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 35 years of industry experience, Moxa has connected more than 94 million devices worldwide and has a distribution and service network that reaches customers in more than 85 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.

Moxa Americas
USA
Toll Free: 1-888-MOXA-USA
Tel: +1-714-528-6777
Fax: +1-714-528-6778
usa@moxa.com

Brazil
Tel: +55-11-95261-6545
brazil@moxa.com

Moxa Europe
Tel: +49-89-413-25-73-0
europe@moxa.com

Moxa Asia-Pacific and Taiwan
Asia/Taiwan
Tel: +886-2-8919-1230
Fax: +886-2-8522-8623
asia@moxa.com
taiwan@moxa.com

India
Tel: +91-80-4172-9088
Fax: +91-80-4132-1045
india@moxa.com

Korea
Tel: +82-2-6268-4048
Fax: +82-2-6268-4044
korea@moxa.com

Japan
Tel: +81-3-6721-5670
Fax: +81-3-6721-5671
japan@moxa.com

Moxa China
Shanghai
Tel: +86-21-5258-9955
Fax: +86-21-5258-5505
china@moxa.com

Beijing
Tel: +86-10-5976-6123/24/25/26
Fax: +86-10-5976-6122
china@moxa.com

Shenzhen
Tel: +86-755-8368-4084/94
Fax: +86-755-8368-4148
china@moxa.com

Connecting the Energy Landscape

Empowering the Evolving Grid:

From Substations All the Way to the Last Mile

www.moxa.com

Grid-to-edge Synergy: Integrating the Dynamic Edge Into a Digital Network

As the demand for electricity continues to grow globally, many markets are undergoing an energy transition to increase the use of renewable energy. However, intermittent power generation and distributed energy sources along with the need for large-scale integration of renewable energy into the grid, pose challenges to grid voltage stability, frequency control, and overall stability of the grid. Power grids need to address increasingly complex load management and require rapid responsive dispatching mechanisms to overcome these challenges.

In the past, management was confined to substations. However, the various impacts of the evolving energy landscape on the grid necessitates the digitalization. The digital grid now extends into the realm of power consumption with grid management reaching all the way to the last mile—the consumers or the grid edge*. Here we highlight the challenges of grid digitalization and focus on addressing them from the perspectives of utility substations, critical power, and feeder automation.

9,000+ Substation Successes Worldwide

We offer industry standards-based communication and computing solutions for substation automation, feeder automation, and control center systems.

Top 3 Hyperscale Data Center Operators' Choice

Leading global data center operators utilize Moxa's integrated network for critical power infrastructure within their data centers.

Industry Leadership

We contribute to forums such as CIGRE, IEC TC57, UCAIug, vPAC Alliance, and PAC World and are members of multiple energy working groups

Renewable Energy

01 Utility Substation

02 Critical Power

03 Feeder Automation

Electric Vehicle Infrastructure

Battery Energy Storage System (BESS)

*The grid edge is an umbrella term coined to cover all the distributed systems, including EV, solar panels, and energy storage, that exist in proximity to the end user.

Strengthen Substation Cybersecurity for the Digital Transformation of the Grid
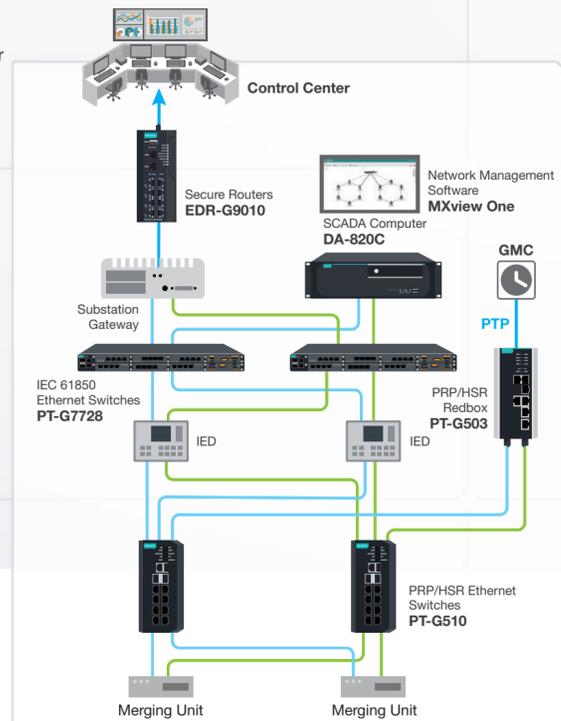
Application Requirements

• With the shift towards decentralized energy sources in substation transformations, the frequency of dispatching has considerably increased. Previously, substations operated in a streaming, closed-network communication mode.

  Now, with the integration of renewable energy sources, substations require additional control mechanisms to effectively manage dispatching. Operators are adopting more complex and open communication in substation networks. Consequently, concerns are being raised regarding cybersecurity blind spots in modern substation networks.

• Substations are beginning to implement defense-in-depth strategies for protecting their networks from external threats as well as enhancing intrinsic security.

Why Moxa

• **Enhanced Substation Cybersecurity:** Industrial-grade utility firewall, tailored for power systems with built-in deep packet inspection (DPI) for power protocols, that protects network devices against cyberattacks.

• **Defense-in-depth Security:** Intrusion detection system (IDS), intrusion prevention system (IPS), and GOOSE check to detect and manage abnormalities in data traffic and data access on a daily basis.

• **Security Standards:** Our products reference IEC 62443-4-2 SL2 and NERC CIP standards to enhance cybersecurity.

Control Center
Secure Routers **EDR-G9010**
Network Management Software **MXview One**
SCADA Computer **DA-820C**
GMC
PTP
Substation Gateway
IEC 61850 Ethernet Switches **PT-G7728**
IED
PRP/HSR Redbox **PT-G503**
IED
PRP/HSR Ethernet Switches **PT-G510**
Merging Unit
Merging Unit

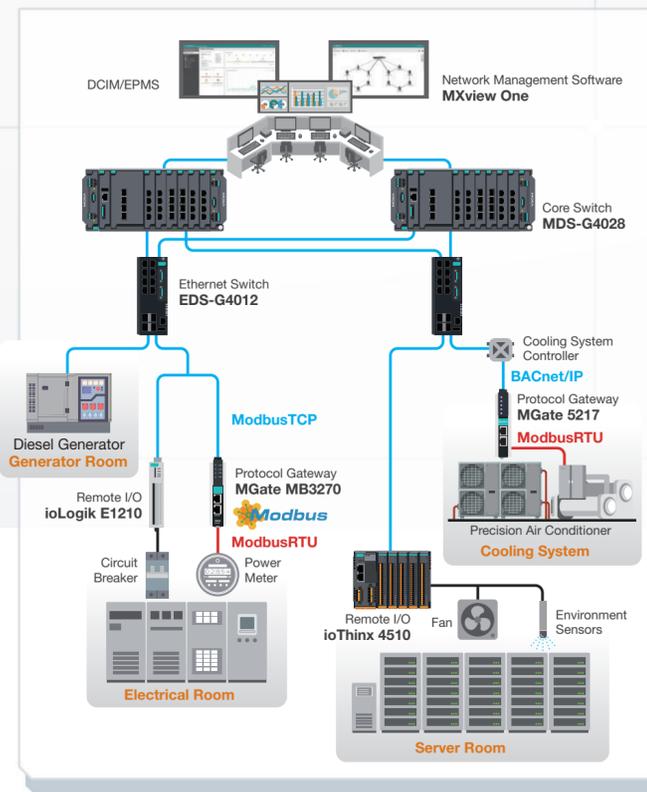## A Single Integrated Network for Critical Power

Application Requirements

• In critical power environments, such as hyperscale data centers, semiconductor fabs, and hospitals, a stable power supply and efficient energy utilization are crucial.

• When electricity is supplied from external substations to the facility, various complex equipment need to be managed via a switchgear panel. In emergencies, activating backup power sources like generators and UPSs is necessary, requiring real-time monitoring and analysis of operational voltage, current, and the statuses of critical equipment, all integrated into a DCIM system.

• All these elements are interconnected and interdependent; none can be neglected. Effective communication between devices and real-time data reporting requires a reliable network infrastructure.

Why Moxa

• **Versatile Communication:** Integration of multiple communication interfaces (Modbus, RS-232, fiber optic, and wireless).

• **Enhanced Visibility:** Effective communication to ensure OT data from various systems is integrated into DCIM for visualization.

• **High Availability:** Industrial-grade features, including EMC, a wide temperature range, and millisecond-level network recovery time, to withstand harsh operating environments.

• **Global Services:** A global technical support team to address customer needs across markets.
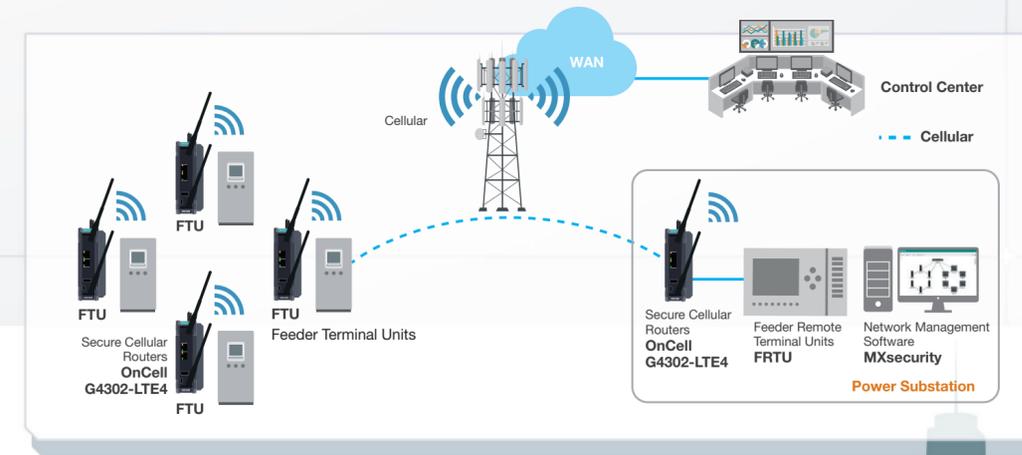
DCIM/EPMS
Network Management Software **MXview One**
Core Switch **MDS-G4028**
Ethernet Switch **EDS-G4012**
Cooling System Controller
BACnet/IP
Protocol Gateway **MGate 5217**
ModbusRTU
Protocol Gateway **MGate MB3270**
ModbusTCP
Diesel Generator **Generator Room**
Remote I/O **ioLogik E1210**
Modbus
ModbusRTU
Circuit Breaker
Power Meter
Electrical Room
Remote I/O **ioThinx 4510**
Fan
Environment Sensors
Precision Air Conditioner **Cooling System**
Server Room

Centralized Feeder Management Across Thousands of Nodes

Application Requirements

• Historically, substations have relied on a reactive approach, waiting for node abnormalities before dispatching personnel for on-site inspection. Feeder automation revolutionizes this process by enabling the collection and transmission of node information back to the control center, facilitating monitoring and predictive maintenance.

• However, a challenge arises when digitalization extends to the feeder level. Due to the large number of feeders and wireless communication, they become vulnerable to attacks and require periodic firmware updates. Operators need to effectively gather feeder data for centralized management by a SCADA system.

Why Moxa

• **Centralized Management:** Visualization of distributed data, simultaneous security patch and firmware upgrades on thousands of nodes, and real-time alerts for abnormal device statuses.

• **Connection Redundancy Guarantee:** GuaranLink® offers cellular connectivity with dual-SIM switchover and continuous connection checks between base station and feeders to ensure continuous availability.

• **IEC 62443-4-2 Based Cybersecurity Functions:** Firewalls, NATs, and VPNs provide effective protection against cyberattacks.

WAN
Cellular
Control Center
Cellular
FTU
FTU
FTU **Feeder Terminal Units**
Secure Cellular Routers **OnCell G4302-LTE4**
FTU
Secure Cellular Routers **OnCell G4302-LTE4**
Feeder Remote Terminal Units **FRTU**
Network Management Software **MXsecurity**
Power Substation

Moxa Product Highlight

PT-G510
IEC 61850-3 10-port Layer 2 full Gigabit PRP/HSR managed Ethernet switches

PT-G7728
IEC 61850-3 28-port Layer 2 full Gigabit modular managed Ethernet switches with PRP/HSR module support

EDR-G9010
IEC 61850-3 8 GbE copper + 2 GbE SFP multiport industrial secure routers, IEC 62443-4-2 certified, low and high voltage models available

RKS-G4000
IEC 61850-3 28-port Layer 2/3 full Gigabit modular managed IEC 62443-4-2 certified Ethernet switches

DA-820C
IEC 61850-3 3U rackmount computers with Intel® Xeon® or 7th Gen Intel® Core™ processor, PRP/HSR card support

MGate 5192/5119
IEC 61850/DNP3/IEC 101/ IEC 104/Modbus protocol gateways

MXview One
Industrial network management platform with MXview Power add-on module for GOOSE and PRP/HSR monitoring

MDS-G4000
4XG+8/16/24G-port Layer 2/3 full Gigabit modular managed Ethernet switches

RKS-G4000
IEC 61850-3 28-port Layer 2/3 full Gigabit modular managed IEC 62443-4-2 certified Ethernet switches

EDS-G4012
IEC61850-3 compliant 12G-port full Gigabit managed IEC 62443-4-2 certified Ethernet switches with an 8 802.3bt PoE port option

ioLogik E1200 Series
Ethernet remote I/O with 2-port Ethernet switch

ioThinx 4510
Advanced modular remote I/O adapters with built-in serial ports

MGate 5217
2-port Modbus RTU/ASCII/TCP-to-BACnet/ IP gateways

MGate MB3170/3270
1 and 2-port advanced serial-to-Ethernet Modbus gateways

MGate MB3660
8 and 16-port serial-to-Ethernet Modbus gateways

OnCell G4302-LTE4
2-port industrial LTE Cat. 4 secure cellular routers

MXsecurity
Industrial network security management software designed for OT networks

Moxa Energy Storage Systems (BESS) Microsite