KEEP MINING
KEEP MOVING

Industrial Communication and Computing Solutions for Mining Digitalization

MOXA

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-
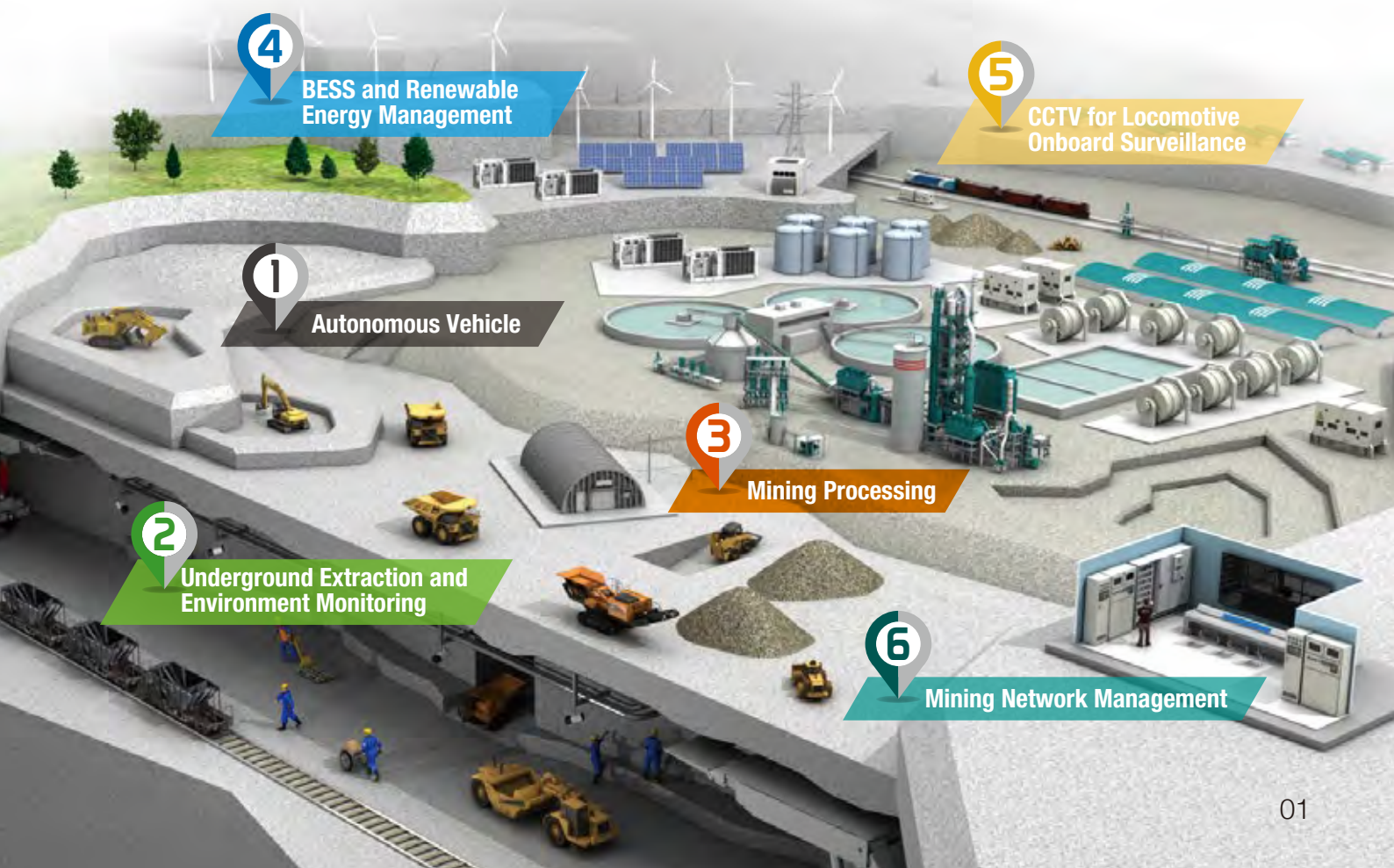automation, remote controlling, decarbonization

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.

4 BESS and Renewable Energy Management

5 CCTV for Locomotive Onboard Surveillance

1 Autonomous Vehicle

3 Mining Processing

2 Underground Extraction and Environment Monitoring

6 Mining Network Management

Network Architecture of Mining Automation

Site Operation Center
Mining Network Management

Local SCADA

Boost Your Backbone Scalability

MRX-G4064
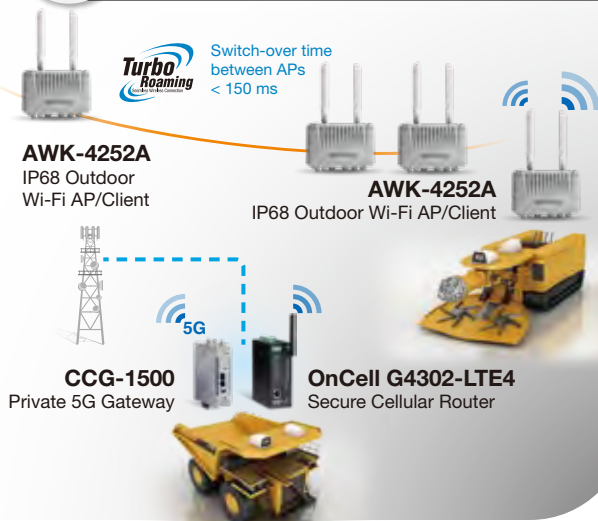10GbE Layer 3 Full Gigabit Switch

MXview One
Network Management Software

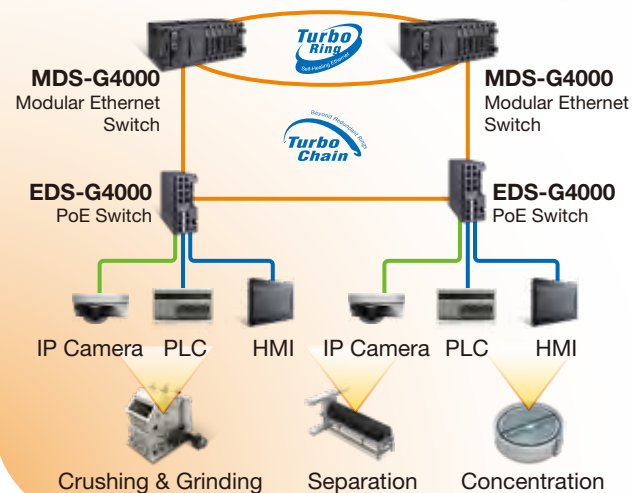**MXsecurity**
Network Security Management Software

Extraction
Communication Networks of Autonomous Vehicle

Turbo Roaming

Switch-over time between APs < 150 ms

AWK-4252A
IP68 Outdoor Wi-Fi AP/Client

AWK-4252A
IP68 Outdoor Wi-Fi AP/Client

5G

CCG-1500
Private 5G Gateway

OnCell G4302-LTE4
Secure Cellular Router

Process Plant
Process Control System Networks

Turbo Ring

Turbo Chain

MDS-G4000
Modular Ethernet Switch

MDS-G4000
Modular Ethernet Switch

EDS-G4000
PoE Switch

EDS-G4000
PoE Switch

IP Camera   PLC   HMI   IP Camera   PLC   HMI

Crushing & Grinding   Separation   Concentration

Substation
PRP/HSR Networks for IEC 61850 Substations

DA-682C
IEC 61850 Computer

PRP

PT-G7728
PRP/HSR Switch

PT-G7728
PRP/HSR Switch

PT-G510
PRP/HSR Switch

PT-G503
PRP/HSR Red Box
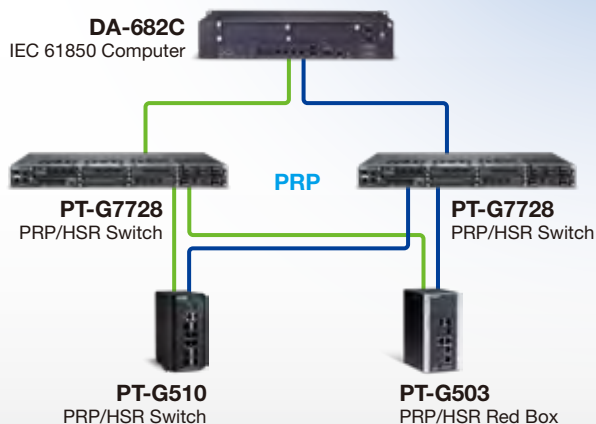
Renewable Energy
Secure Access for BESS Monitoring

EDR-G9010
Secure Router

Battery Containers

BMS

PCS

EMS
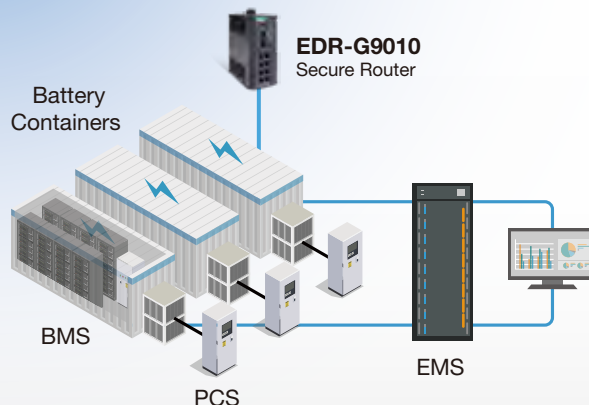
Moxa facilitates agile responses to diverse changes in the mining industry

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
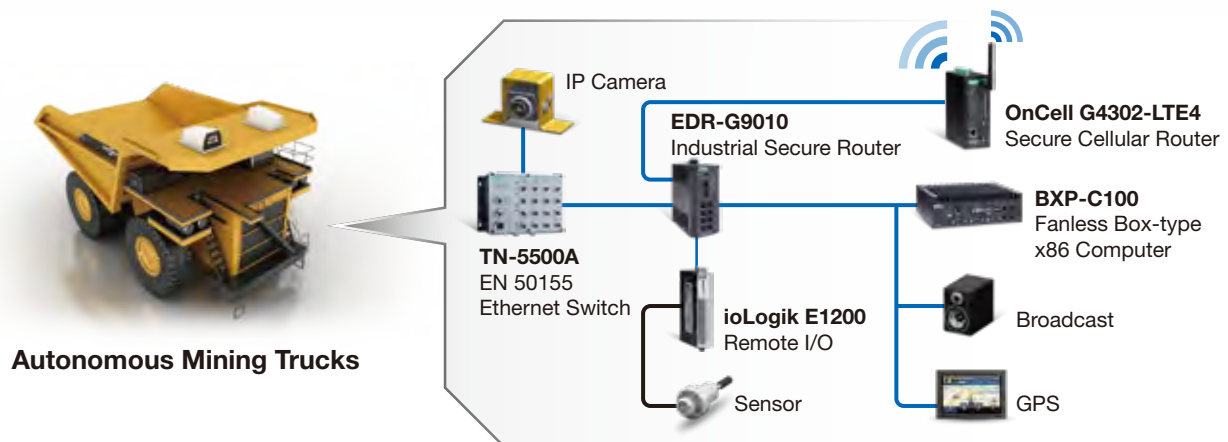
Be Agile for the Future:

› **Cybersecurity**
Strengthen cybersecurity in OT networks and comply with IEC 62443 for IT/OT convergence
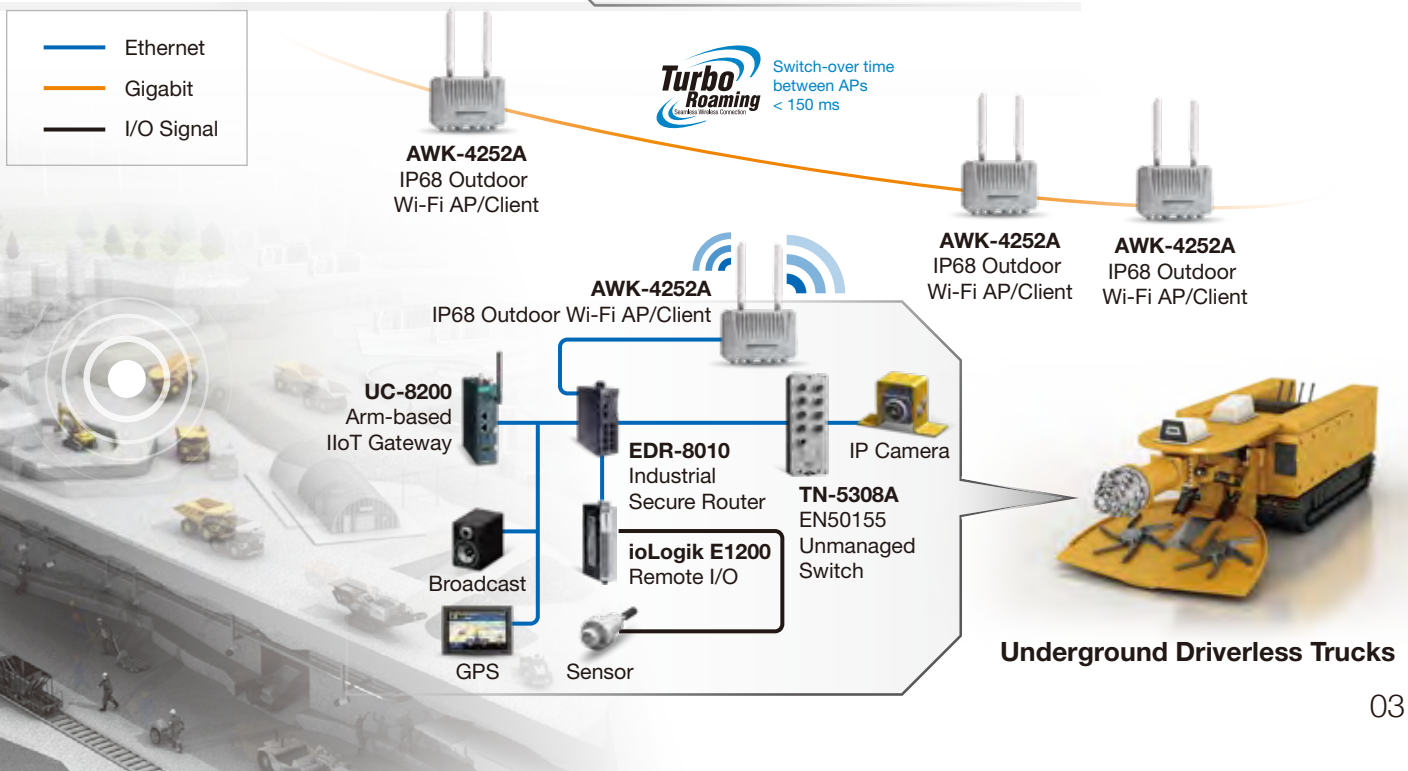
› **Energy Diversity**
From renewable energy, energy storage to smart grids and microgrids, we are experts in critical infrastructure, empowering sustainable and hybrid power supply through stable communication

① Communication Networks of Autonomous Vehicle

IP Camera

EDR-G9010
Industrial Secure Router

OnCell G4302-LTE4
Secure Cellular Router

BXP-C100
Fanless Box-type x86 Computer

TN-5500A
EN 50155
Ethernet Switch

ioLogik E1200
Remote I/O

Broadcast

Sensor

GPS

Autonomous Mining Trucks

Ethernet
Gigabit
I/O Signal

AWK-4252A
IP68 Outdoor
Wi-Fi AP/Client

Turbo Roaming
Seamless Wireless Connection
Switch-over time between APs < 150 ms

AWK-4252A
IP68 Outdoor Wi-Fi AP/Client

AWK-4252A
IP68 Outdoor
Wi-Fi AP/Client

AWK-4252A
IP68 Outdoor
Wi-Fi AP/Client

UC-8200
Arm-based
IIoT Gateway

EDR-8010
Industrial
Secure Router

IP Camera

TN-5308A
EN50155
Unmanaged
Switch

ioLogik E1200
Remote I/O

Broadcast

GPS

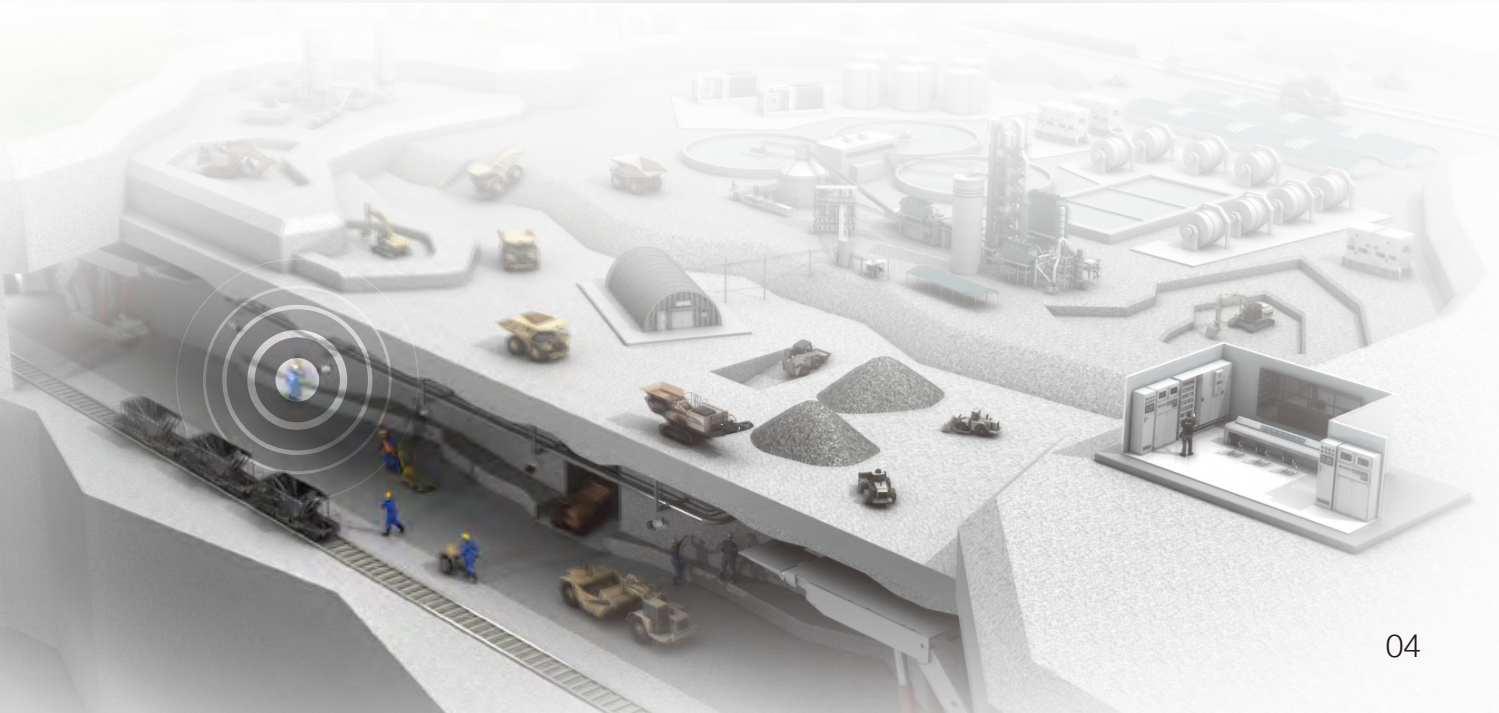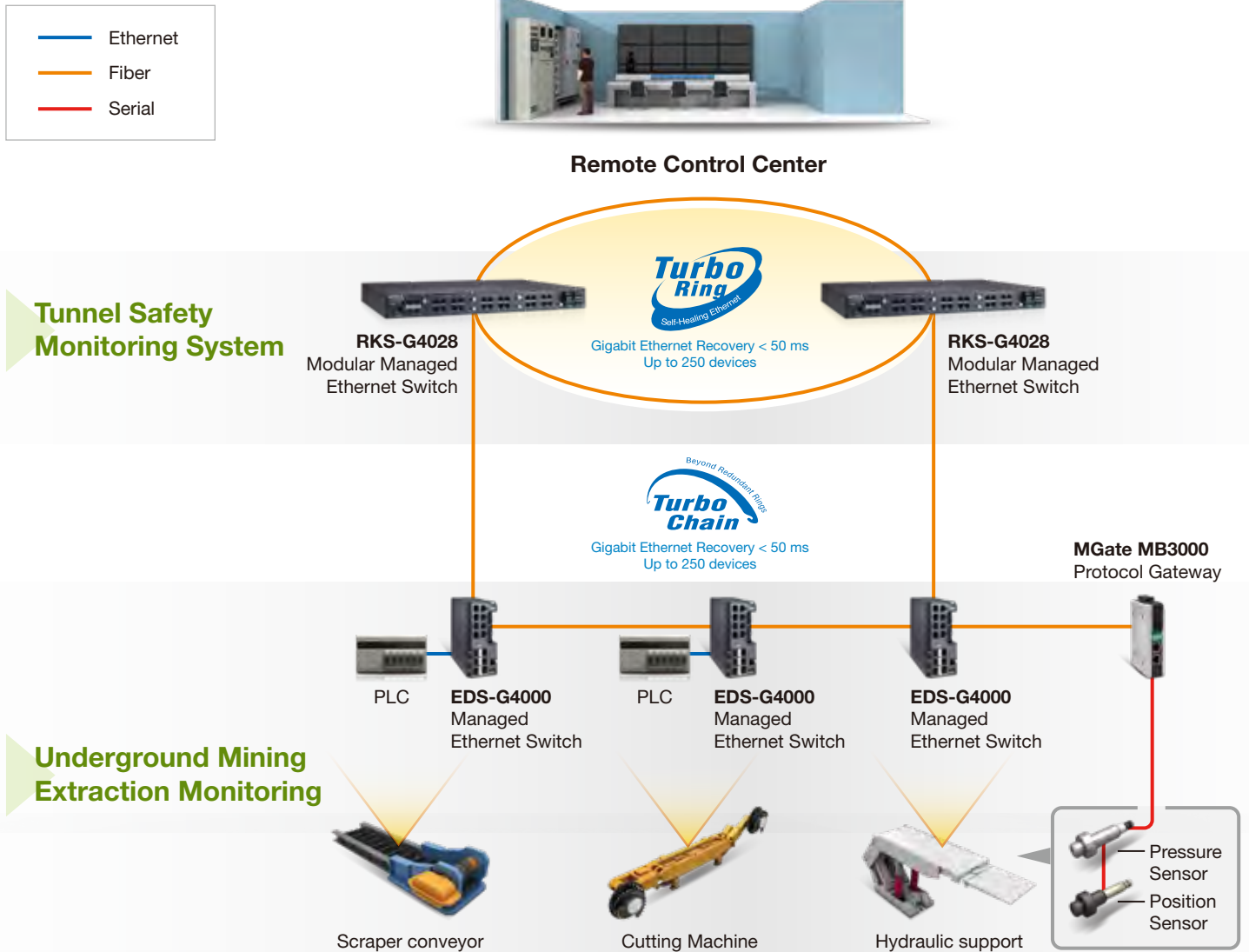Sensor

Underground Driverless Trucks

② Robust Backbone Network for Underground Extraction and Environment Monitoring

Legend:
- 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
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

③ Processing Control System Networks

Remote Operation Center

MXview ONE
Network Management Software

Local SCADA

MDS-G4000
Modular Ethernet Switch

MDS-G4000
Modular Ethernet Switch

Turbo Ring
Self-Healing Ethernet

RKS-G4028
Modular Ethernet Switch

RKS-G4028
Modular Ethernet Switch

Beyond Redundant Rings
Turbo Chain

Beyond Redundant Rings
Turbo Chain

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

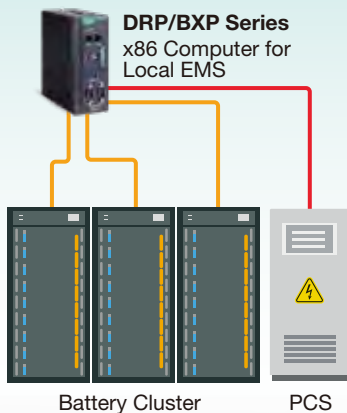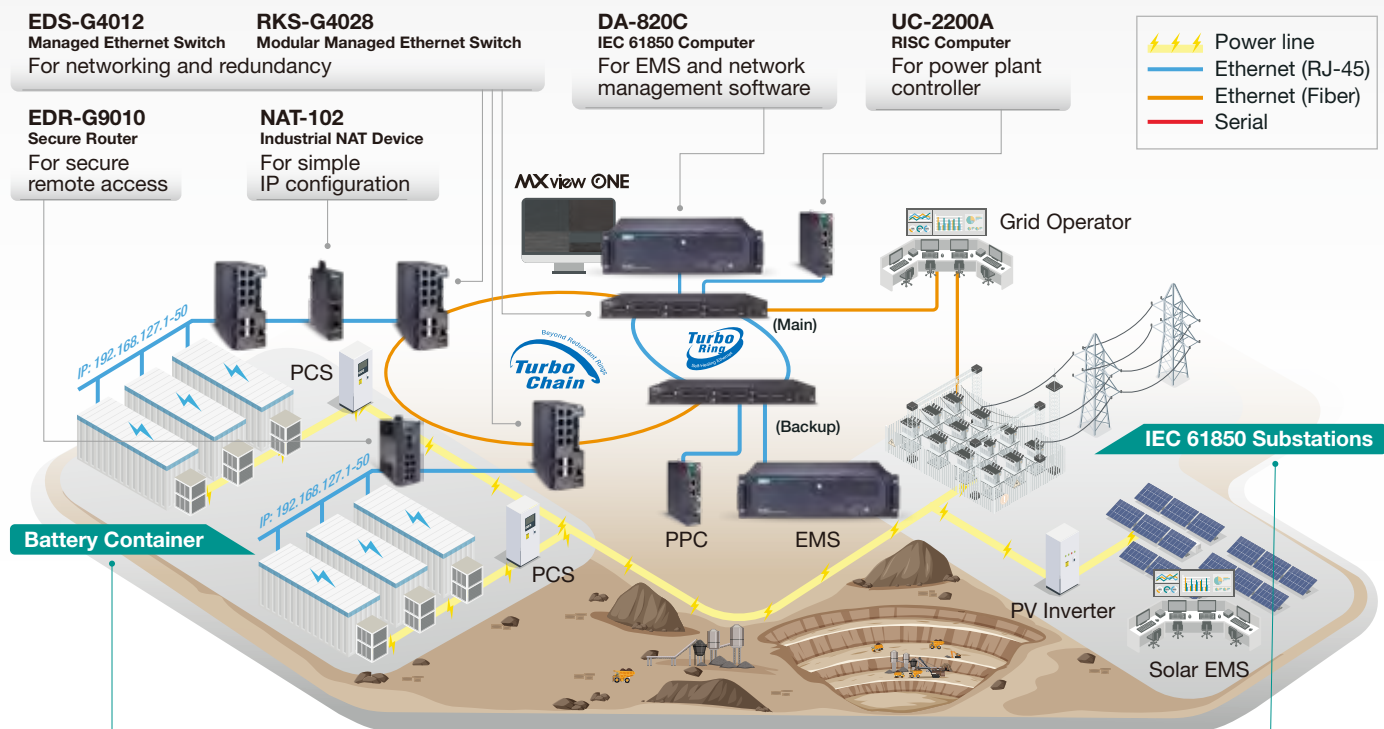Crushing & Grinding

Separation

Concentration
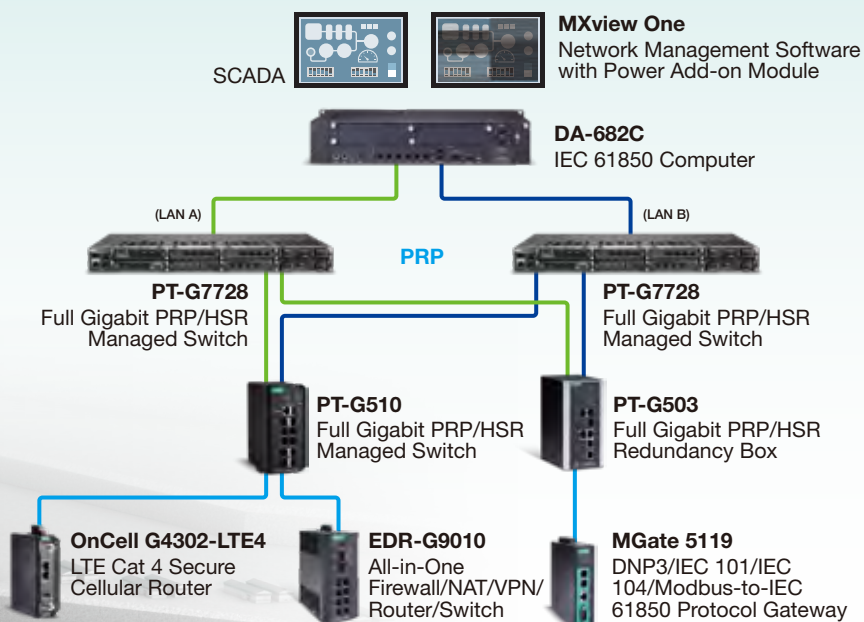
Dewatering

— Ethernet
— Gigabit
— PoE

Accelerate Clean Energy Transition With Resilient Communication Networks

④

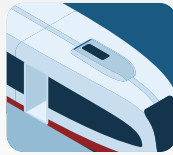## Moxa's Solutions for Grid-connected Battery Energy Storage Systems

EDS-G4012
Managed Ethernet Switch
For networking and redundancy

RKS-G4028
Modular Managed Ethernet Switch

DA-820C
IEC 61850 Computer
For EMS and network management software

UC-2200A
RISC Computer
For power plant controller

EDR-G9010
Secure Router
For secure remote access

NAT-102
Industrial NAT Device
For simple IP configuration

- ⚡⚡⚡ Power line
- Ethernet (RJ-45)
- Ethernet (Fiber)
- Serial

MXview ONE

Grid Operator

Turbo Chain
Beyond Redundant Ring

Turbo Ring
Self-healing Ring

(Main)

(Backup)

IP: 192.168.127.1-50

PCS

IP: 192.168.127.1-50

PCS

PPC

EMS

IEC 61850 Substations

Battery Container

PV Inverter

Solar EMS

DRP/BXP Series
x86 Computer for Local EMS

Battery Cluster   PCS

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

SCADA

MXview One
Network Management Software with Power Add-on Module

DA-682C
IEC 61850 Computer

(LAN A)   **PRP**   (LAN B)

PT-G7728
Full Gigabit PRP/HSR Managed Switch

PT-G7728
Full Gigabit PRP/HSR Managed Switch

PT-G510
Full Gigabit PRP/HSR Managed Switch

PT-G503
Full Gigabit PRP/HSR Redundancy Box

OnCell G4302-LTE4
LTE Cat 4 Secure Cellular Router

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

MGate 5119
DNP3/IEC 101/IEC 104/Modbus-to-IEC 61850 Protocol Gateway

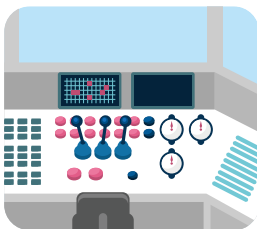# ⑤ CCTV for Locomotive Onboard Surveillance

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

TN-G6512
EN 50155 M12 Gigabit
PoE Switch

MPC-2101/2121
EN 50155 10/12-inch
x86 Panel Computer

V2406C
EN 50155
x86 NVR Computer

— PoE
— Ethernet

⑥ Mining Network Management

MXview One
Efficient Daily Operation

MXsecurity
Enhanced Cybersecurity Protection

| Firewall | IPS | DPI | VPN | NAT |

Network Status At a Glance

Flash Backup and Restore

Timely Notification

OT/IT Convergence Made Easy

Visibility on Malicious Activities

Unified Security Policy

Real-time Alert

Centralized Management

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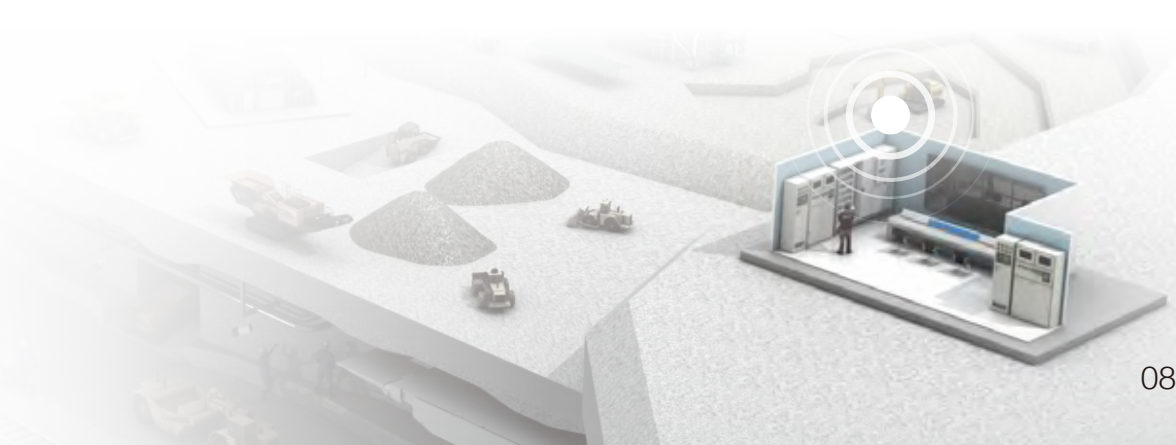
Your One-stop Shop:
Addressing Diverse Connectivity Needs in One Go

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
MRX-G4064 `NEW`
RKS-G4028
MDS-G4000
EDS-4000/G4000

EN 50155 Switches
TN Series

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

Industrial Computers

Fanless x86 Computers `NEW`
11th Gen Intel® Core™ Processors
DRP-A100/C100
BXP-A100/C100
RKP-A110/C110

EN 50155 Certificated
V2403C/2406C

IEC 61850 Certificated
DA-820C/682C/681C

Fanless Panel PC `NEW`
Zone 2 Certificated
MPC-3000
EXPC-F2000W

Industrial Wireless

Private 5G Cellular Gateways `NEW`
CCG-1500

Cellular Routers `NEW`
OnCell G4302-LTE4

Outdoor 802.11ac AP/Client
AWK-4252A

Outdoor 802.11ax AP/Client `Coming Soon`
AWK-4262A

Secure Routers

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

Next-generation LAN Firewalls `NEW`
EDF-G1002-BP

Industrial Network Address Translation (NAT) Devices
NAT-102

Industrial IoT Gateways

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

Arm-based Computers
UC-5100/8200/1200A/2200A
AIG-101/301/302

Network Management

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

Network Security Management Software
MXsecurity

Protocol Gateways

MGate MB3000
MGate 5000

Remote I/O

Modular/Standalone
ioThinx 4510
ioLogik E1200

IP Cameras

EN 50155 Certificated
VPort Series

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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Book the Moxa Demo Ute for a free live demo of our mining solutions!

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