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MOXA®



Resilient Connectivity.
Scalable Productivity.

Supporting mobile and critical mining operations throughout the long project lifecycle

moxa mining

The mining industry is at yet another crossroads in its hundreds of years of history. To stay profitable amidst technology changes, the industry is embracing automation, unmanned operations, and decarbonization. At the same time, it must confront a multitude of internal and external challenges.

The Ever-changing Landscape in the Mining Industry

Internal Challenges

Changing terrains-
mining deeper underground, digging farther into mountains

Changing conditions-
flooding, toxic gases, explosions, mine collapses

Changing technologies-
automation, remote controlling, decarbonization

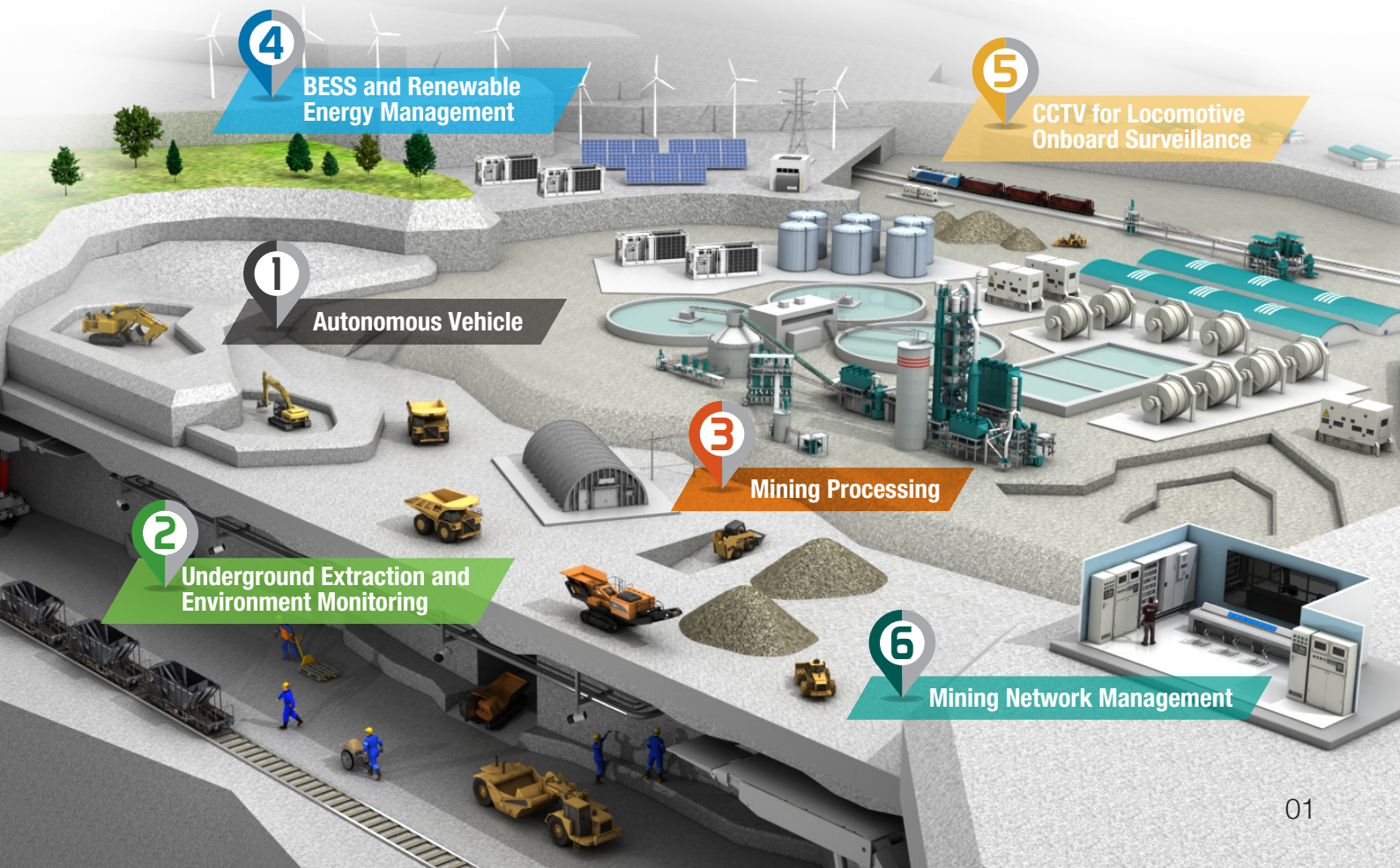
External Challenges

Evolving cyberthreats-
As mining equipment gets connected, cyberthreats are not affecting IT only but also OT

Evolving energy diversity-
Embracing net zero calls for renewable energy and more complex grid management

Evolving mining commodity selection-
Fast deployment and adjustments to absorb market fluctuations in mineral demand

Embrace Changes with Advanced Automation Networks - Let Moxa Help Keep You Moving Forward.



Network Architecture of Mining Automation

Site Operation Center

Mining Network Management





Local SCADA

Boost Your Backbone Scalability



MRX-G4064
10GbE Layer 3 Full Gigabit Switch

page 9

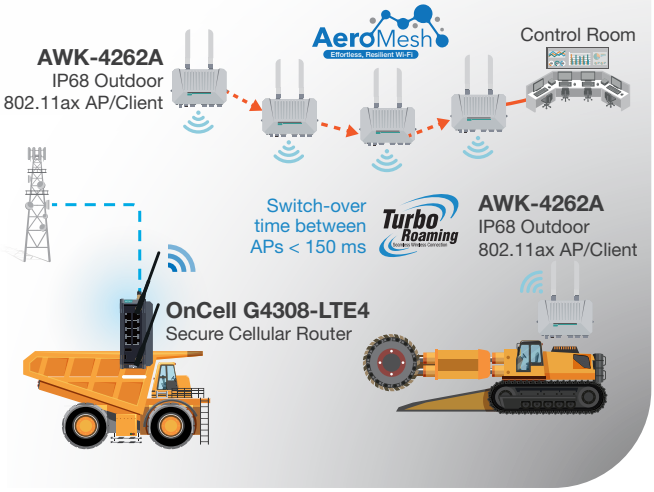


MXview One
Network Management Software

Extraction

page 4

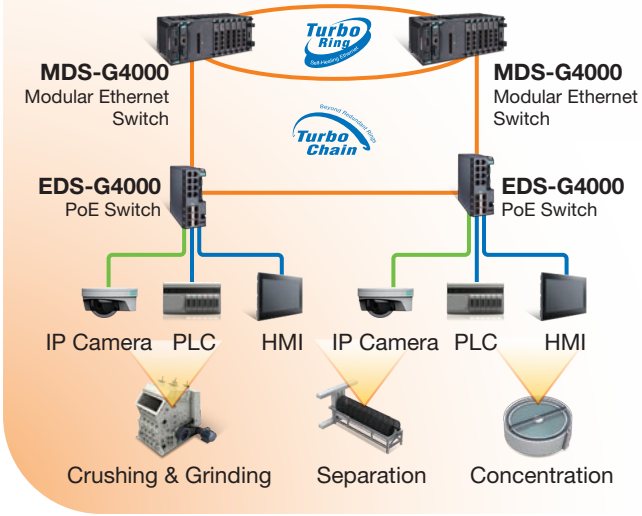
Communication Networks of Autonomous Vehicle



Process Plant

Process Control System Networks

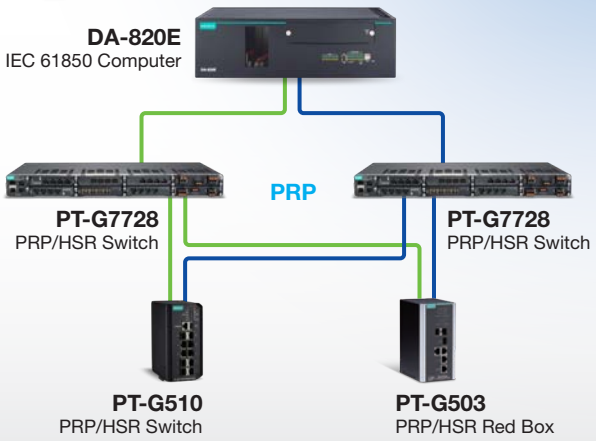
page 6



Substation

PRP/HSR Networks for IEC 61850 Substations

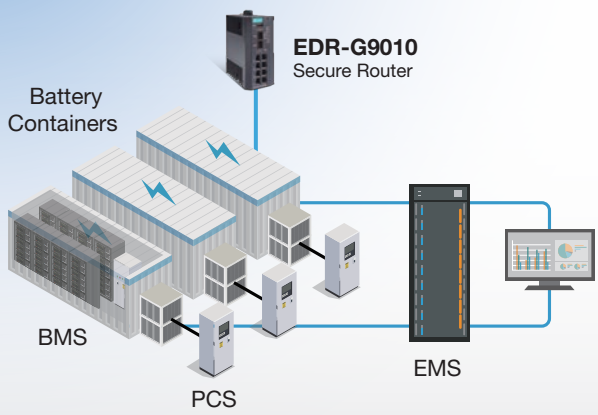
page 7



Renewable Energy

Secure Access for BESS Monitoring

page 7



Moxa facilitates agile responses to diverse changes in the mining industry

Be Agile Today:

Availability
From wired and wireless connectivity to high bandwidth, advanced redundancy, and roaming capabilities for industrial networks

Visibility
Full visibility of wired and wireless devices from field sites to remote control centers

Interoperability
Multiple protocols and edge computing fulfill OT/IT data convergence

Be Agile for the Future:

Cybersecurity
Strengthen cybersecurity in OT networks and comply with IEC 62443 for IT/OT convergence

Energy Diversity
From renewable energy, energy storage to smart grids and microgrids, we are experts in critical infrastructure, empowering sustainable and hybrid power supply through stable communication

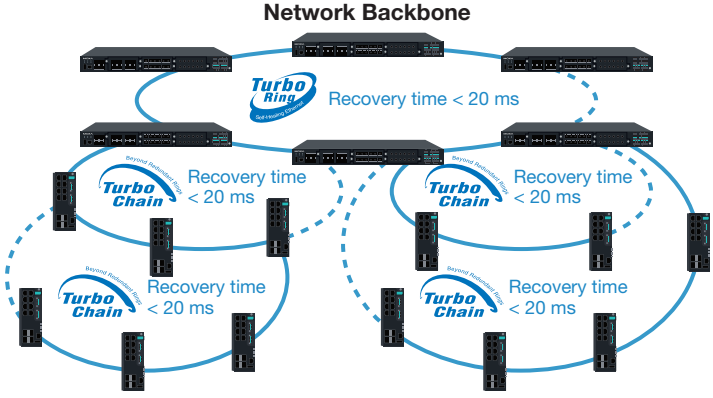
Network Infrastructure Lifecycle Sustainability
Moxa enables long-lifecycle mining operations with a scalable networking infrastructure to support future migration and technology evolution

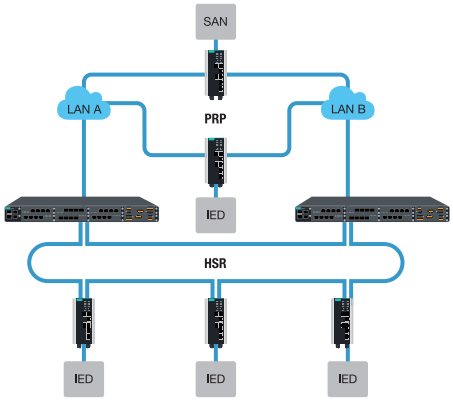
Technologies Enabling Always-On Network Connectivity

Resilient connectivity technologies are essential for maximizing network availability and maintaining uninterrupted communications across critical mining operations.

Rapid Recovery and Zero-Loss Redundancy

Moxa Turbo Ring and Turbo Chain offer unrestricted, flexible topology expansion, and ensure network recovery time < 20 ms with up to 250 nodes. (Gigabit Ethernet recovery time < 50 ms)
PRP/HSR architectures deliver zero-packet-loss redundancy for mission-critical industrial communications.

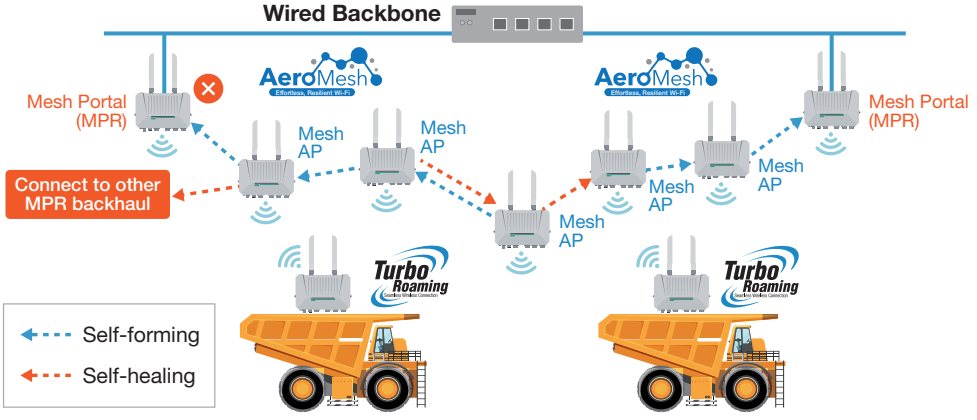




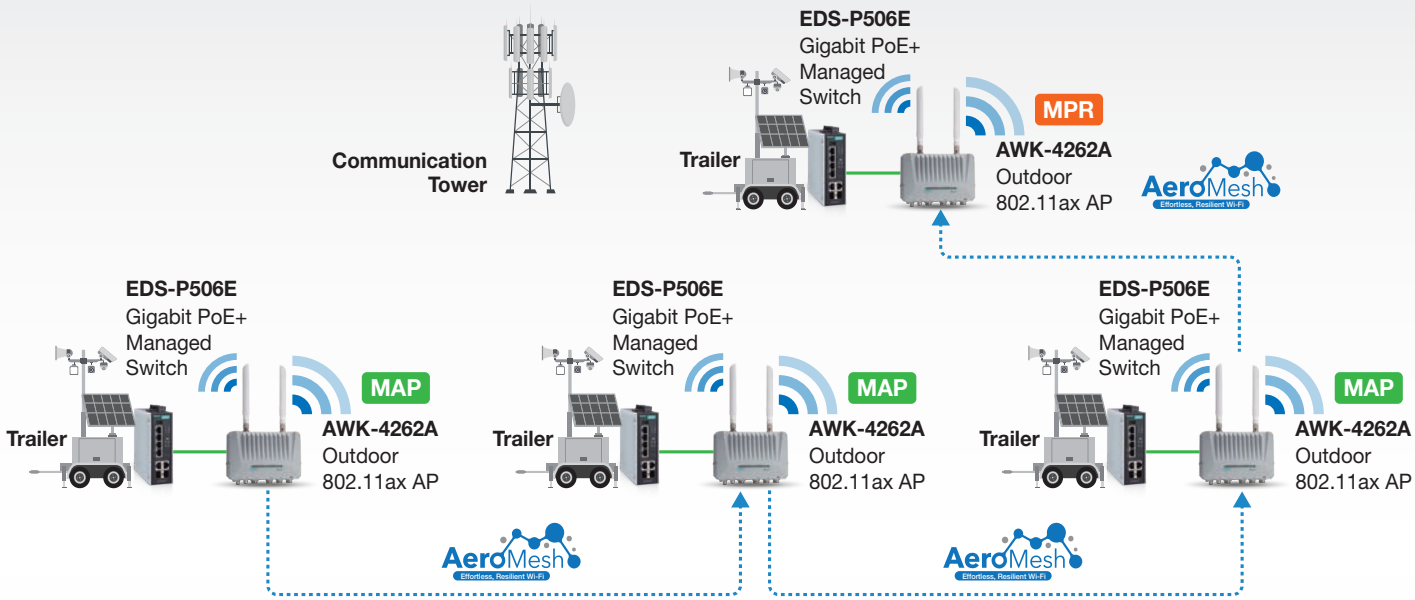
Seamless Wireless Mobility

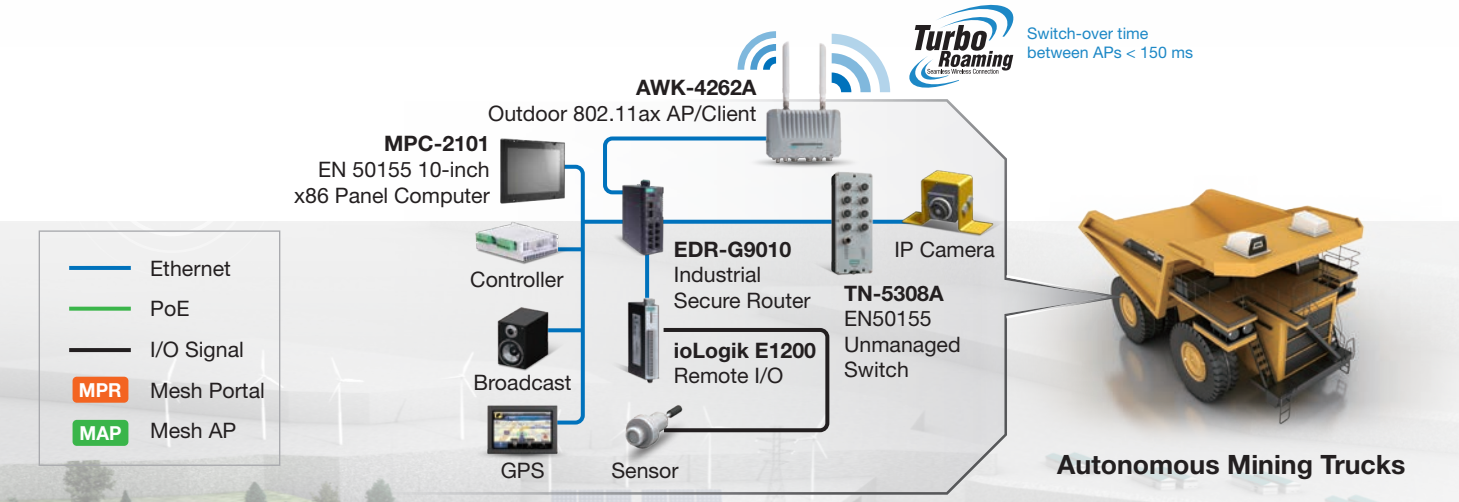
Turbo Roaming enables client-based roaming recovery in less than 150 ms, while AeroMesh delivers self-forming and self-healing wireless mesh networks with greater scalability for stable connectivity across moving assets and hard-to-wire environments.

Note: Turbo Roaming V2.0, coming in 2027, will further reduce roaming handoff time to less than 50 ms for even more seamless wireless connectivity.



Communication Networks of Autonomous Vehicle





Autonomous Mining Trucks

Robust Backbone Network for Underground Extraction and Environment Monitoring

Ethernet
Fiber
Serial



Remote Control Center

Tunnel Safety Monitoring System

Turbo Ring
Self-Healing Ethernet
Gigabit Ethernet Recovery < 50 ms
Up to 250 devices

RKS-G4028
Modular Managed
Ethernet Switch

RKS-G4028
Modular Managed
Ethernet Switch

Turbo Chain
Beyond Redundant Rings
Gigabit Ethernet Recovery < 50 ms
Up to 250 devices

MGate MB3000-G2
Protocol Gateway

Underground Mining Extraction Monitoring

PLC
EDS-G4000
Managed
Ethernet Switch

PLC
EDS-G4000
Managed
Ethernet Switch

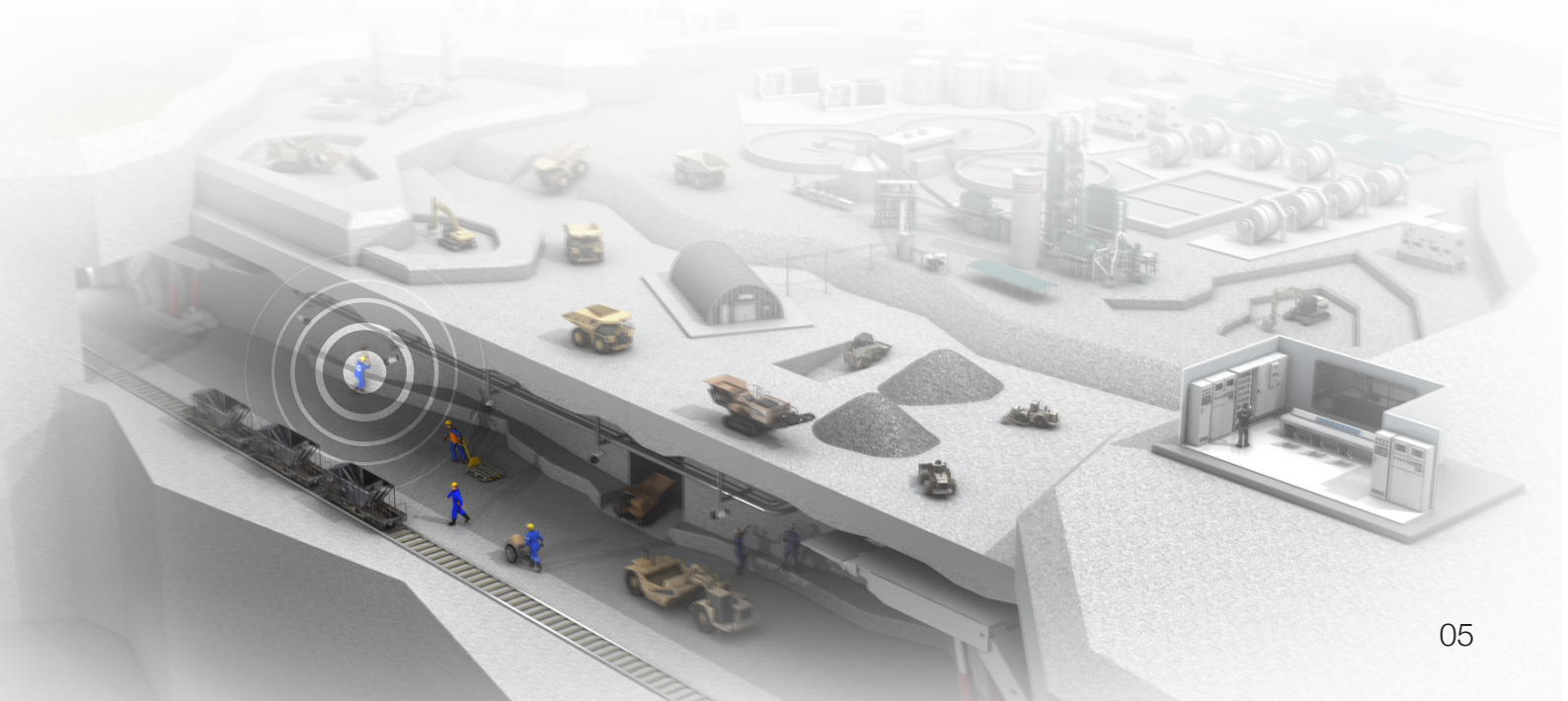
EDS-G4000
Managed
Ethernet Switch

Pressure Sensor
Position Sensor

Scraper conveyor

Cutting Machine

Hydraulic support



Process Control System Networks



Remote Operation Center



MXview ONE
Network Management
Software



Local SCADA

MDS-G4000
Modular Ethernet Switch



Turbo Ring
Self-Healing Ethernet



MDS-G4000
Modular Ethernet Switch



RKS-G4028
Modular Ethernet Switch



RKS-G4028
Modular Ethernet Switch

Turbo Chain
Beyond Redundant Rings

Turbo Chain
Beyond Redundant Rings



EDS-G4000
Managed PoE
Switch



EDS-G4000
Managed PoE
Switch



EDS-G4000
Managed PoE
Switch



EDS-G4000
Managed PoE
Switch



IP Camera
PLC
EXPC-F2000W
Zone 2 Panel
Computer



IP Camera
PLC
MPC-2000
Fanless Panel
Computer



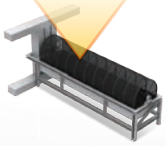
IP Camera
PLC
EXPC-F2000W
Zone 2 Panel
Computer



IP Camera
PLC
MPC-2000
Fanless Panel
Computer



Crushing & Grinding



Separation



Concentration

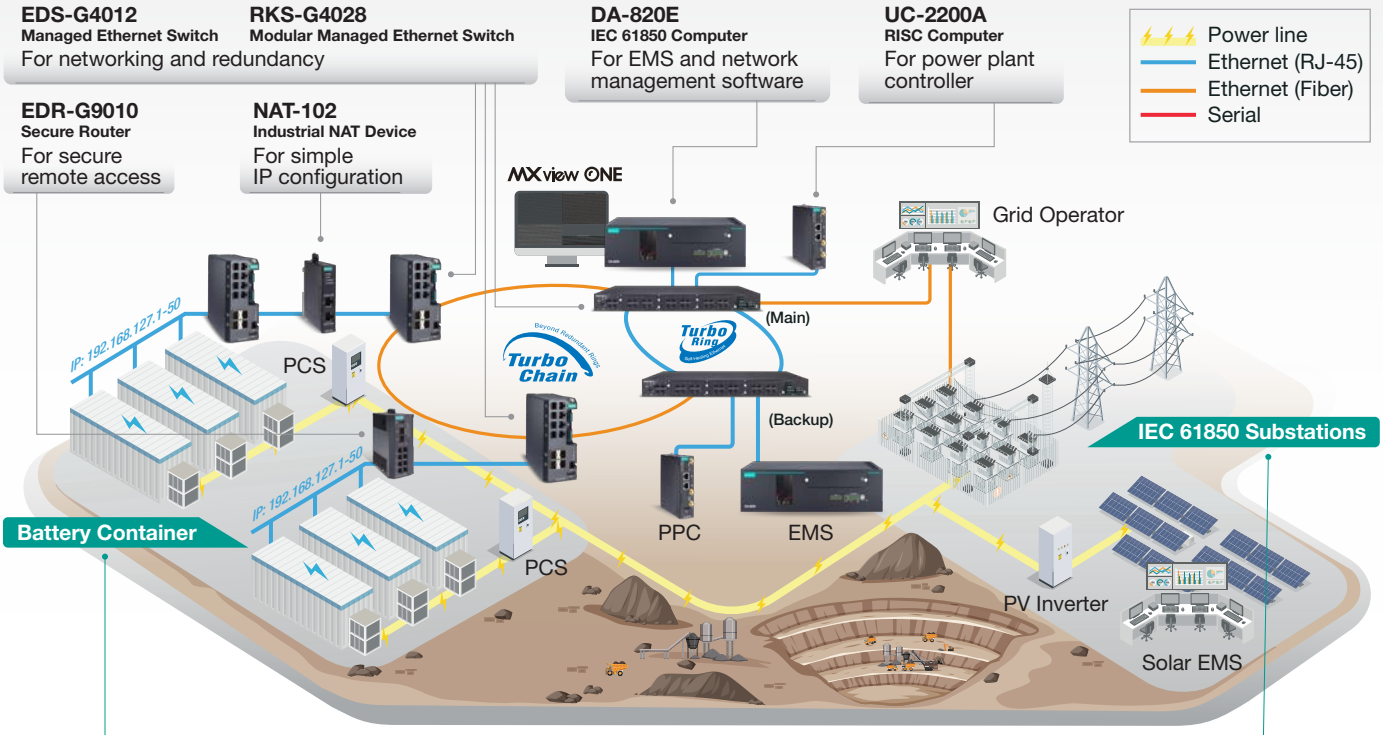


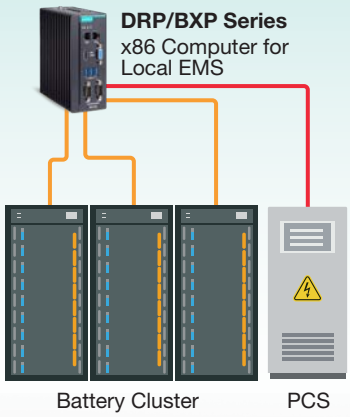
Dewatering



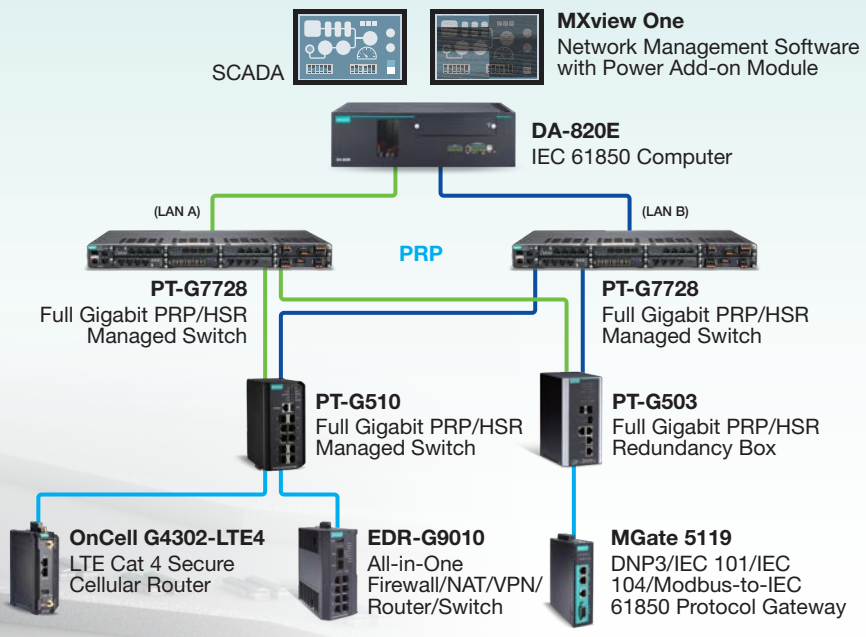
4 Accelerate Clean Energy Transition With Resilient Communication Networks

Moxa's Solutions for Grid-connected Battery Energy Storage Systems

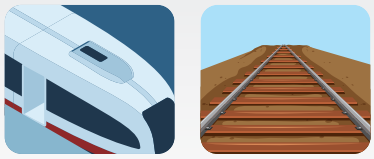




PRP/HSR Networks and IEC 61850 System Visibility for Substation Digitalization



CCTV for Locomotive Onboard Surveillance



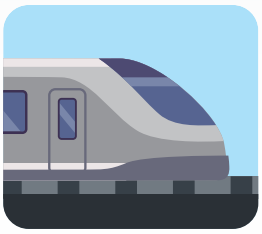
Forward-/Rear-facing Camera

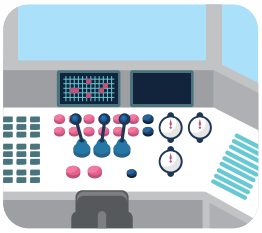
VPort P16-1MP-M12
EN 50155 720P
Rugged IP Camera

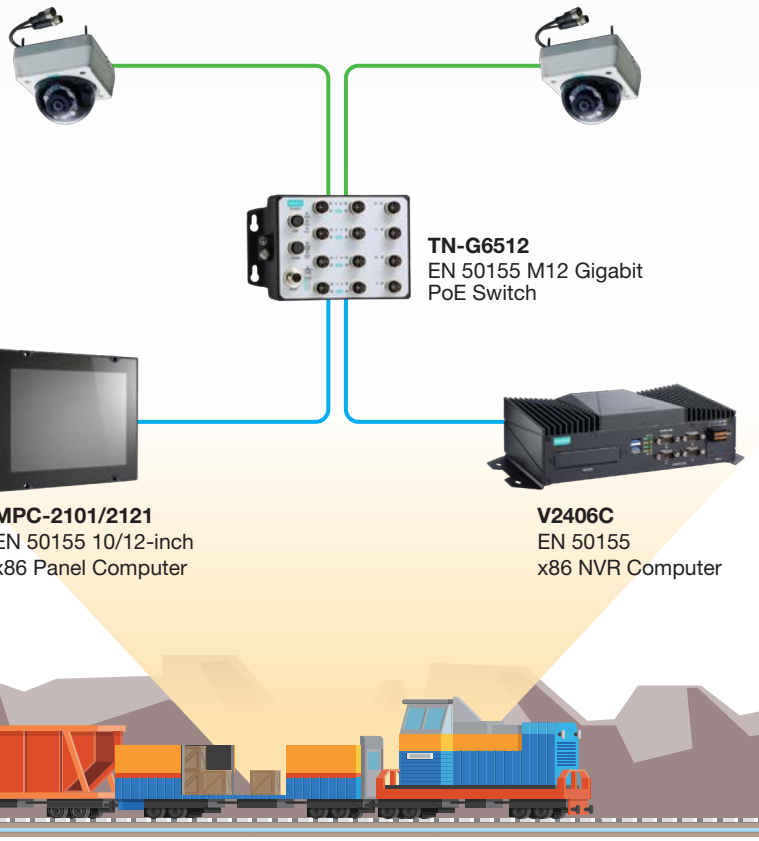


Driver Cabin Camera

VPort P16-1MP-M12-IR
EN 50155 720P Infrared
IP Camera

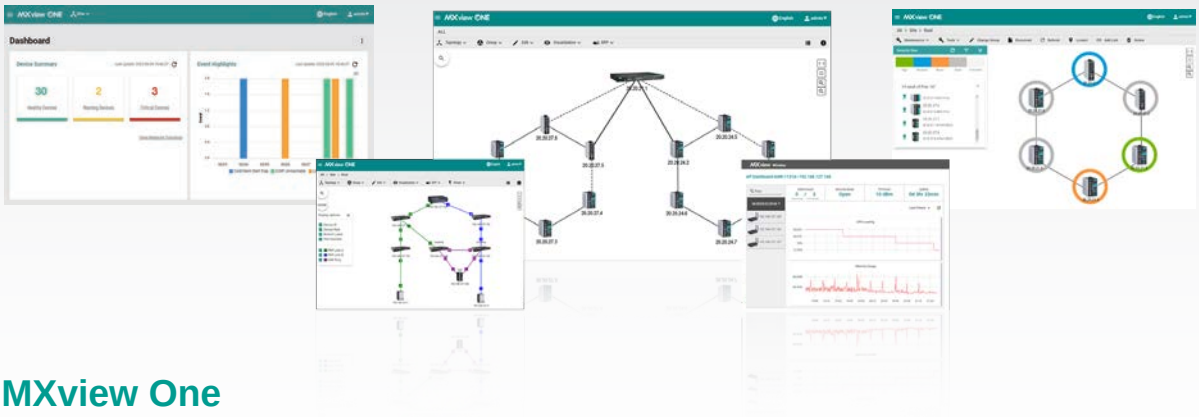








6 Mining Network Management



MXview One

Industrial Network Management Software

- Visualize industrial network topology and device status with real-time monitoring, event logging, and unified user access control.
- Automate configuration backup, audits, and firmware management to speed recovery, minimize downtime, and reduce risks from configuration drift or device replacement.
- Detect bandwidth saturation, link and power failures, abnormal traffic, and SFP degradation in real time through centralized diagnostics and event alerts.
- Use built-in **Security View** to detect abnormal behavior, unauthorized configuration changes, and security events for enhanced OT cybersecurity visibility.

Efficient Daily Operation

Network Status At a Glance

Timely Notification

Flash Backup and Restore

OT/IT Convergence Made Easy



Operation Center



Your One-stop Shop: Addressing Diverse Connectivity Needs in One Go

Ethernet Switches/PoE Switches

Support Turbo Ring, Turbo Chain, STP/RSTP/MSTP for network redundancy, and provide PoE/PoE+/PoE++ options



Rackmount/Modular/ DIN-rail Switches
RKS-G4028
MDS-G4000
EDS-4000/G4000

10GbE High-bandwidth Switches
RKS-G4000-PL
MDS-G4000-L3-4XGS
MRX-G4064/Q4064



EN 50155 Switches
TN Series (M12 Connector)

IEC 61850 Switches
PT-G7728/G7828
PT-G510/G503

Industrial Computers



Fanless x86 Computers
DRP-A100/C100
BXP-A100/A101/C100
RKP-A110/C110/C220

EN 50155 Certified
V2406C/V3200/V3400



IEC 61850 Certified
DA-820E

Fanless Panel PC
Zone 2 Certified
MPC-2120/3000/3000W
EXPC-F2000W

Industrial Wireless



Cellular Routers
OnCell G4302-LTE4
OnCell G4308-LTE4

802.11ax APs/Clients
AWK-4262A (Outdoor, IP68)
AWK-3262A (Indoor, IP30)

Secure Routers



All-in-One Firewall/NAT/VPN/Router/Switch
EDR-G9010/G9004/8010

Next-generation LAN Firewalls
EDF-G1002-BP

Industrial Network Address Translation (NAT) Devices
NAT-108/102

Industrial IoT Gateways

4G, MQTT, built-in device SDKs for Azure/AWS cloud, Moxa Industrial Linux 10-year support



Arm-based Computers
UC-1200A/2200A/3400A/4400A
UC-5100/8200
UC-8600A
V1200 (M12 Connector)
AIG-100/300

Network Management



Network Management Software
MXview One with Power/Wireless Added-on Modules

Protocol Gateways



MGate MB3000-G2
MGate 5000

Remote I/O



Modular/Standalone
ioThinx 4510
ioLogik E1200

IP Cameras



EN 50155 Certificated
VPort Series



Master Industrial Communication Networks with Moxa MXCx Certification and Training

◀ Request Training Information
www.moxa.com/mxcx

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 102 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.

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