Go Small for **Big Gains**

EDS-2005-EL/2008-EL Series Unmanaged Switches

- Credit-card sized footprint
- QoS to prioritize critical data
- Spring-type DIN-rail kit for easy installation

Scan to Learn More

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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Build Future-ready Network Infrastructure

- Network Management Suite
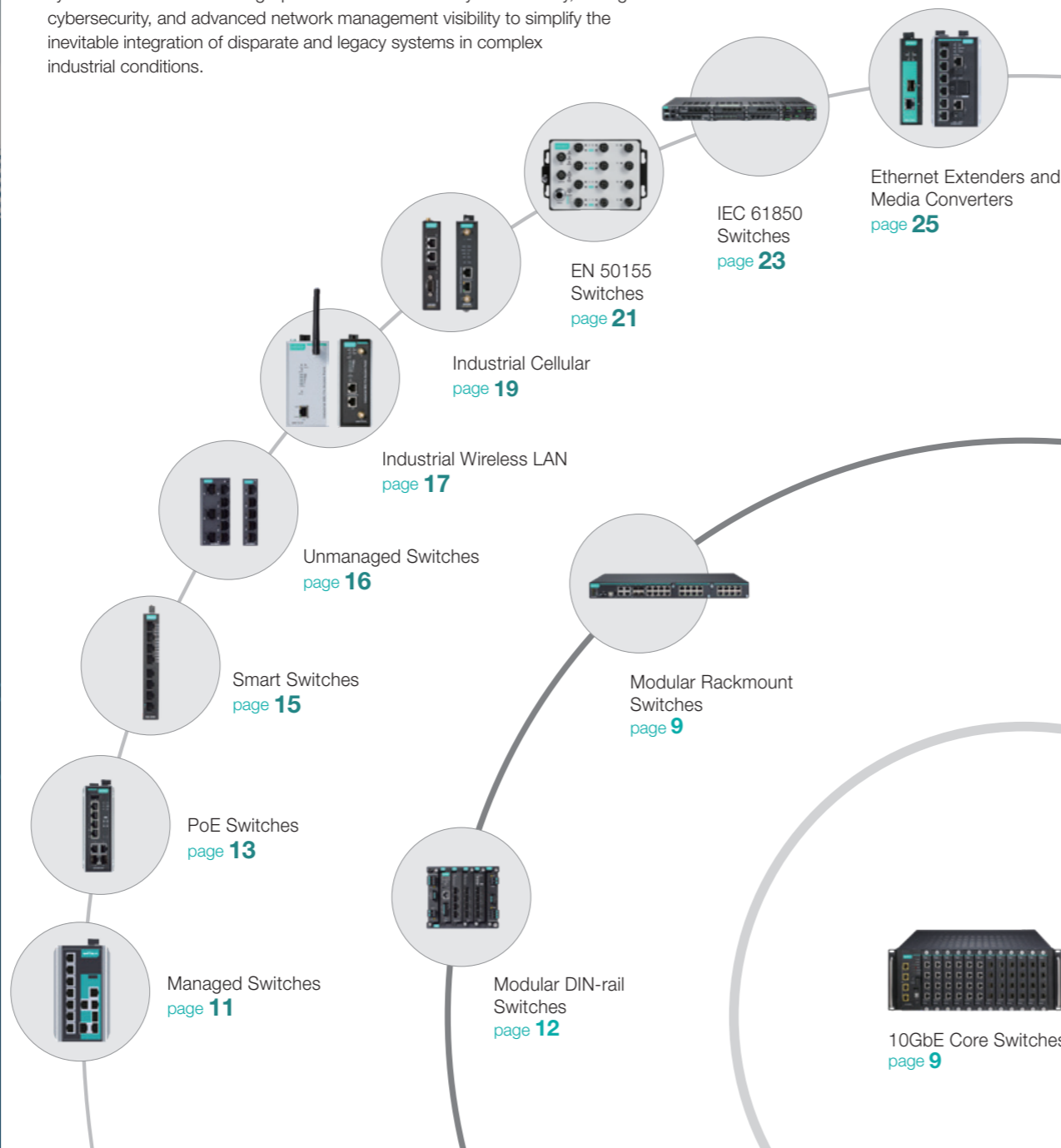- Industrial Cybersecurity
- Modular Gigabit Switches
- Unmanaged Switches
- Industrial Wireless

www.moxa.com

Build Future-ready Network Infrastructure

Enabling reliable connectivity for OT-IT convergence is key to creating a digital future that can accelerate data collection and utilization to boost operational efficiency, innovation, and growth in every industry.

Ensure that your networks can take on future challenges and opportunities. Moxa's large portfolio of industrial network infrastructure solutions helps customers optimize network systems that consolidate high-performance connectivity and mobility, strong cybersecurity, and advanced network management visibility to simplify the inevitable integration of disparate and legacy systems in complex industrial conditions.

Ethernet Extenders and
Media Converters
page **25**

IEC 61850
Switches
page **23**

EN 50155
Switches
page **21**

Industrial Cellular
page **19**

Industrial Wireless LAN
page **17**

Unmanaged Switches
page **16**

Smart Switches
page **15**

Modular Rackmount
Switches
page **9**

PoE Switches
page **13**

Managed Switches
page **11**

Modular DIN-rail
Switches
page **12**

10GbE Core Switches
page **9**

Security

page **3-6**

Defense-in-depth Cybersecurity

- Network devices with embedded security features
- Firewall, VPN, NAT, and secure routing for data and network protection
- IPS/IDS devices for in-depth OT network security
- Security dashboard for event detection and prevention
- Cloud-based secure remote access

Connectivity

page **9-26**

Industrial Ethernet Communication Backbone

- High-performance LANs composed of 10GbE/GbE/Fiber/PoE/DSL connections
- Highly robust wireless based on 802.11n Wi-Fi/4G LTE cellular
- Industry-proven availability and reliability
- Easy to use for OT-IT integration

Manageability

page **7-8**

Automation-friendly Network Management

- Easy mass deployment
- Live network monitoring
- Easy event tracking
- Mobile app and alerts
- RESTful APIs for easy integration

▶ Highlights

Industrial Cybersecurity

Moxa's industrial cybersecurity solution utilizes state-of-the-art IT technologies to protect mission-critical operations and assets in OT environments from malicious cyberactivities. The tiny IEC-G102-BP Series industrial IPS can detect and block malicious traffic from the network to edge devices and contain threats at the edge devices to secure your industrial networks with minimal efforts.

Optimal Modularity

Moxa optimizes your network connectivity with a compact yet super-robust MDS-G4000 Series modular managed switch to meet ever-changing demands via highly flexible, hot-swappable port configurations which help minimize lifecycle costs from installation to maintenance.

Edge Network Expanding

More data points bring more insights for meaningful improvement. Introducing the Moxa EDS-2000 Series, a lineup of industrial unmanaged switches with an extra-small footprint. These switches are ideal for edge network expansion in a variety of industrial applications that need proven reliability, easy deployment, and flexibility.

Long-lasting Wireless over Cat 1 LTE

The OnCell 3120-LTE-1 Series improves long-lasting power efficiency and LTE connection reliability for critical data collection from serial and Ethernet devices, consuming only 40 mW in hibernation mode for power-constrained remote applications.

Strengthen the Defense of

Your Industrial Networks

With cyberattacks targeting industrial networks more and more, it is crucial to identify and mitigate vulnerabilities before they can be exploited. Moxa provides holistic OT-IT integrated network security solutions to enhance your network defense against cyberthreats on two fronts.

One is to reinforce your network infrastructure to be equipped with device-by-device and layer-by-layer security capabilities to ensure legitimate data traffic on the network remains unaffected.

Secondly, you can add Moxa's industrial cybersecurity solution to protect your critical assets and networks with specific OT protocol and packet inspection, as well as pattern-based protection against vulnerabilities.

As the number of cyberincidents on ICS/SCADA networks continues to grow, industrial networks are no longer immune to internal or external cyberthreats.

▶ **Secure Network Infrastructure**
- Network management
- Network segmentation
- Network access control
- Secure remote access
- Data encryption

▶ **Industrial Cybersecurity Solution**
- Security management
- Network segmentation
- Industrial next-generation firewall
- Industrial IPS/IDS
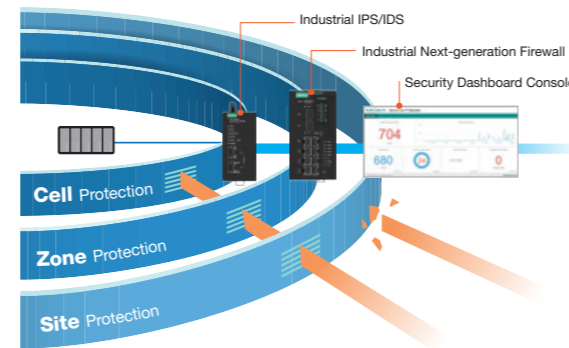- Whitelisting control

Moxa Security Advisories

The Moxa Cyber Security Response Team (CSRT) is taking a proactive approach to protect our products from security vulnerabilities and help our customers better manage security risks. To stay informed by receiving notifications about our product vulnerabilities and security updates, please subscribe to our Security Advisories at www.moxa.com.

▶ **Moxa Offers**
- Industrial IPS/IDS
- Industrial NGFW with IPS features
- Security management for event detection and response
- Industrial hardened networking devices with security functions

Learn more about our OT-IT Integrated Network Security Solution now

Industrial Cybersecurity Solution

Moxa's industrial cybersecurity solution is specifically designed to secure industrial networks from both an OT and IT perspective.

The solution protects the network with a holistic cell-to-site defense approach to help you create a multi-layer defense for your industrial network.

Industrial IPS/IDS
Industrial Next-generation Firewall
Security Dashboard Console

Cell Protection
Zone Protection
Site Protection

IEC-G102-BP Series
Industrial IPS/IDS
- Ultra-compact industrial security box with IPS/IDS
- Fine-grained policy enforcement with whitelisting control
- Bump-in-the-wire installation without impacting the network

Preliminary

IEF-G9008 Series
Industrial Next-generation Firewall
- Compact, security-hardened, and rugged design
- Fine-grained Layer 2 to Layer 7 firewall policy with IPS capability
- Industrial NAT and network segmentation

* Available in Q3, 2020

Preliminary

Security Dashboard Console
Security Management Software
- Centralized cybersecurity management with real-time dashboards
- OT visibility including device identification and network traffic analyzer
- Automatically deploy virtual patches without disrupting operations

* Available in Q2, 2020

Secure Network Infrastructure

▶ Moxa Offers

▶ Featured Products

Management
Network
Device

Network Management
Visualized management for security auditing and monitoring
- MXview / MXview ToGo
- MXconfig

Network Protection
Defense-in-depth protection for industrial control systems
- Industrial Secure Routers
- Secure Remote Access

Device Security
Hardened devices with embedded security functions
- Industrial Ethernet Switches
- Industrial Serial Device Servers
- Industrial Protocol Gateways

EDS-(G)500E Series
8/10/12/16/18/28 Ports
Layer 2 Managed Switches
- User authentication
- Network access control (port lock, sticky MAC, 802.1x, ACL)
- Network redundancy (STP/RSTP/Turbo Ring/Turbo Chain)

EDR-810 Series
2 GbE + 8 FE Ports Secure Router
- 1 WAN, firewall/NAT/VPN/switch
- 110 Mbps firewall throughput and 17 Mbps VPN switch throughput
- Network segmentation and data filtering

MXview
Industrial Network Management Software
- Network security status at a glance
- Predefined security profiles
- Visualized console for security policy management
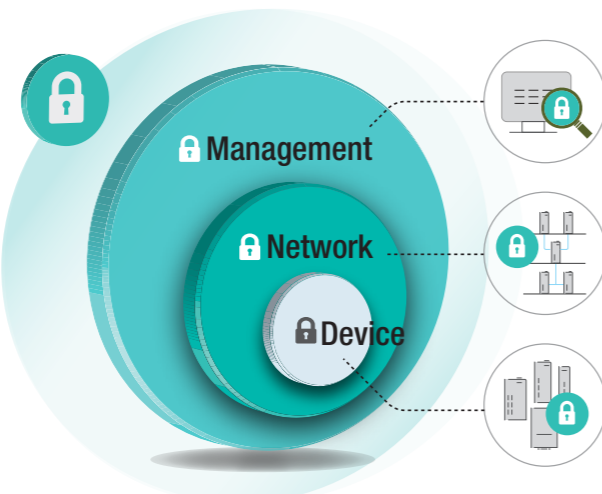
Secure Remote Connections for Maintenance and Collaboration

Remote access to PLCs, HMIs, and automation networks is becoming more common for many machine builders, industrial plants, and critical facilities. Moxa introduces the security-oriented Moxa Remote Connect (MRC) solution suite and service that provide strong data encryption and secure tunneling between your local and remote systems, leading to fewer site visits, better efficiency, and improved services for remote collaboration and predictive maintenance from anywhere.
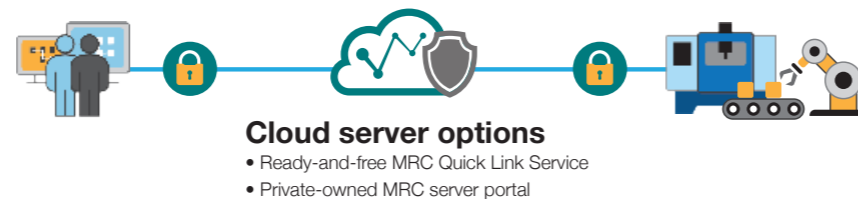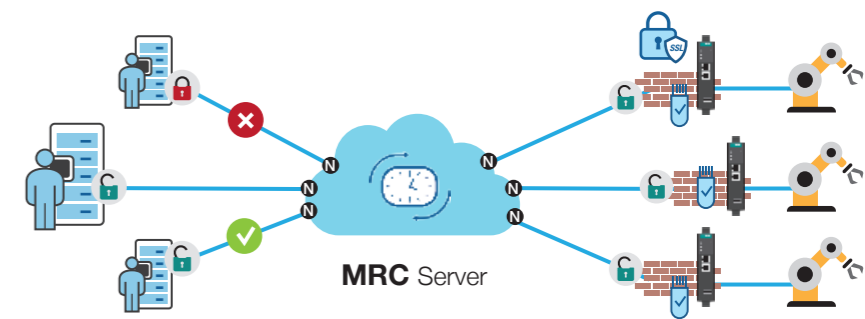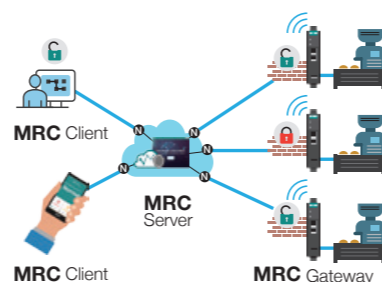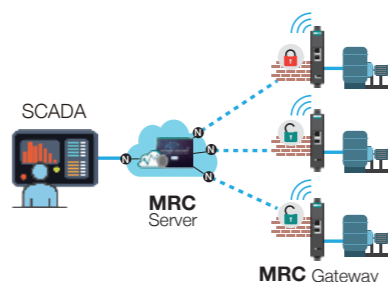
It is better to be safe than sorry when it comes to granting remote access to company networks and assets.

▶ Moxa Offers

- ■ Supports wired and global LTE communications
- ■ Security-oriented design for remote access
- ■ Ready-to-go MRC Quick Link Service
- ■ Supports private-owned MRC server

Cloud server options
- Ready-and-free MRC Quick Link Service
- Private-owned MRC server portal

◾ MRC Suite

Moxa Remote Connect (MRC) is a cloud-hosted security platform consisting of MRC gateways, the MRC server, and MRC clients.

The MRC solution easily bridges field devices, off-site engineers, and application servers over the Internet and is ideal for remote maintenance services. With MRC, technical engineers can remotely access machines equipped with MRC gateways to deliver in-time services. Moreover, when signing up for MRC Quick Link, users can enjoy 5-year free access to the MRC Quick Link cloud service.

- Security with embedded firewall and whitelist remote access control
- End-to-end data encryption
- Smart IP mapping for easy field IP management
- Transparent tunnels suitable for existing software tools
- Flexibility for defining the relation between remote connections

MRC Client
A Windows-based application installed on laptops/computers to build a secure link with the MRC server.

◄ Encrypted tunnel ▶

- Supports Windows 7/10
- Download for free from Moxa's website

MRC Server
A cloud-based server that manages scalable secure connections between MRC gateways and MRC clients.

◄ Encrypted tunnel ▶

- A centralized portal that enables security and connection management
- Supports both MRC Quick Link Service and privately-owned MRC server portals

MRC Gateways
Connect Ethernet-based machines to a MRC server through secure tunnels over the Internet.

- Ethernet or LTE WAN connectivity
- Up to 25 local devices or site-to-site connection
- An embedded whitelist firewall enables high levels of access control

MRC Quick Link Service
- 5-year free service
- 5 GB monthly data volume
- 5 concurrent online nodes

Visit to learn how to register your MRC gateways to activate your MRC Quick Link Service in three steps.

Why MRC, and how it works

Watch our video showing how MRC makes remote access easy, secure, and flexible.

Three Scenarios

Scenarios	One-to-many Data Acquisition	Many-to-many Remote Maintenance	Machine-to-machine Remote Monitoring and Maintenance
Needs	A wastewater plant needed to collect data for water temperatures and tank levels of each remote pumping station. • Permanent and stable remote connections • Easy deployment without requiring advanced IT knowledge	A bakery machine manufacturer wanted to improve efficiency for remote machine maintenance. • Remote access controlled by the local backery machine operator • Multiple mobile remote access connections needed for service efficiency	A power transfer switch equipment provider wanted to improve its regional services via centralized machine monitoring and secure remote access when an alert is sent. • Remote machine status monitoring • Using existing tools for remote maintenance
Moxa's Solutions	The plant customer installed cellular MRC gateways at each pumping station to build wireless VPN tunnels between the SCADA system in the control center and remote sites.	Each machine integrates an MRC gateway for machine operators to enable or disable remote access connections. Maintenance staff only need to use the MRC client software to access machines for monitoring and maintenance from anywhere.	Machine providers installed MRC gateways at the control center and at each site connected to their machines to enable machine-to-machine communication for machine monitoring. Once an alarm is sent, maintenance staff can use the MRC client software to remotely troubleshoot the machine using existing tools as if they were locally connected to the machine.

◾ Access Control Permissions

The MRC suite provides four types of access control to help users determine whether remote connection requests should be authorized or rejected.

Gateway Permission
Machine operators can use USB authorization keys to control which gateways can be remotely accessed.

Service Permission
Through the MRC server, the server manager can restrict which services of the device can be remotely used.

Client Permission
Server managers can specify which clients can access which machine.
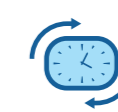
Time Permission
Server managers can configure specific time frames in which MRC clients can access remote devices.

SCADA
MRC Server
MRC Gateway

MRC Client
MRC Server
MRC Client
MRC Gateway

Control Center
MRC Client
MRC Server
MRC Client
MRC Gateway

MRC Server

Every minute of system downtime is costly. MXstudio provides real-time visibility to enable immediate troubleshooting and remediation without the need for advanced IT expertise.

Gain **Visibility**
to Ensure Operational Availability and Security

Network visibility is more crucial than ever with more and more interconnected devices in industrial applications. MXstudio is an industrial networ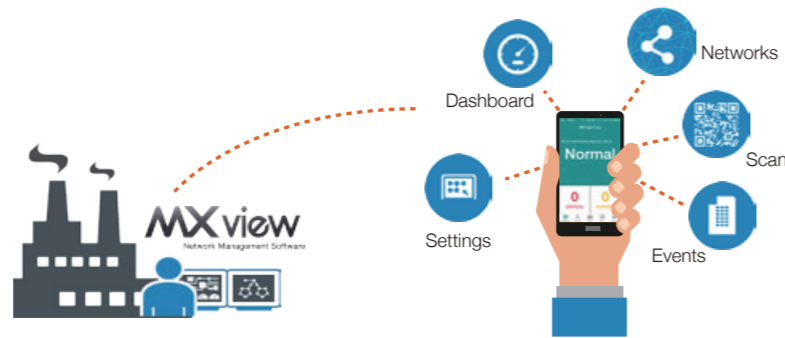k management software suite that provides visibility of operation technology (OT) for improved operational management and efficiency throughout network deployment, monitoring, maintenance, and diagnostics.
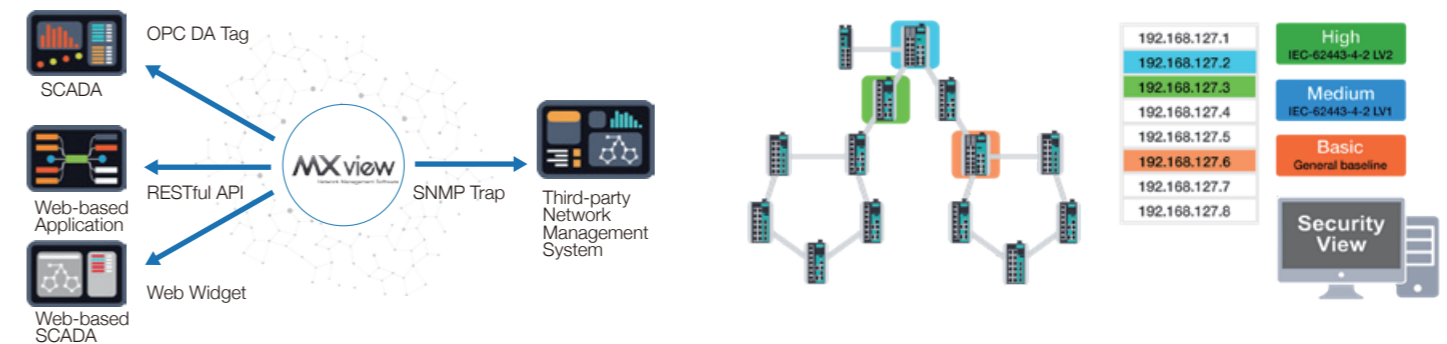

Dashboard
Networks
Settings
Scan
Events

MXstudio Series
Industrial Network Management Suite

▪ Tools to Enrich Your Dashboards

- Displays a network summary on a dashboard
- Supports a web widget and RESTful APIs to supply network data to your web-based application dashboard
- Provides OPC DA tags for SCADA/HMI integration
- Event traps for third-party NMS collaboration

▪ Optimizes Your Security Settings

With Security View, network managers can see the security profile, and then use Security Wizard to adjust device security to provide better protection to the network.

SCADA — OPC DA Tag

Web-based Application — RESTful API

Web-based SCADA — Web Widget

SNMP Trap — Third-party Network Management System

192.168.127.1
192.168.127.2
192.168.127.3
192.168.127.4
192.168.127.5
192.168.127.6
192.168.127.7
192.168.127.8

High IEC-62443-4-2 LV2
Medium IEC-62443-4-2 LV1
Basic General baseline

Security View

▶ Moxa Offers

- ▪ Live topology monitoring
- ▪ Easy event tracking
- ▪ Mobile app and alerts
- ▪ Network health updates sent to SCADA systems
- ▪ Mass configuration to save time and reduce errors
- ▪ A dashboard view with a network summary

Trial Download

Start with the free 20-node trial version now

⫴ Deployment

Deploying devices one-by-one is both time-consuming and error-prone.

10x Faster

MXconfig speeds up network deployment through group configuration, duplication, and link sequence detection.

MXconfig

Industrial Network Configuration Tool

- Configuration is 10x faster than deploying switches one-by-one
- Link sequence detection eliminates manual configuration errors
- Security View and Security Wizard provide optimized security profiling

Operation

Monitoring network health and traffic and responding to events is resource-intensive.

Smart Visualization

MXview provides a real-time visual overview of physical network topologies that OT engineers can view and interact with to manage the network easily.

MXview

Industrial Network Management Software

- Automatic topology visualization
- Security View for viewing the security level of network devices
- Security Wizard for device security setup and updates
- A network management dashboard to quickly view network status
- Easy integration with third-party management systems

✔ Maintenance

Network backups require repetitive manual tasks that increase maintenance time, costs, and the risk of errors.

One-click Backup

MXview's Configuration Center supports one-click bulk configuration backup, allowing scheduled backups, firmware upgrades, and selectable rollbacks for easy maintenance.

- Scheduling periodic configuration backups
- Comprehensive reports, including inventory, traffic, and availability reports

➕ Troubleshooting

Unstructured troubleshooting leads to delays and incorrect network diagnoses, wasting time and resources.

Quick Diagnostics

MXview facilitates event search and playback functions for easy event tracking. MXstudio's N-Snap utility enables one-click device information collection to help engineers identify and analyze changes to the network.

N-Snap

Industrial Network Snapshot Tool

- A standalone utility to take network snapshots for quick troubleshooting
- Automatically compares network and device data, and highlights the differences

◉ Remote Monitoring

Having automation engineers monitor network screens 24/7 is inefficient and costly.

Mobile Monitoring

MXview ToGo sends alerts straight to your mobile phone to keep you posted on network status and events.

MXview ToGo

Mobile Monitoring Tool

- Real-time notifications to help reduce downtime
- Quickly check the status of networks and devices
- Search and map devices with one click

Utilize 10GbE
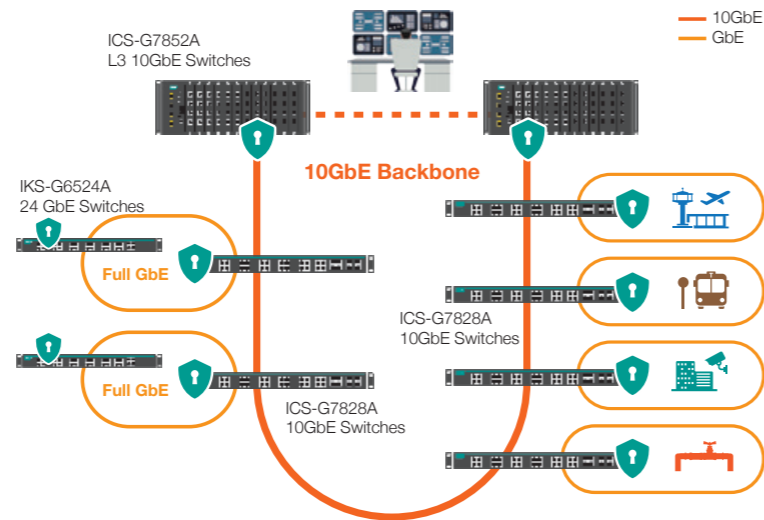## to Empower Network Edge Performance

Moxa's industrial Ethernet rackmount switches boost your productivity with 10GbE/GbE performance, help protect against cyberthreats, and work reliably in harsh environments.

Moxa's rackmount switches, including both ICS Series 4U/1U and IKS Series, have high-density copper, fiber, and PoE interfaces with 10GbE/GbE/FE connectivity, industry-specified security features, and millisecond-fast failover recovery to reduce downtime and maximize productivity.

10GbE Edge Data Aggregation

Moxa's fixed and modular industrial rackmount switches enable 10GbE edge-to-core backbone convergence to simplify your network infrastructure.

- Enabling 10GbE edge-to-core backbone convergence
- Two or four 10GbE uplinks and up to 48 GbE uplinks
- Flexible combinations of 10GbE/GbE/FE for multiple network types
- SFP modules that allow data transmission of up to 120 km

Your network field infrastructure deserves 10GbE solutions that are tough enough to withstand harsh environments and enhance your network performance.

▶ Moxa Offers

- Up to 4 10GbE and 24 GbE uplinks
- Fanless routers and switches
- Devices with -40 to 75°C operating temperature range
- Device security based on the IEC 62443 standard
- High-level EMI/EMC shielding

ICS-G7852A
L3 10GbE Switches

IKS-G6524A
24 GbE Switches

Full GbE

Full GbE

ICS-G7828A
10GbE Switches

10GbE Backbone

ICS-G7828A
10GbE Switches

— 10GbE
— GbE

Robust Reliability

Moxa's rackmount switches can connect to multiple endpoints for data aggregation in tough conditions. The rackmount switches allow you to increase uptime and lower the total cost of ownership (TCO).

- Network recovery times within milliseconds
- High MTBF values with no fan or heater
- Hot-swappable operation
- Dual-isolated power supply

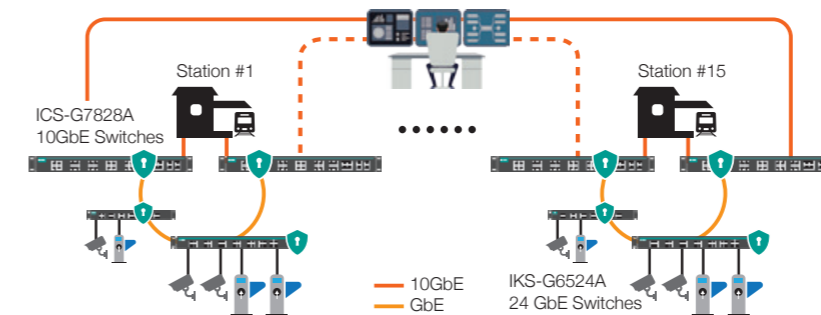### ▶ Ensure Reliability Comparison of Rackmount Ethernet Switches

	Moxa Switches	Commercial 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, CISPR 32, FCC Part 15B Class A NEMA TS2*, DNV GL/ABS/LR/NK*, EN 50121-4*, NEMA TS2*	CE/FCC

* IKS-6728A/6726A only

▶ Use Case
10GbE Backbone for Tram Networks

An urban tram system required a reliable network backbone between 15 stations to ensure operational safety and security.

Station #1

Station #15

ICS-G7828A
10GbE Switches

— 10GbE
— GbE

IKS-G6524A
24 GbE Switches

IACS-level Security

To enhance endpoint security and protect data aggregation against cyberthreats, all of Moxa's industrial rackmount switches have IACS (Industrial Automation Control Systems) security features that are available via firmware updates.

- Enhanced network protection with built-in security features based on the IEC 62443 standard
- Security control for data and access protection
- Supports MXstudio for device security profiling and monitoring

Network Requirements

- High-capacity aggregation and long-haul transmission
- Network resilience for operational safety and security
- Flexible network deployment and expansion in outdoor conditions

Why Moxa

- ICS-G7828A switches provide 10GbE coupling and 10GbE uplinks for data aggregation at every station
- ICS-G7828A can operate in a wide temperature range and supports up to 28 fiber ports for long distance transmissions
- Supports Turbo Ring and Turbo Chain technologies for flexible and redundant ring expansion and fast failure recovery in under 50 ms

▶ Layer 3 Rackmount Switches

	ICS-G7852A/G7850A	ICS-G7828A/G7826A	ICS-G7848A	IKS-G6824A
	L3 10GbE	L3 10GbE	L3 Full GbE	L3 Full GbE
10GbE	4/2	4/2	–	–
GbE	48	24	48	24
Operating Temperature	-10 to 60°C	-40 to 75°C	-10 to 60°C	-40 to 75°C

▶ Layer 2 Rackmount Switches

	ICS-G7752A/G7750A	ICS-G7528A/G7526A	ICS-G7748A	IKS-G6524A	IKS-6728A/6726A	IKS-6728A-8PoE
	10GbE	10GbE	Full GbE	Full GbE	Best Value	PoE
10GbE	4/2	4/2	–	–	–	–
GbE	48	24	48	24	4/2	4
10/100 FE	–	–	–	–	24	24
Operating Temperature	-10 to 60°C	-40 to 75°C	-10 to 60°C	-40 to 75°C		

Optimize **Reliability** and **Productivity**

Moxa's DIN-rail managed switches are built to achieve uninterrupted connectivity for maximum availability. Our portfolio of switches was designed with availability, security, flexibility, integration, and scalability in mind so you can ensure operational reliability and efficiency when expanding your network infrastructure.

Unreliable network equipment often increases maintenance costs and downtime. Therefore, we make every effort to ensure our network equipment is reliable to help reduce risk and errors.
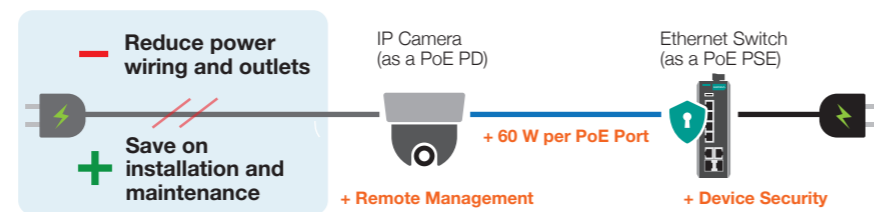
▶ Moxa Offers

- ■ Diverse fixed and modular managed switches
- ■ Devices with -40 to 75°C operating temperature range
- ■ Millisecond-level network redundancy
- ■ Device-level security based on the IEC 62443 standard

▶ EDS-400A/500A/(G)500E Series

Optimized Network Reliability at All Levels

	EDS-(G)500E Series	EDS-400A/500A Series
Bandwidth	6 to 28-port GbE/FE	5 to 18-port GbE/FE
PoE+	Up to 8-port PoE+	Up to 8-port PoE+
Security	TACACS+, IEEE 802.1X, HTTPS, SSH (Excluding EDS-400A Series)	
Security Enhancement	Advanced security based on IEC 62443	–
Redundancy Protocols	Turbo Ring, Turbo Chain, STP, RSTP	
Multicast Redundancy	V-ON	–
Industrial Protocols	EtherNet/IP, PROFINET, Modbus TCP protocols	
EMS	Level 4	Level 3
Dual Power Inputs	12/24/48/-48 VDC	12/24/48 VDC
Industrial Certifications	C1D2, ATEX Zone 2, IEC 61850-3 Ed.2 Class1, IEEE 1613, DNV GL, ABS, LR, NK, NEMA TS2, EN 50121-4	C1D2, ATEX Zone 2, DNV GL, NEMA TS2, EN 50121-4

Enhanced Interoperability	• Supports industrial protocols for SCADA integration • Concurrent fieldbus support for enhanced flexibility and performance (EDS-500E Series only)
Enhanced Security	• Device-level data and access security based on the IEC 62443 standard (EDS-500E Series only) • Supports MXstudio to easily manage the security status of network devices
Enhanced Availability	• Turbo Ring for Fast Ethernet redundancy under 20 ms • Turbo Chain for flexible and redundant ring expansion

3U rack:
480 x 133.5 x 200 mm   Ⓐ Ⓑ Ⓒ

▶ MDS-G4000 Series

Modularity for Future Adaptability

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.

Ⓐ 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

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 vibration and shock resistance
- Compliant with multiple industry standards

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

▶ Managed Switches

	MDS-G4000 Modular GbE	EDS-G500E Full Gigabit	EDS-518E/528E High Port Density	EDS-510E 3 GbE Fiber	EDS-500A Long-haul Fiber	EDS-400A Multiple Protocols
No. of Ports	12/20/28	8/12/16	18/28	10	5/8/10/16/18	5/8
Gigabit Ports	12/20/28	8/12/16	4	3	–	–
Fiber Ports	Up to 24	Up to 4*	4	3	Up to 2*	Up to 3*
Fiber Type	LC	LC	LC	LC	ST, SC	ST, SC

* Available for some models only

Power Your Critical Surveillance Equipment With **Smart** PoE Switches

To address the growing connectivity and power requirements of surveillance infrastructure, Moxa's PoE/PoE+ Ethernet switches function as a power source. These switches provide up to 48 Gigabit PoE+ ports with either 36 W or 60 W per PoE+ link to power PTZ cameras and other wireless devices.

Unlike commercial PoE solutions, Moxa's PoE/PoE+ solutions boast cybersecurity features, millisecond-fast recovery, high EMI/surge protection, and -40 to 75°C operating temperature ranges to keep surveillance networks up and running even in harsh environments.

"Less is more" is the beauty behind Moxa's PoE switches. They reduce the amount of cabling required while still providing high power and smart management to deliver data and PoE with a lower total cost of ownership.

▶ **Moxa Offers**

- IEEE 802.3af/at interoperability
- Up to 48 Gigabit PoE+ ports
- 4 kV LAN surge protection
- Smart PoE power management
- Device-level security based on the IEC 62443 standard

Reduce power wiring and outlets

Save on installation and maintenance

IP Camera (as a PoE PD)
+ Remote Management

Ethernet Switch (as a PoE PSE)
+ Device Security

+ 60 W per PoE Port

◼ Power+

Moxa's PoE+ switches combine high power and high bandwidth to carry power, video, and data over Ethernet cables.

- 60 W and 36 W PoE+ outputs for PTZ and power-hungry cameras
- 12/24/48 VDC dual power inputs
- High PoE port density up to 48 ports

◼ Management+

Built-in Smart PoE functions for remote PD links, diagnostics, and failure recovery.

- Supports PoE/PoE+ standard, non-standard, and legacy PDs for easy deployment
- Automatic PD check and reboot for fault-tolerant recovery
- Remote management by MXview or Web UI

◼ Cybersecurity+

The PoE/PoE+ managed switches reinforce access authentication and control to protect the device and connected PDs.

- Device-level cybersecurity
- Supports system-level security integration for increased protection
- Supports MXstudio for network device security profiling and monitoring

▶ Showcase

60 W Compact Powerhouse

EDS-P506E-4PoE Series

2 GbE + 4 FE PoE+ switches

High PoE Power
- 4-port PoE/PoE+
- Up to 60 W output per port
- 180 W power budget

High Bandwidth
- 2-port Gigabit combo

Dual Power
- 12/24/48 VDC inputs

Smart Management
- Built-in Smart PoE for easy PD links, diagnostics, and monitoring
- LED indicators for maintenance

High Reliability
- Built-in device security
- Ethernet failover under 20 ms
- Level 4 EMS immunity
- Models with -40 to 75°C operating temp.
- Industrial certifications

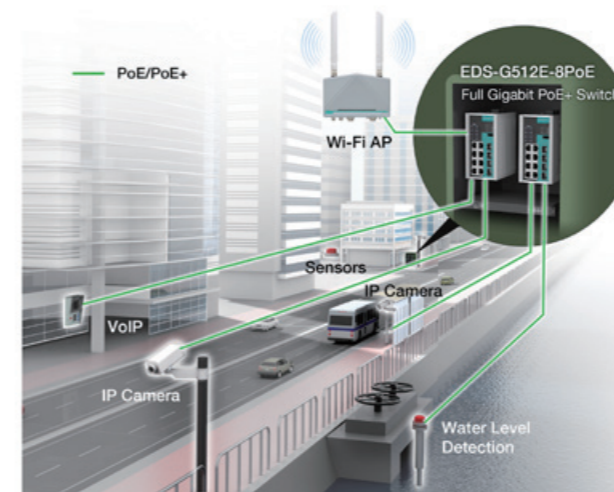▶ Use Case

A Smart City Infrastructure

A city in Asia planned to upgrade their infrastructure by utilizing EDS-G512E PoE switches to integrate city surveillance, data collection, and public services.

System Requirements
- Reliable data collection and a strong power supply
- Uninterrupted network reliability
- Network protection against cyberattacks

Why Moxa
- 12-port Gigabit and high PoE+ output for bandwidth and power-hungry IP cameras and wireless APs
- Extreme robustness for reliable operation in challenging conditions
- Device-level cybersecurity for access protection

▶ Use Case

## Optical Character Recognition (OCR) Systems

An OCR system required high-capacity PoE switches and IP cameras to facilitate automatic freight container loading, unloading, and tracking at port terminals.

System Requirements
- Withstand outdoor and salty air conditions
- High PoE output to support PTZ camera functions
- Easy deployment, management, and maintenance

Why Moxa
- The EDS-P506E-4PoE switches deliver up to 60 W per PoE link to power multiple PTZ cameras
- Fault-tolerant design that automatically performs failure checks of IP cameras and reboots them if needed
- Gigabit recovery under 50 ms for network availability
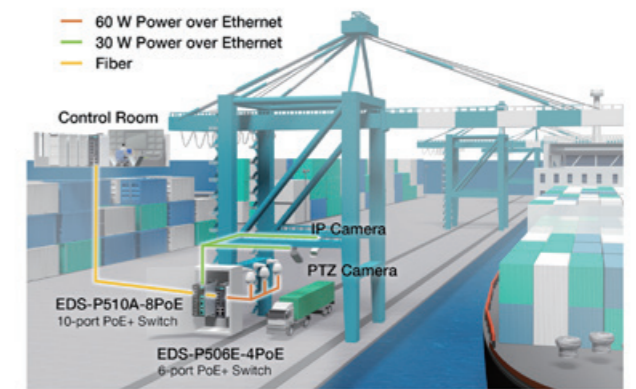
▶ PoE/PoE+ PSE Portfolio

Managed Switches

	ICS-G7800A/ G7700A	EDS-G512E-8PoE	IKS-6728A	EDS-P510A-8PoE	EDS-P506E-4PoE	EDS-P510	TN-5508A-8PoE TN-5516A-8PoE	TN-4500A
Ports	0/2/4 10G + 48 GbE	12 GbE	4 GbE + 24 FE	2 GbE + 8 FE	2 GbE + 4 FE	3 GbE + 7 FE	8/16 FE	4 GbE + 12/20/24 FE
PoE Ports	48 PoE+	8 PoE+	8/16/24 PoE+	8 PoE+	4 PoE+	4 PoE	8 PoE+	14/16/18/20 PoE+
PoE Output	36 W	36 W	36 W	36 W	60 W	15.4 W	30 W	30 W

Unmanaged Switches

	EDS-G205A-4PoE	EDS-P206A-4PoE	TN-5308-4/8PoE
Ports	5 GbE	6 FE	8 FE
PoE Ports	4 PoE+	4 PoE+	4/8 PoE+
PoE Output	36 W	30 W	30 W

Single-port PSE

	INJ-24A	INJ-24	IMC-P101
PoE Output	60 W	30 W	15.4 W
Power Input	24/48 VDC	24/48 VDC	48 VDC

Network complexity and environmental limitations hinder the efficiency of industrial automation network deployment and maintenance for most IA engineers.

Smart, Simple, Efficient Networking

Moxa's smart switches simplify daily tasks for industrial automation (IA) engineers with easy configuration, installation, and reduced downtime.

The palm-sized SDS-3008 features versatile mounting for easy installation, smart UI configurations for simplified operations, support for multiple IA protocols (EtherNet/IP, PROFINET, Modbus TCP) for distributed SCADA/HMI monitoring, and flexible replacement parts for network design and maintenance.

▶ Moxa Offers

- 8-port Ethernet smart switching
- Basic managed switch functions
- One-click profile setup for seamless SCADA/HMI integration
- Simple GUI for easy configuration
- Flexible mounting and slim design
- Industrial-grade reliability
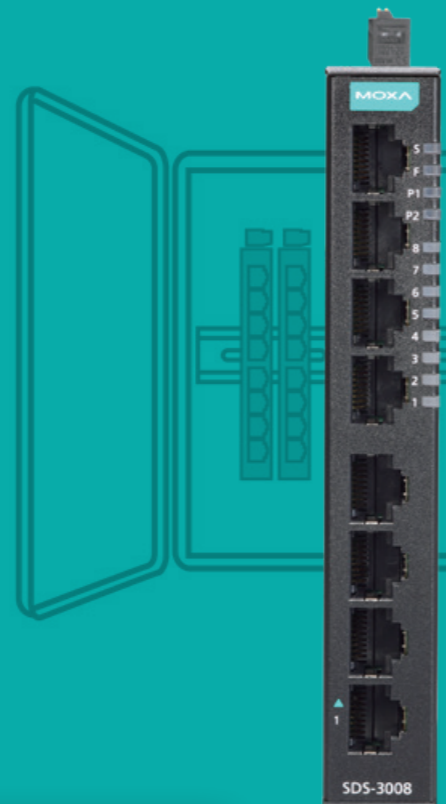
OT Management
- One-click settings for SCADA/HMI/NMS integration
- Supports EtherNet/IP, PROFINET, and Modbus TCP protocols

Robust Reliability
- Device security and network access control
- Supports RSTP/STP network redundancy
- -40 to 75°C operating temperature (-T models)

Ease of Use
- Dashboard GUI for configuration without requiring specialized IT knowledge
- ABC-02 device for configuration/backup

SDS-3008

▶ Use Case

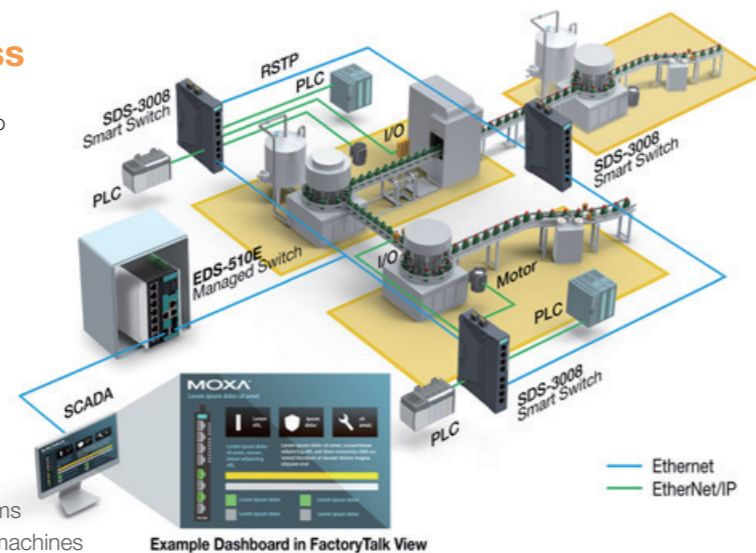## Network Monitoring for Bottling Process

A bottling plant utilized Ethernet switches and EtherNet/IP technology to build their operational infrastructure and enable their SCADA/HMI systems to monitor all processes, networking devices, and network statuses.

Network Requirements
- Minimal IT skills required for network deployment and maintenance
- Supports SCADA/HMI monitoring
- Reliable network performance
- Easy diagnostics for maintenance

Why Moxa
- The SDS-3008 has a graphical UI for user-friendly configuration
- Supports network redundancy, security, and hardened features
- Supports EtherNet/IP profiles for fast deployment
- The status of the switch can be monitored on SCADA and HMI systems
- Small form factor fits well into both existing cabinets and processing machines

RSTP
PLC
SDS-3008 Smart Switch
PLC
I/O
SDS-3008 Smart Switch
EDS-510E Managed Switch
I/O
Motor
PLC
SCADA
PLC
SDS-3008 Smart Switch

— Ethernet
— EtherNet/IP

Example Dashboard in FactoryTalk View

Gear Up Your Edge Network for Expanding Connectivity

With ultra-small versatile industrial unmanaged switches

To address the needs of rapidly-expanding industrial networks, Moxa has developed a new series of industrial unmanaged Ethernet switches—the EDS-2000 Series—with an extra-small footprint that offer reliability, easy deployment, and flexibility for a variety of industrial applications.

Extra-small footprint for easy placement into control cabinets

Enhanced data efficiency via QoS and BSP functions

Automatic warnings for power and port failures*

Ultra-compact Size
For easy deployment into cabinets

81 mm
85.6 mm

EDS-2005-EL Series   Credit Card

Up to 2 Gigabit combo ports for fast and flexible uplinks*

9.6~60 VDC
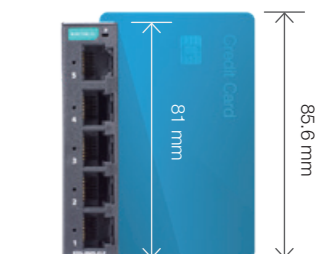
Redundant 9.6 to 60 VDC input for higher reliability*

Reliable operation in extreme cold and heat conditions

*Only available for the EDS-2000-ML Series

Moxa Offers

Moxa's wide array of industrial unmanaged switches provide rock-solid reliability that withstands extreme conditions to earn the confidence and satisfaction of global customers through thousands of long-term deployments around the world.

Rich Options
- Full Gigabit options
- Flexible copper and fiber combinations
- QoS and BSP functions for traffic efficiency
- Redundant power inputs
- -40 to 75°C operating temperature
- Diverse industrial certifications

▶ Unmanaged Switches

	Entry Best Value EDS-2000-EL	Advanced High-port Density EDS-2000-ML	Standard Hardened Design EDS-200A	Full Gigabit High Bandwidth EDS-G200/G300
Features	• Extra-small size • QoS, BSP DIP switch • Metal/plastic housing	• High port density • QoS, BSP DIP switch • Relay output warning	• Redundant dual 12/24/48 VDC inputs • NEMA TS2 for transportation	• Fiber Gigabit connections • Jumbo frame supported for enhanced performance
Ethernet Ports	5/8	10/16/18	5/8	5/8
Gigabit Ports	–	2	–	5/8
Fiber Ports	Up to 1*	Up to 2**	Up to 4*	Up to 2*
Operating Temp.	-10 to 60°C / -40 to 75°C (-T models)			
Certifications	UL 508	C1D2, ATEX, IECEx, DNV GL, EN 50121-4, NEMA TS2, UL 61010-2-201***	C1D2, ATEX, IECEx, DNV GL, ABS, LR, NK, EN 50121-4, NEMA TS2, UL 508****	

* Available for some models only
** The EDS-2016-ML fiber models will be available in the second half of 2020
*** EN 50121-4 and NEMA TS2 for the EDS-2010-ML/2018-ML Series are currently available. Other certifications for the EDS-2000-ML Series will be available in Q4, 2020
**** IECEx is for the EDS-205A Series only, NEMA TS2 is for the EDS-200A Series only

Wireless connections set us free from wiring hassles but raise concerns about availability, security, and reliability of networks.

▶ Moxa Offers

- Speeds up to 300 Mbps
- Industrial-grade reliability
- Device security based on the IEC 62443 standard
- AeroMag for easy Wi-Fi deployment and maintenance
- Millisecond-level roaming handoff times for uninterrupted mobility

Building Field-proven and Future-ready **Wireless Networks**

There is no need to suffer from unreliable wireless connections due to signal interference, weak signals, or slow failover.

Moxa's WLAN products provide robust wireless connectivity and innovative functions to optimize your wireless network for reliability, availability, and security.

By combining innovative technologies, such as fast roaming, effortless Wi-Fi deployment, enhanced network security, hardened reliability against extreme conditions, Moxa's AWK series devices provide field-proven and future-ready Wi-Fi connectivity to meet various mission-critical applications.

■ Availability

Moxa's Turbo Roaming technology provides client handoff times under 150 ms between APs to ensure seamless mobility for your industrial equipment on the move.

- Turbo Roaming for fast handoff times under 150 ms
- AeroLink Protection for redundant Wi-Fi links
- MXstudio support for real-time monitoring and management

■ Reliability

Moxa's wireless products enhance network reliability and prevent ambient interference from affecting industrial operations.

- 500-V insulation on power inputs
- Level-4 ESD protection on antenna ports
- -40 to 75°C operating temperature (-T models)
- Anti-vibration design

■ Security

Moxa adopts the IACS guideline for device security enhancements and advocates a defense-in-depth strategy to secure your wireless networks.

- Reinforces device-level access control based on the IEC 62443 standards
- Supports HTTPS/SSL, RADIUS, and SSH
- Supports ICMP and filtering based on MAC address, IP protocol, and ports
- Supports MXstudio for real-time event monitoring

▶ Challenges

Wi-Fi mobility is a welcome change in industrial operations; but for system operators with limited IT knowledge, configuring devices and WLAN maintenance can be quite daunting.

■ Easy Development

Moxa's AeroMag feature helps you set up, update, and secure your WLANs with no IT skills required, providing effortless connectivity that adapts to changes in the operating environment.

One-step Setup For Multiple Wi-Fi Devices

One-click Optimization of Wi-Fi Channels

Zero Configuration To Add New Wi-Fi Devices into Existing Networks

Initial Setup → On-site Installation → System Operation → Network Maintenance

Lock Down Function to Block Unauthorized Devices from Joining the Network

AeroMag is a great feature for deploying wireless devices in various industrial environments, providing secure and reliable WLAN operations without operators having to worry about setting up and maintaining complex WLANs.

▶Use case
Manufacturing
A fiberglass yarn manufacturer integrated AeroMag devices into their mobile automated guided vehicles to expand the capacity of their production lines through automatic material handling and parts processing.

▶Use case
eBus
A bus company leveraged AeroMag technology to connect their fleet of buses so that they can transmit surveillance footage back to the control center for effective monitoring.

▶Use case
Oil Fracturing
An oil company installed AeroMag devices on their fracturing trucks to ensure secure wireless connection for the trucks to continuously transmit and receive data.

■ Smart Wi-Fi Strategy

Integrate AWK-1137C Into Your Machines for Added Benefits

- Compact form factor that enables integration into machines
- AeroMag Client for easy WLAN deployment and optimized-channel connectivity with an AeroMag AP
- Client-based Turbo Roaming automatically switches to stronger APs at < 150 millisecond handoff times
- One-to-many NAT to simplify device setup
- Anti-vibration design to provide stability when installed on moving vehicles and shuttles
- Durability with a wide operating temperature range
- Solid yet flexible installation options
    - DIN-rail mounting (LEDs on the side panel)
    - Wall mounting (LEDs on the front panel)

AWK-3131A Wireless AP

Ethernet Switch

AWK-1137C Wireless Client

Ethernet
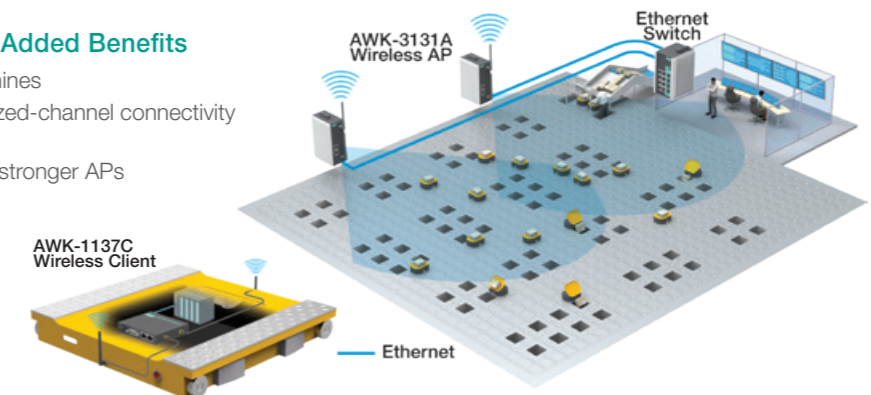
▶ Wireless AP/Bridge/Client

Model	AWK-4131A	AWK-3131A	AWK-1131A	AWK-1137C
Operation Mode	AP/Client/Client-router/Master/Slave	AP/Client/Client-router/Master/Slave	AP/Client	Client/Client-router/Slave
Wi-Fi Interface	802.11a/b/g/n, up to 300 Mbps data rate			
Link Interfaces	1 GbE			2 FE, 1 RS-232/422/485
PoE	PoE-powered devices		–	–
AP Capacity	Up to 60 clients per AP	Up to 60 clients per AP	Up to 30 clients per AP	–
AeroMag	AeroMag AP/Client		–	AeroMag Client
Wi-Fi Roaming	Client-based Turbo Roaming with < 150 ms handoff times			
Operating Temperature	-40 to 75°C	-25 to 60°C / -40 to 75°C (-T model)	0 to 60°C / -40 to 75°C (-T model)	
Radio Certificates	FCC, CE, MIC, ANATEL, WPC, SRRC, KC, RCM			
Industrial Certifications	–	C1D2, ATEX Zone 2, IECEx	–	eMark

Left sidebar

Providing sufficient power to all active devices to maintain reliable and secure remote networks is a challenge for most industrial operators.

▶ Moxa Offers

- Devices with low power consumption
- Cellular redundancy
- VPN support
- Device security based on the IEC 62443 standard
- Industrial-grade reliability
- Europe, Australia, and US* LTE band support

* Available for the OnCell 3120-LTE-1 Series only

Watch Over Your Cellular Access
OnCell Central Manager (OCM)

Moxa's OCM hosts centralized private IP management for OnCell devices enabling secure IP enrollment, configuration, monitoring, and firmware updates over the Internet.

- Cost-effective and secure private IP connectivity
- End-to-end data exchange over the Internet
- Device monitoring on various platforms

Deploy Your Critical Remote Applications With
Low-power LTE

Industries and cities around the world are seeking reliable and long-lasting wireless solutions for remote infrastructure deployment and maintenance.

Moxa's compact OnCell 3120-LTE-1 gateways adopt power-saving technology to facilitate power-constrained conditions such as solar-powered battery applications for long-lasting operations.

Wide network coverage, reliable LTE connections, and industrial-grade security make the OnCell 3120-LTE-1 suitable for long-haul critical data collection from serial and Ethernet devices.

Future-ready Mobility

The OnCell 3120-LTE-1 combines low power consumption LTE Cat 1 technology with existing 2G and 3G bands to deliver global coverage, making it easy to migrate to 4G for future-ready M2M and IIoT applications.

Applications

- Transportation
- Power distribution automation
- Utility data collection
- Pipeline monitoring for water, and oil and gas facilities
- Oil/gas wellhead monitoring
- Environmental monitoring

▶ Learn More

Security
- VPN, IPsec, GRE, and OpenVPN
- Device security based on IEC 62443
- OnCell Central Manager (OCM) for secure private IP connections

Reliability
- -30 to 70°C operating temperature (-T models)
- C1D2, ATEX, and IECEx certifications

Redundancy
- Dual SIMs
- GuaranLink for connection checking and self-recovery

Global LTE
- Supports EU, AU, and US* bands
- 10 MB downlink and 5 MB uplink
- Serial/Ethernet-to-cellular
- Deep signal penetration in buildings and underground locations
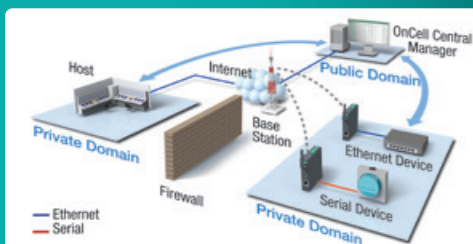- * Available in Q3, 2020

Low Power
- 4 W for normal operation
- 40 mW during standby

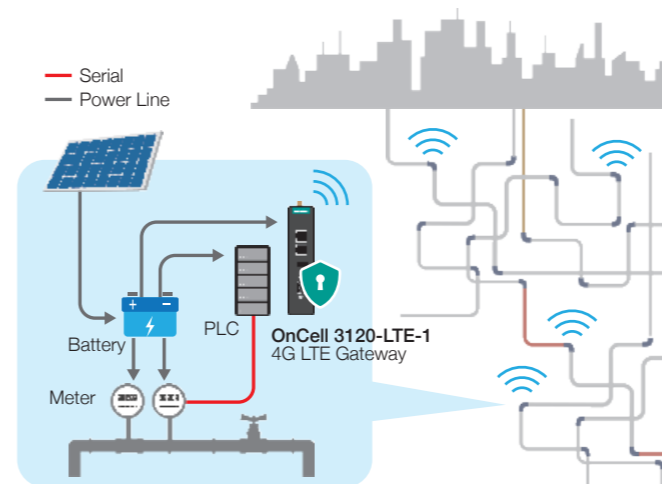### Solar-powered Water Treatment Plants

Water treatment systems require reliable data collection and monitoring throughout the treatment and distribution processes to ensure the safety and quality of drinking water.

System Requirements
- Low power consumption
- Secure and reliable data transmission
- Flexible IP assignment
- Easy troubleshooting

Why Moxa
- The OnCell 3120-LTE-1 consumes only 40 mW when on standby, increasing battery life and reducing maintenance costs
- Device-level security and VPN functions for network security
- Supports OCM for cost-effective private IP assignment
- Front-panel LEDs for easy link diagnostics
- Serial and Ethernet ports for efficient data collection

### Smart Street Lighting Systems

As governments continue to implement smart city infrastructures, street lights are increasingly being connected to automatically adjust brightness and conserve energy without compromising on public safety.

System requirements
- Compact form factor for installation inside small wayside cabinets
- Secure connection for lighting control applications
- Centralized management for private IP devices
- Device durability to withstand industrial environments

Why Moxa
- The small form factor of the OnCell 3120-LTE-1 enables installation in pole-mounted cabinets
- Ultra-low power consumption, ideal to work with solar-powered batteries
- Built-in device security to block unauthorized access
- IPsec, GRE, and OpenVPN support for secure VPN tunneling
- Hardened design to withstand extreme conditions
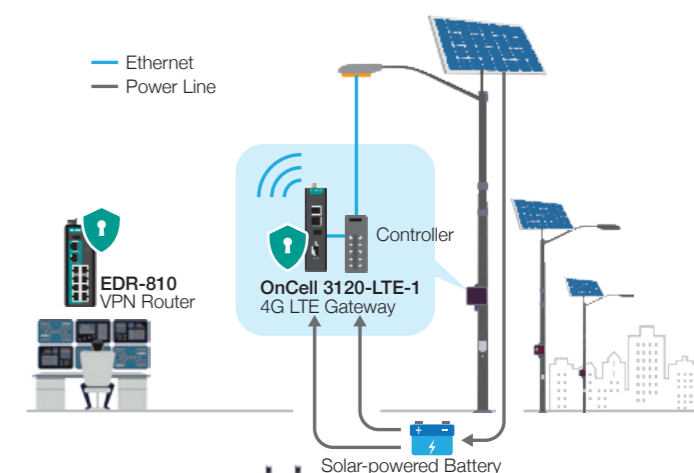
▶ Cellular Gateways/Routers

	OnCell 3120-LTE-1	OnCell G3150A-LTE	OnCell G3470A-LTE	OnCell 5104-HSPA
4G	LTE Cat 1	LTE Cat 3	LTE Cat 3	–
3G	UMTS/HSPA			
Ethernet	2 FE	1 FE	4 GbE	5 FE
Serial	1 RS-232/422/485	1 RS-232/422/485	–	–
SIM Cards	2	2	2	2
VPN/Firewall	VPN: IPsec, GRE, and OpenVPN (The OnCell G3470A-LTE Series only supports IPsec) Firewall filter: MAC, IP protocol, port-based, access IP list			Firewall filter: WAN IP filtering
Device Security	Based on the IEC 62443 standard		–	–
Power Saving Mode	Hibernation mode: 40 milliwatts Sleep mode: 2 watts	–	–	–
Power Inputs	9 to 36 VDC	Dual, 12-48 VDC		
Operating Temperature	0 to 55°C / -30 to 70°C (-T models)		-30 to 55°C / -30 to 70°C (-T models)	
Industrial Certifications	UL 60950-1, C1D2, ATEX, IECEx	UL 60950-1		

Enable **Smart**
Railways With Ethernet

Moxa provides Ethernet-compliant railway solutions for onboard, train-to-ground, and wayside communication and control systems that enhance operational capacity, efficiency, and passenger services.

Using divergent networks to provide multiple services in railway systems can be costly and cumbersome to deploy, maintain, and scale.

▶ Moxa Offers

- EN 50155 proven reliability from trains to tracks
- Ethernet compatibility across different train builders
- One-stop-shop wired and wireless portfolios
- Quality based on IRIS Rev. 0.3 certification

EN 50155   EN 50121-4

Ethernet-connected
Onboard Networks

Moxa's EN 50155 Ethernet solutions enable high-bandwidth communications for CCTV and passenger information systems (PIS), and other train-wide communication services in space-limited onboard environments.

Train-to-ground
Wireless Solutions

From vital train-to-ground communications (such as CBTC) to onboard infotainment systems, high bandwidth and rapid handoffs for wireless transmissions on fast-moving trains are more crucial than ever. Moxa provides robust 802.11n-based train-to-ground connectivity to ensure real-time train status updates and control for smooth rides and passenger safety.

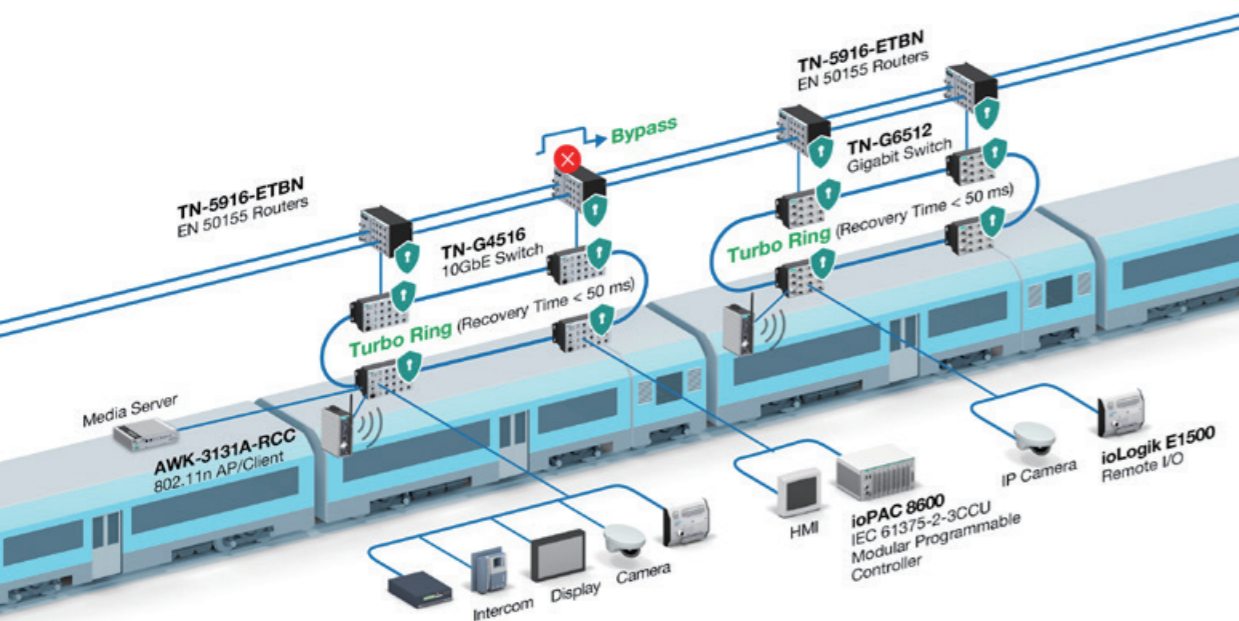### TN-G4516 Series
10GbE Full Gigabit PoE Switches
- Up to 4 10GbE and 12 GbE ports
- Push-Pull Ethernet connector
- 8 GbE PoE ports with total 120 W power budget

TN-G6500 Series
12-port Full Gigabit Switches
- Up to 8 PoE/PoE+ links
- Gigabit recovery time under 50 ms
- Device security based on the IEC 62443 standard

AWK-3131A-RCC Series
Onboard 802.11n AP/Client
- IEEE 802.11n compliant
- Up to 300 Mbps data rate
- ACC technology for inter-carriage wireless connections

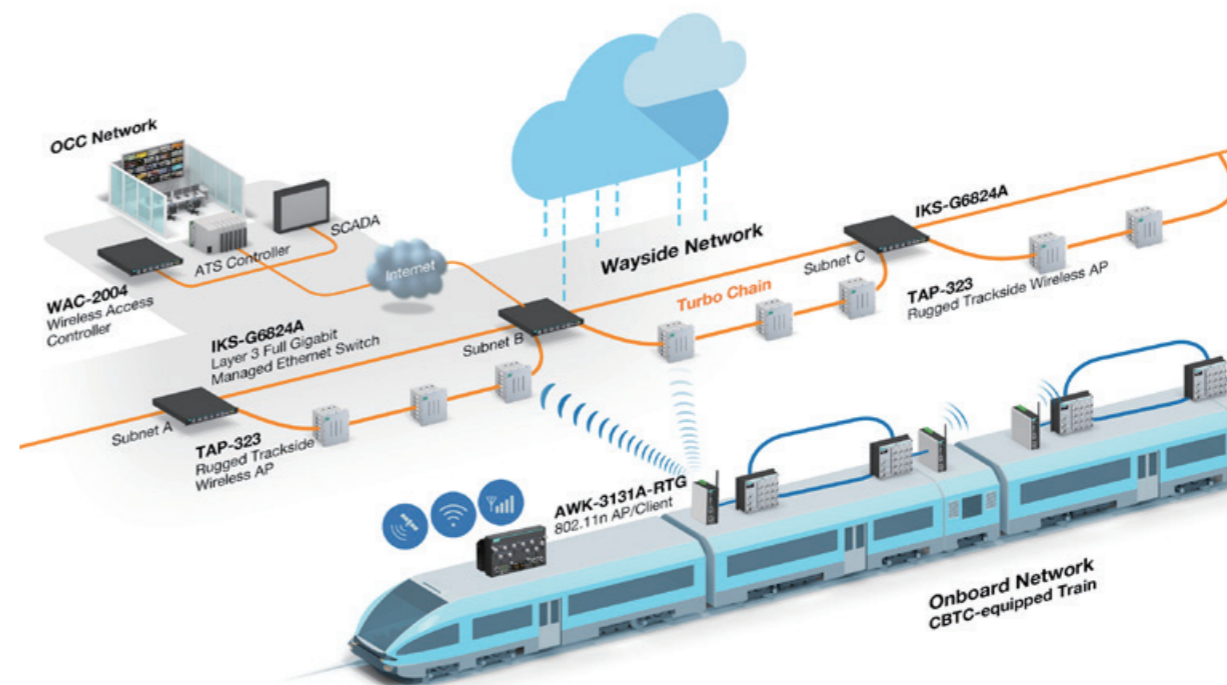### AWK-3131A-RTG / TAP-213 Series
Onboard 802.11n AP/Client
- PoE powered or dual DC inputs
- Wi-Fi redundancy with AeroLink Protection

TAP-323 Series
Trackside 802.11n Dual Radio AP
- IP68 rating
- Dual-AP and switch combo device
- Gigabit Ethernet/fiber redundancy with Turbo Chain

WAC-2004 Series
Industrial Wireless Access Controller
- IEEE 802.11i/802.1x-compliant security
- Up to 450 Mbps throughput for tunneling
- Supports device failover check

Performance
- » Gigabit for network convergence
- » 802.11n with up to 300 Mbps data rate

Security
- » Device-level cybersecurity
- » TN-5916-ETBN for firewall protection

Reliability
- » Compliant with a portion of EN 50155
- » Seamless failover with network redundancy and bypass

Performance
- » Up to 300 Mbps data rate
- » Turbo roaming under 50 ms*

Security
- » Device-level security
- » WPA/WPA2 and 802.1x security

Reliability
- » Compliant with a portion of EN 50155
- » EN 50121 compliance
- » IP68 rated APs and clients
- » Wi-Fi radio redundancy

▶ EN 50155 Switches

	TN-5916/TN-5916-ETBN	TN-G6512	TN-G4516	TN-4516A/4524A/4528A	TN-5510A/5518A	TN-5508A/5516A
10GbE	–	–	4	–	–	–
GbE	–	12	12	Up to 4	2	–
Fiber GbE	–	–	–	Up to 2	Up to 2	–
FE	16	–	–	12/24	8/16	8/16
PoE	–	8 PoE+	Up to 12 PoE+	Up to 20 PoE+	Up to 8 PoE+	Up to 8 PoE+

▶ Wireless LAN and Access Controller

	AWK-3131A-RCC	AWK-3131A-RTG	TAP-213	TAP-323	WAC-2004
Best Scenarios	Auto-carriage, Passenger Wi-Fi	Train-to-ground	Train-to-ground	Train-to-ground	Wi-Fi Controller
Wi-Fi Capability	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	–
Network Interfaces	1 GbE	1 FE	1 GbE + 1 GSFP	2 GSFP + 4 FE	1 GbE
Wi-Fi Roaming	–	Controller-based Turbo Roaming* < 50 ms handoff times (with WAC Series)			–
Reliability	-40 to 75°C operating temperature	IP68 rated, -40 to 75°C operating temperature			–

* Turbo Roaming performance can vary based on infrastructure and parameter configurations. Users can view product manuals for more information.

In substation automation systems (SAS), network devices that were released at different times and from different vendors may lack interoperability, which results in reduced performance and increases operating costs and risks.

▶ Moxa Offers

- IEC 61850-3 Ethernet switches for vendor-independent interoperability
- High bandwidth and high port density options
- Maximum reliability and availability
- Built-in device security

IEC 61850

Embrace IEC 61850
Infrastructure for Future-proof Substations

Moxa's PT-G7828/G7728 switches are designed in accordance with IEC 61850-3 Edition 2 Class 2 and IEEE 1613 Class 2 standards. The switches integrate cutting-edge hardware and software functions to optimize system availability and interoperability for substation automation systems (SAS).

The modular switches offer up to 28-port full Gigabit routing and switching with selectable RJ45/SFP/PoE+ interfaces and dual power modules for various applications.

Embedded with the innovative GOOSE Check feature, MMS server capability, and nanosecond-level time synchronization, the PT-G7828/G7728 switches ensure the accuracy of time-critical operations in power substations.

Built for Maximum System Availability

PT-G7828/G7728 Series
Layer 3 and Layer 2 28-port Gigabit Rackmount Switches

- ▶ Minimize Errors
- ▶ Detect Errors
- ▶ Solve Errors

Extended Performance
- Up to 28 full GbE ports with RJ45/SFP/PoE+ modules
- Up to 24 PoE+ connections

Deterministic Ethernet
- All ports support IEEE 1588 v2 PTP
- IEC 61850 QoS to prioritize critical GOOSE/SMV transmission

All-round Reliability
- IEC 61850-3 and IEEE 1613 compliance
- Dual redundant isolated power modules
- Device security based on the IEC 62443 standard

Specific Manageability
- Built-in MMS to support centralized monitoring from PSCADA
- Embedded GOOSE monitoring for predictive maintenance
- 1 second dying gasp for failure alarm and reduced downtime

Smart Diagnosis and Maintenance
- Hot-swappable power and line modules
- PTP sync LEDs for fast PTP diagnostic

Next Generation SAS

PT-7728-PTP Series
24 FE + 4 GbE PRP/HSR Modular Rackmount Switches

- 4-GbE-port PRP/HSR module for zero failover time
- RSTP Grouping for multiple couplings of HSR and RSTP
- IEEE 1588v2 time synchronization
- Dual isolated redundant power inputs
- -40 to 85°C operating temperature range
- Built-in MMS server for power SCADA monitoring

▶ Proven PRP/HSR Interoperability
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 in the 2015 PRP/HSR Interoperability Test, conducted by UCAIug.

▦ MMS for Power SCADA Supervision

With a built-in MMS server, the PT-G7828/G7728 switches can be controlled, monitored, and managed via the centralized power SCADA system for enhanced efficiency and availability.
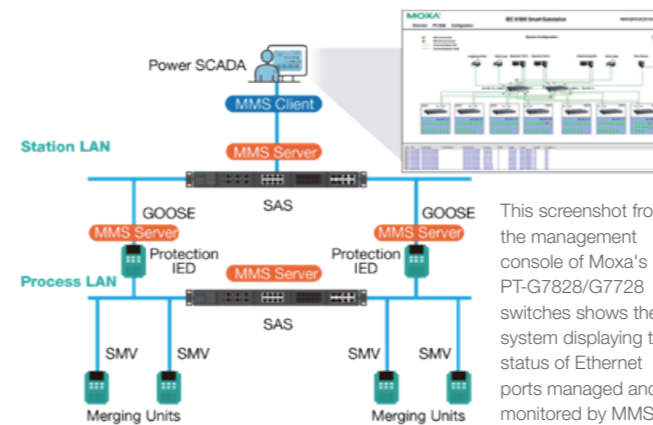
This screenshot from the management console of Moxa's PT-G7828/G7728 switches shows the system displaying the status of Ethernet ports managed and monitored by MMS.

▦ GOOSE Check

The PT-G7828/G7728 switches feature a GOOSE Check function that monitors GOOSE packets, and sends alerts to the power SCADA and NMS systems immediately when any time-out or tampered GOOSE packets are detected.

Together with GOOSE Lock that forms a whitelist of legitimate GOOSE packets, the PT-G7728/G7828 can block malicious traffic to defend the network.

| All	Index	APP ID	GOOSE Address	IED Name	VID	Ingress Port	Rx Counter	Status	Type
☐	1	1	01:0c:cd:01:00:00	BC_CONTCTRL	1	1-2	85	Health	Static
☐	2	1	01:0c:cd:01:00:01	BC_CONTCTRL	1	1-2	85	Health	Dynamic
☐	3	1	01:0c:cd:01:00:02	BC_CONTCTRL	1	1-2	85	Timeout	Dynamic
☐	4	1	01:0c:cd:01:00:03	BC_CONTCTRL	1	1-2	85	Health	Dynamic
☐	5	1	01:0c:cd:01:00:04	BC_CONTCTRL	1	1-2	85	Health	Static
☐	6	1	01:0c:cd:01:00:05	BC_CONTCTRL	1	1-2	85	Health	Dynamic
☐	7	1	01:0c:cd:01:00:06	BC_CONTCTRL	1	1-2	85	Tampered	Static
☐	8	1	01:0c:cd:01:00:07	BC_27_1CTRL	1	1-2	85	Health	Dynamic

▶ Use Case

Gigabit PTP Switches for Smart Substation Maintenance

In order to maintain bay-level changes with minimal modifications to the core infrastructure, the substation managers use PT-G7728 full Gigabit modular switches to enhance backbone aggregation capability, providing sufficient bandwidth to bridge distributed feeder protection bays.

Why PT-G7728 Switches
- 28 Gigabit ports for dynamic traffic flows
- Hot-swappable modularity for scalable expansion with minimum MTTR (mean time to repair) values
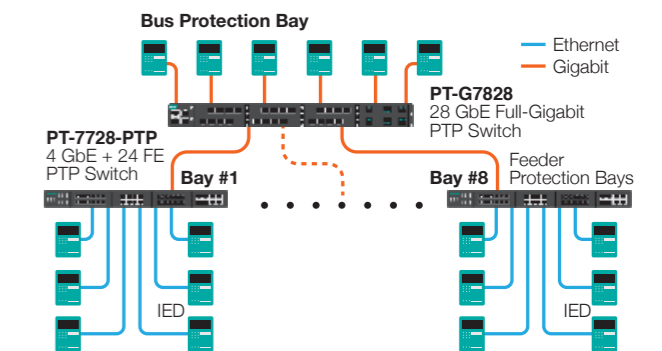
▶ IEC 61850-3 Switches

	PT-G7828/G7728	PT-7828/7728	PT-7528	PT-7728-PTP	PT-G503	MDS-G4000
Device Design	Modular	Modular	Fixed ports with single-slot module	Modular	Compact fixed ports	Modular
Max. No. of Ports	28 GbE	4 GbE + 24 FE	4 GbE + 24 FE	4 GbE + 24 FE	3 GbE	28 GbE
Max. No. of PTP Ports	28	–	–	14	3	–
Zero-time Redundancy	–	–	–	PRP/HSR	PRP/HSR	–
Proprietary Redundancy	Turbo Ring, Turbo Chain (Ethernet recovery time < 20 ms, Gigabit recovery time < 50 ms)					
RSTP Grouping	–	–	–	✓	✓	–
MMS Server	✓	✓	✓	✓	✓	–
GOOSE Check	✓	–	–	–	–	–
IEC 61850 QoS	✓	✓	✓	✓	–	–
Industrial Certifications	IEC 61850-3 Edition 2 Class 2, IEEE 1613 Class 2	IEC 61850-3 and IEEE 1613 Class 2				IEC 61850-3 and IEEE 1613
Operating Temperature	-40 to 85°C					-40 to 75°C

No new infrastructure is needed if your existing DSL infrastructure can support Ethernet network extensions, helping you cut costs and complexity.

▶ Moxa Offers

- Flexibility with point-to-point extenders and multi-drop switches
- Long-distance connectivity up to 8 km
- Plug-and-play deployment
- Network redundancy
- Easy maintenance with local and remote management tools

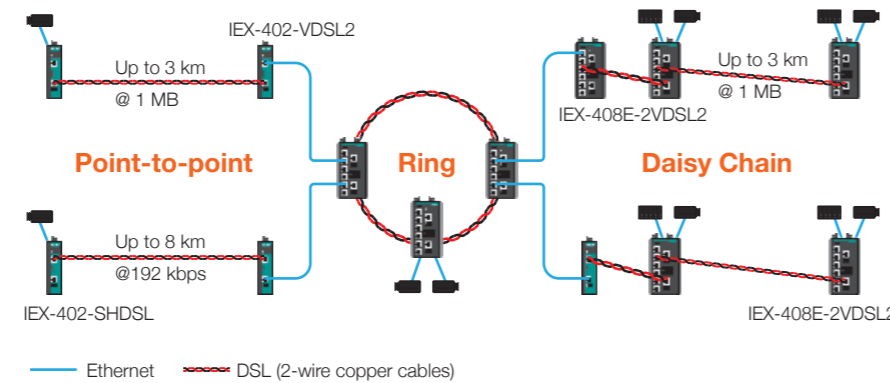# Extend **Ethernet** Over Existing **Copper** Wires

Moxa's IEX series of DSL Ethernet extenders provides easy and cost-effective Ethernet-to-DSL bridges to expand your last-mile networks beyond the 100-meter Ethernet limit, with tremendous savings on time and costs for long-haul connections.

Leveraging DSL infrastructure, both the IEX-402 Series and IEX-408E Series provide diverse and reliable options to meet your point-to-point and multi-drop applications in ring, chain, or daisy-chain topologies. The IEX-408E switches provide 2-port VDSL2, 6-port Ethernet, and fast Ethernet redundancy to connect multiple distributed LANs and devices with great flexibility and seamless connectivity.

Both the IEX-402 and IEX-408E models guarantee device reliability with industrial certifications, save time with zero-configuration, and make maintenance easy with LED indicators and a web console.

Extension Scenarios

Scenario	Point-to-point	Point-to-point	Multi-drop
Distance	Up to 8 km	Up to 3 km	Up to 3 km
Recommendation	Ethernet extender IEX-402-SHDSL Series	Ethernet extender IEX-402-VDSL2 Series	Ethernet switch with DSL links IEX-408E-2VDSL2 Series
DSL Technology	G. SHDSL for up to 8 km @ 192 kbps	VDSL2 for up to 3 km @ 1 Mbps	VDSL2 for up to 3 km @ 1 Mbps

IEX-402-VDSL2
Up to 3 km @ 1 MB
IEX-408E-2VDSL2
Up to 3 km @ 1 MB

Point-to-point   **Ring**   **Daisy Chain**

Up to 8 km @192 kbps
IEX-402-SHDSL
IEX-408E-2VDSL2

— Ethernet   ---- DSL (2-wire copper cables)

▶ Ethernet Extenders

Preliminary

	IEX-402-SHDSL	IEX-402-VDSL2	IEX-408E-2VDSL2
Ethernet Ports	1 FE	1 FE	6 FE
DSL Ports	1 G. SHDSL	1 VDSL2	2 VDSL2
Distance	Up to 8 km	Up to 3 km	Up to 3 km
Redundancy	Link fault pass-through (LFPT)	Link fault pass-through (LFPT)	Turbo Ring, Turbo Chain fast redundancy, and DSL bypass
Operating Temperature	-10 to 60°C / -40 to 75°C (-T models)		
Industrial Certifications	UL 508, EN 50121-4, SafetyNET p	UL 508, EN 50121-4, NEMA TS2, ATEX/C1D2	UL 61010, EN 50121-4, NEMA TS2, ATEX/IECEX*, IEC 61850-3

* Available for low-voltage (-LV) models only

Optical fiber can upgrade Ethernet connections in terms of throughput, distance, and reliability.

▶ Moxa Offers

- Gigabit fiber conversion
- Superior EMI immunity
- Long-distance transmissions
- Industrial-grade reliability

Extend the Distance of **Ethernet** Over **Fiber**

Moxa offers industrial media converters that provide copper-to-fiber Gigabit-speed extensions of up to 120 km over single-mode fiber in harsh conditions.

Moxa's Ethernet-to-fiber media converters feature innovative link fault pass-through, relay output, industrial-grade reliability, and a compact design to withstand industrial environments.
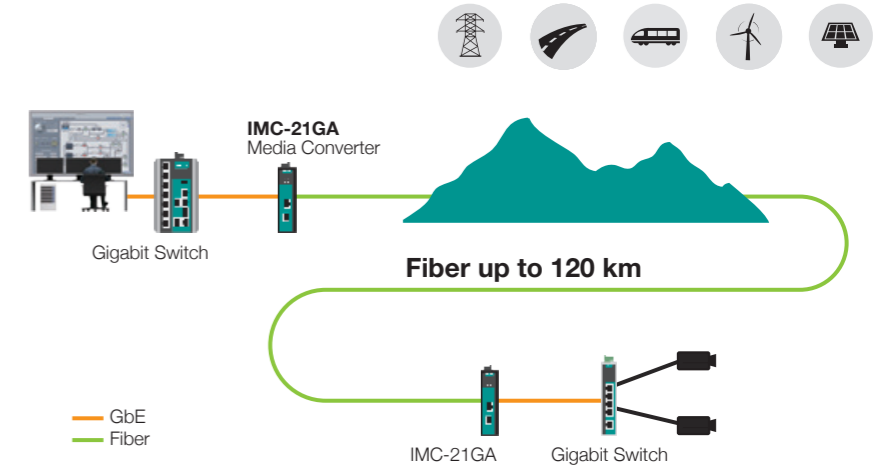
Both IMC-101G and IMC-21GA fiber converters are perfect for megapixel machine vision inspection, public IP surveillance, and outdoor applications that require Gigabit throughput and EMI immunity with fewer hops regardless of distance.

IMC-21GA
Media Converter

Gigabit Switch

Fiber up to 120 km

— GbE
— Fiber

IMC-21GA   Gigabit Switch

Long-haul Options
- The IMC-21GA supports Gigabit single/multi-mode models with an SC connector and SFP slot for flexible deployment from 0.5 to 120 km
- The IMC-101G supports single-mode fiber for data transmissions up to 120 km

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
- Industrial certifications for hazardous locations

▶ Ethernet Media Converters

Robust Design   Best Value

	IMC-101G	IMC-101	IMC-21GA	IMC-21A
Ethernet Ports	1 GbE	1 FE	1 GbE	1 FE
Fiber Ports	100/1000Base SFP slot	100BaseFX (SC or ST)	100/1000Base-SX/LX or 100/1000Base SFP slot	100BaseFX (SC or ST)
Single-mode Transmission Distance	Up to 120 km	Up to 40 km	Up to 120 km	Up to 40 km
Dual Power Inputs	12 to 45 VDC	12 to 45 VDC	12 to 48 VDC	12 to 48 VDC
Operating Temperature	0 to 60°C / -40 to 75°C (-T models)		-10 to 60°C / -40 to 75°C (-T models)	
Industrial Certifications	UL 508, C1D2, ATEX Zone 2, IECEx	UL 508, UL 60950-1 C1D2, ATEX Zone 2, IECEx, DNV GL	UL 60950-1	UL 60950-1