IEC 61850-3 and IEEE 1613 Class 2 Certified, -40 to 85°C operating temperature range | | | | |

EN 50155 Ethernet Switches

# Your Trusted Partner in Rail Automation

- Greater Ethernet Compatibility Across Different Train Builders
- Real-Time Responses to Traffic Demands
- Automatic Inter-Carriage Links
- Reliable Wireless Train-to-Ground Connections

## Full Ethernet Connected Railways

Traditionally, the rail industry has relied on disparate networks to keep trains rolling on train lines. Divergent networks bring rail systems multiple services but also tangible and intangible costs.

Moxa is the world's first IRIS-certified manufacturer that provides a complete portfolio of EN 50155 rugged Ethernet products. These products have been widely deployed in many rail and metro systems around the world.

With innovative solutions and technologies, Moxa helps rail customers capitalize on full-fledged Ethernet-integrated networks that connect trains to the trackside and all the way back to control center to achieve overall transport safety, efficiency, and significant cost savings and time-savings on railway operation and maintenance.

Future-Oriented Networks

### IEC 61375 for Train-Wide Networks

IEC 61375 is the new standard for onboard Ethernet Train Backbone (ETB) to ensure onboard interoperability between local consist subnets, regardless of their respective network technology and manufacturer.

Tailored to IEC 61375 standards, the TN-5916 routers automatically assign IP addresses to the onboard devices of each consist to enable highly flexible and reliable interconnections between ETB and Ethernet Consist Network (ECN).

TN-5916 ETBN Series

EN 50155 16-port ETBN Router

- IEC 61375-2-5/-2-3 compliance
- Dual bypass relay
- Dual power with 24 to 110 VDC range

Passenger-Oriented Safety and Services

### Improves Passenger Experience

The TN-4500A M12 managed switches drive higher connection capacity and higher PoE power output to improve operational efficiency and passenger services in space-limited onboard environments.

The TN-4500A Series provides up to 28-port Ethernet to accommodate video surveillance and more passenger services, up to two Gigabit fiber ports for reliable broadband transmission, and up to four port Gigabit for optional bypass relay functionality. The switch delivers up to 120W PoE+ power output to support Wi-Fi devices and IP cameras with no extra power wiring needed.

TN-4500A Series

EN 50155 M12 Ethernet Switches

- 16, 24 and 28-port models
- Up to 4 Gigabit ports with up to 2 Gigabit fiber
- Up to 20 PoE+ ports, 120 W power budget
- Dual power with 24 to 110 VDC range

### EN510155 ToughNet Switches

| | TN-5916 | TN-5816A/5818A | TN-4500A | TN-5518A/5510A | TN-5516A/5508A | TN-5308 |
|---|---|---|---|---|---|---|
| Gigabit | – | 2 | Up to 4 | 2 | – | – |
| Fiber | – | – | Up to 2 | Up to 2 | – | – |
| Fast Ethernet | 16 | 16 | 12/20/24 | 16/8 | 16/8 | 8 |
| PoE/PoE+ | – | – | Up to 20 PoE+ | Up to 8 PoE+ | Up to 8 PoE+ | 8 PoE |



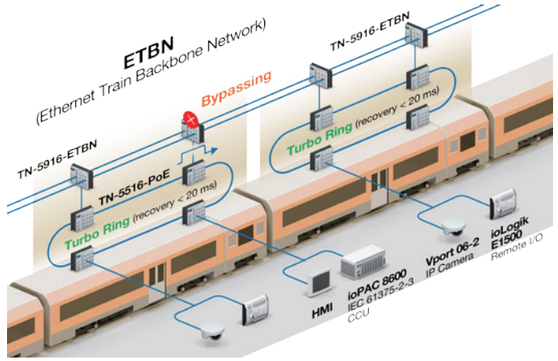
Onboard Architecture

### Integrated IP solutions for TCMS Networks

Moxa's TCMS (Train Control and Management System) network solution consists of a controller and Ethernet router. Compliant with IEC 61375, the TN-5916 ETBN acts as an ETBN router and the ioPAC 8600 IO controller as a non-critical Computer Control Unit (CCU) to control end devices, such as IP cameras and remote IOs, in Train Real-time Data Protocol (TRDP) networks. Moreover, to provide comprehensive solutions, our VPort06-2 also supports IEC 61375-2-3, making it able to communicate with ETBN via a TRDP network.

IEC 61375 ETBN

- Ethernet bandwidth is up to 100 Mbps.
- With auto train-level IP assignment and R-NAT, no more effort is required to define IP schemes for different consists and trains.
- No communication interruptions in consists when a train is coupled and decoupled.
- With TCN-DNS, no effort is required to change or remap IP addresses when a train's direction is changed.
- No proprietary communication to be defined in devices and trains




Why Moxa?

## Reliability and Availability

- Bypass relay in linear topology
- Turbo Ring for Ethernet redundancy under 20 ms
- EN 50155 compliance and M12 connectors for robust connections
- -40 to 75°C operating temperature range
- Dual power with wide power input range

Train-to-Ground Architecture

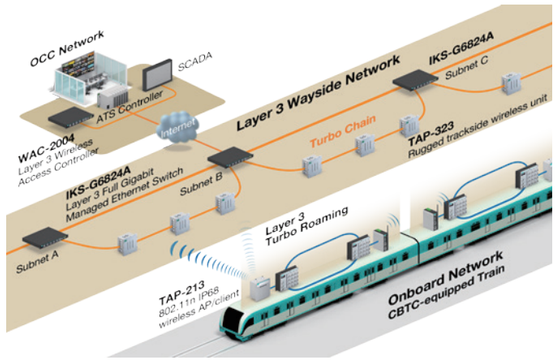
### Travel Along with Wireless

In most metros, a wayside network consists of several subnets distributed across multiple base stations that require train-to-ground wireless networks that include onboard radio clients and wayside APs. All the devices need redundant links to manage and minimize the network outage.

Wayside APs are connected to different subnets by physically linking to station routers. Furthermore, higher redundancy, such as Moxa' Turbo Chain or RSTP, should be deployed while attaching those APs to the main backbone network.

Onboard, two clients are placed at each end of the train and associated by AeroLink Protection Wi-Fi redundancy. Each client connects to different wayside APs, and only one radio link is active at a time.

To secure communications across subnets, Moxa Wireless Access Controller (WAC-2004) enables a Layer-3 handover that conducts roaming delay of less than 50 ms. For safe operations, this capability allows for the seamless exchange of data between a moving train and the trackside.




Why Moxa?

## Train-to-Ground Wireless Solutions

- Sub-50 ms layer 2/layer 3 fast secure roaming
- Up to 300 Mbps data rate for critical train-to-ground data transmissions
- Network latency under 1 ms
- EN 50155 compliant reliability
- IP 68 rated and full-function wireless units

| | WAC-2004 | TAP-323* | TAP-213** |
|---|---|---|---|
| Standard | – | 802.11a/b/g/n | 802.11a/b/g/n |
| No. of Radio | – | 2 dual-band radios | 1 dual-band radio |
| Wi-Fi Handover | – | Sub 50 ms wireless roaming (w/WAC-2004 controller) | Sub 50 ms wireless roaming (w/WAC-2004 controller) |
| Fiber | – | 2 | 1 |
| PoE | – | 4 x M12 | 1 |
| Redundancy | Primary/Backup Controllers | Turbo Chain / RSTP for wayside networking | AeroLink Protection for redundant Wi-Fi links |
| Reliability | – | IP 68 sealed, -40 to 75°C operating temperature range | |

* TAP-323 available in Q4, 2017; ** TAP-213 available at Q2, 2017

# A Long Reach and Big Savings With Existing Infrastructure

- Up to 100 Mbps Transmissions
- Plug-and-Play Deployment
- DSL Bypass and Millisecond-Level Redundancy
- Diverse Industry Certifications

## Ease and Reliability over Long-Distance Deployments

Simplifying long-distance network deployments is a challenge for engineers.

The IEX-408E is a managed Ethernet extender switch that provides long-reach transmissions over twisted-pair copper wiring, allowing users to leverage legacy or existing industry-specific cables for cost-effective and faster deployments.

The IEX-408E switch features plug-and-play installation, millisecond-fast redundancy, and multidrop connections over copper wires up to a 3-km distance or up to 100 Mbps speed in harsh environments.

### IEX-408E-2VDSL2 Series

Industrial 6 FE + 2 VDSL2 Ethernet Extender

- Auto CO/CPE negotiation for plug-and-play deployment
- Ethernet recovery < 50 ms
- DSL bypass for multidrop failure tolerance
- LED indicators for easy on-site troubleshooting
- Supports MXview for remote management
- Smart speed detection and adjustment
- 12/24/48 VDC or 110/220 VDC/VAC power inputs

# Ensure a Long Reach and Immunity for Critical Ethernet Extensions

- Gigabit Fiber Conversions
- Superior EMI Immunity
- Long-Distance Transmissions
- Industrial-Grade Reliability

## A Long Reach and High Reliability

Network speed, reliability, and cost-efficiency should be the top considerations when critical network infrastructure needs to be extended beyond the 100-meter Ethernet limit. Moxa offers industrial media converters that provide EMI-immune, Gigabit-speed extensions of up to 80 kilometers (over single-mode fiber) in harsh conditions.

Both IMC-101G and IMC-21GA fiber converters are perfect for megapixel machine vision inspection, public IP surveillance, and outdoor applications that are exposed to changeable elements but require a high level of performance reliability for real-time data transmissions over long-distance connections.

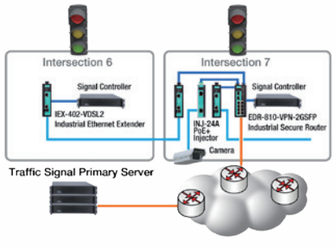
## Why DSL?

### I need to minimize user interruption

An ITS Application in North America

**Secure Traffic Signal and CCTV Monitoring**

- Easy installation with auto CO/CPE negotiation
- The IEX-402 DSL extenders support P2P connections over long distances through existing copper wires

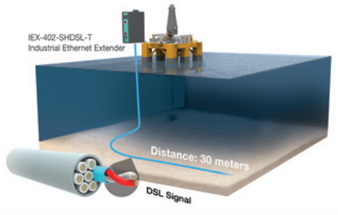



### My application requires specific cabling

An Oil & Gas Application in Australia

**Upgrading Subsea Oil & Gas Control with Existing Wires**

- Leveraging existing industry-specific cables for Ethernet extensions
- Compact, rugged, and a -40 to 75°C operating temperature range

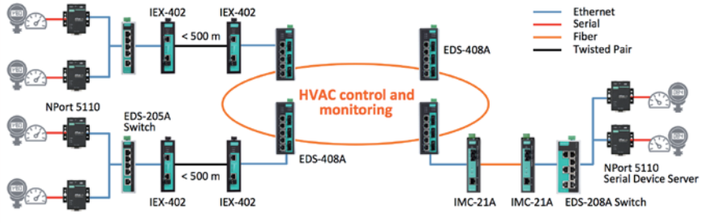


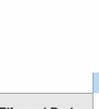

### Extending to larger bandwidth and long-distance networks

A Factory Automation Application in Taiwan

**Extended Factory Emission Treatment and Monitoring**

- The IEX-402 DSL Series supports hundreds of meters point-to-point data transmissions over existing RS-485/telephone wires



| | IEX-402-SHDSL | IEX-402-VDSL2 | IEX-408E-2VDSL2 |
|---|---|---|---|
| Ethernet port | 1 x 10/100M | 1 x 10/100M | 6 x 10/100M |
| DSL port | 1 x G. SHDSL | 1 x VDLS2 | 2 x VDLS2 |
| Distance | Up to 8 km | Up to 3 km | |
| Redundancy | Link Fault Pass-Through (LFP) | Link Fault Pass-Through (LFP) | Turbo Ring, Turbo Chain fast redundancy; DSL bypass |
| Power Supply | LV: 12/24/48 VDC (9.6 to 60 VDC) | | LV: 12/24/48 VDC (9.6 to 60 VDC)<br>HV: 110/220 VDC/VAC (88 to 330 VDC, 85 to 264 VDC) |
| Operating Temperature | -10 to 60˚C or -40 to 75˚C (T models) | | |
| Approvals | CE/FCC, UL 508, EN 50121-4<br>SafetyNET p | CE/FCC, UL 508, EN 50121-4<br>NEMA TS2, ATEX/C1D2 | CE/FCC, UL 61010, EN 50121-4, NEMA TS2,<br>ATEX/C1D2, IEC 61850-3 |

## Why Ethernet to Fiber?

### Long-Haul Options

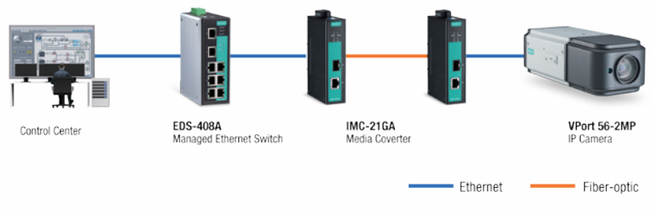
- IMC-21GA: Supports single-/multimode models with SC/ST connectors and SFP slots for flexible deployment from 0.5 km to 120 km
- IMC-101G: Supports single-mode fiber up to 120-km data transmissions

### Easy Maintenance

- Link Fault Pass-through to easily trace network link failures
- A compact size and DIN-rail mounting for easy installation
- LED indicators for easy maintenance

### Industrial Reliability

- Power failure and port break alarms by relay output
- Redundant power inputs
- -40 to 75°C operating temperature range
- Industry certifications for hazardous locations



| | IMC-101G Series | IMC-101 Series | IMC-21GA | IMC-21A |
|---|---|---|---|---|
| Ethernet Ports | 10/100/1000BaseT(X) | 10/100BaseT(X) | 10/100/1000BaseT(X),<br>auto MDI/MDI-X | 10/100BaseT(X), |
| Fiber Ports | 1000BaseSX/LSX/LX/LH/LHX/ZX/EZX | 100/1000BaseFX (SC or ST) | 100/1000Base-SX/LX or 100/1000BaseSFP slot | 100/1000BaseFX (SC or ST) |
| Fiber Modes | Multi-mode or single-mode | | | |
| Dual Power Input | 12 to 45 VDC | 12 to 45 VDC | 12 to 48 VDC | 12 to 48 VDC |
| Operating Temperature | 0 to 60°C , or -40 to 75°C | 0 to 60°C , or -40 to 75°C | -10 to 60°C , or -40 to 75°C | -10 to 60°C , or -40 to 75°C |
| MTBF | 500,540 hrs. | 401,000 hrs. | 2,762,058 hrs. | 353,000 hrs. |
| Certification | UL 508, LVD (EN 60950-1), Class 1 Div. 2, ATEX Zone 2, IECEx, CE (EN 55022 Class A, EN 55024), FCC Part 15 Subpart B Class A | | UL 60950-1<br>FCC Part 15 Sub part B Class A | |