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

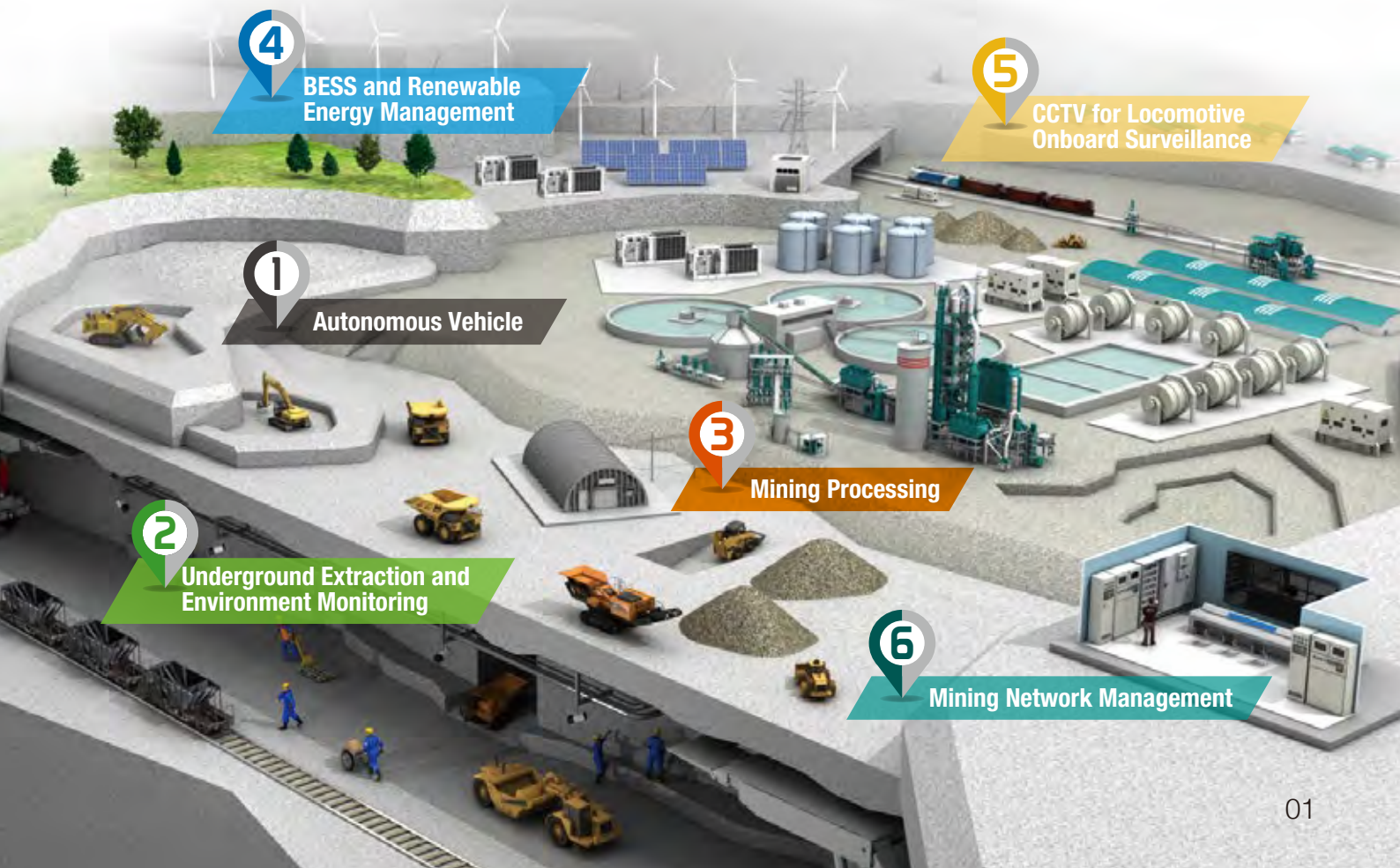
External Challenges

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.



Network Architecture of Mining Automation

Site Operation Center
Mining Network Management

page 8

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

page 3

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

page 5

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

page 6

DA-682C
IEC 61850 Computer

PRP

PT-G7728
PRP/HSR Switch

PT-G7728
PRP/HSR Switch

PT-G510
PRP/HSR Switch

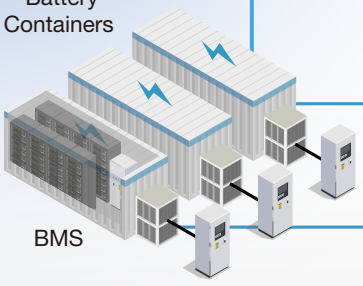
PT-G503
PRP/HSR Red Box

Renewable Energy
Secure Access for BESS Monitoring

page 6

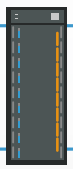
EDR-G9010
Secure Router

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

Autonomous Mining Trucks

IP Camera

EDR-G9010
Industrial Secure Router

OnCell G4302-LTE4
Secure Cellular Router

TN-5500A
EN 50155
Ethernet Switch

BXP-C100
Fanless Box-type
x86 Computer

ioLogik E1200
Remote I/O

Broadcast

Sensor

GPS

Ethernet
Gigabit
I/O Signal

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

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

Robust Backbone Network for Underground Extraction and Environment Monitoring

Ethernet
Fiber
Serial

Remote Control Center

Tunnel Safety Monitoring System

RKS-G4028
Modular Managed
Ethernet Switch

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

RKS-G4028
Modular Managed
Ethernet Switch

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

MGate MB3000
Protocol Gateway

PLC
EDS-G4000
Managed
Ethernet Switch

PLC
EDS-G4000
Managed
Ethernet Switch

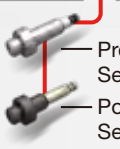
EDS-G4000
Managed
Ethernet Switch

Underground Mining Extraction Monitoring

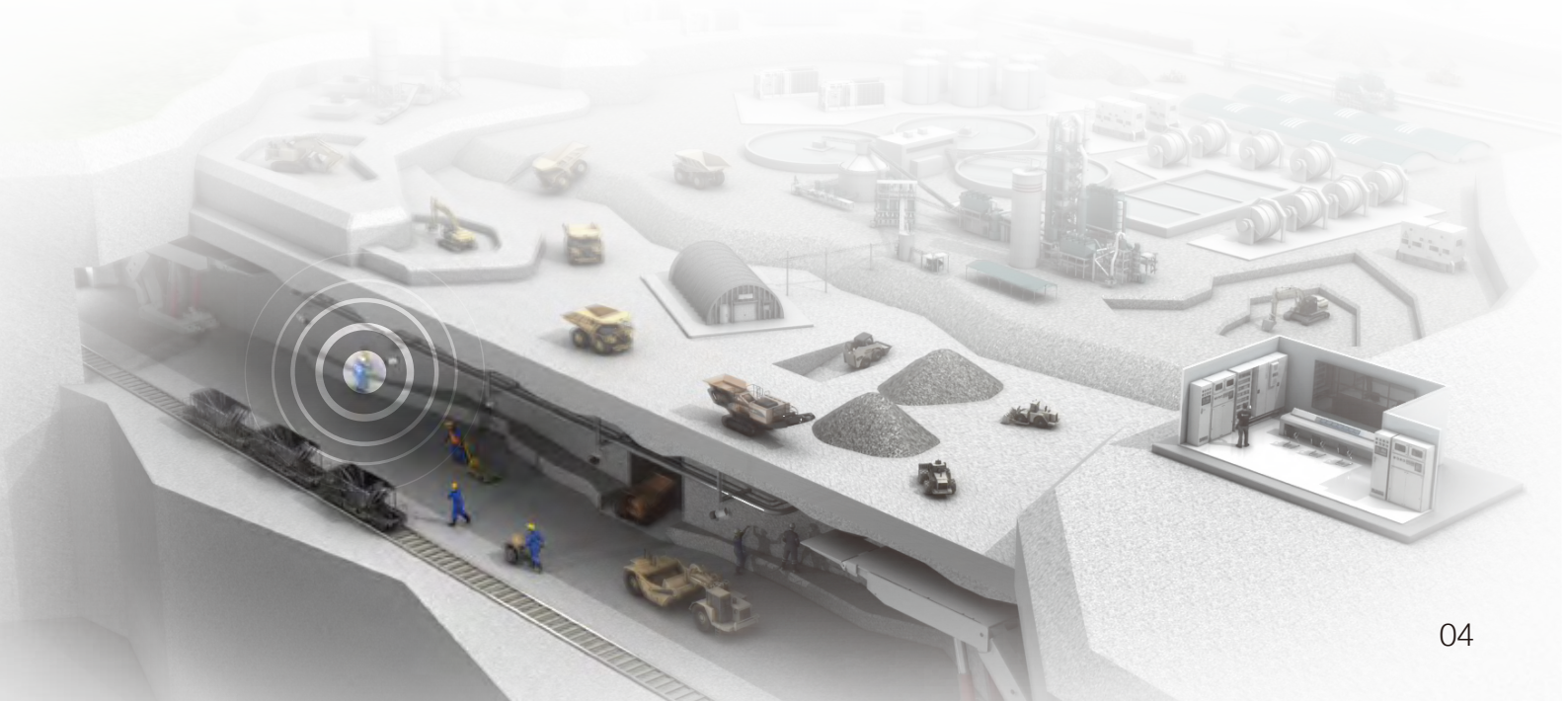
Scraper conveyor

Cutting Machine

Hydraulic support



Pressure Sensor
Position Sensor



3 Processing 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

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

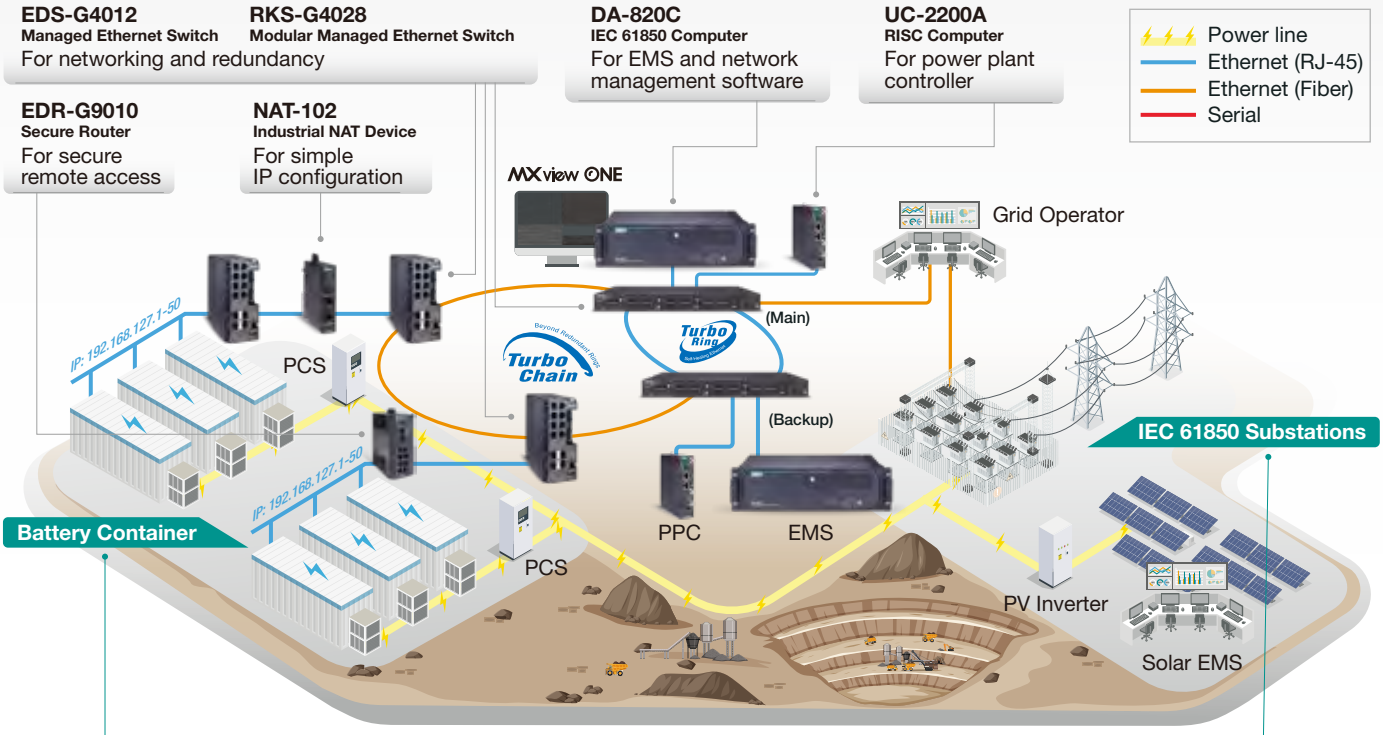
Separation

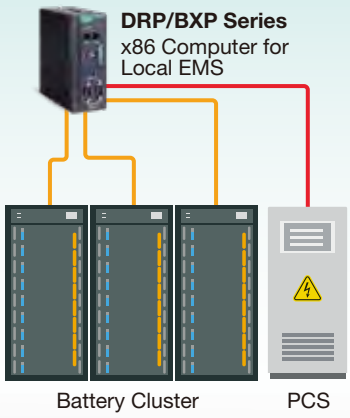
Concentration

Dewatering

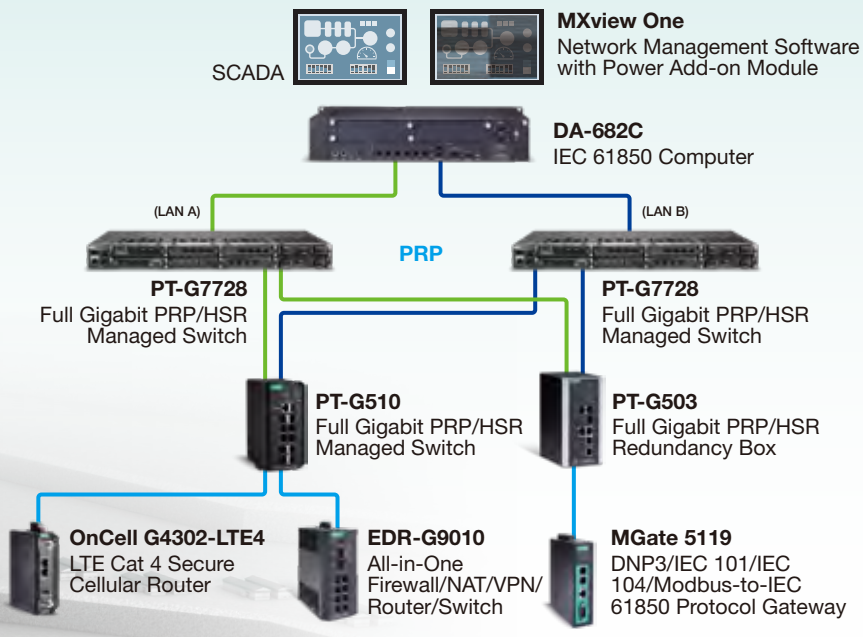
4 Accelerate Clean Energy Transition With Resilient Communication Networks

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

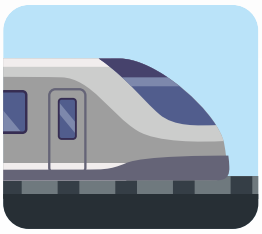


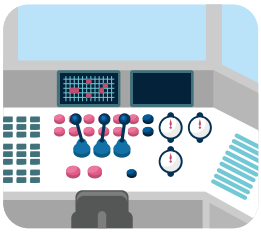


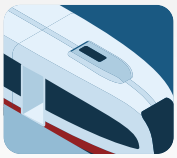
PRP/HSR Networks and IEC 61850 System Visibility for Substation Digitalization



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

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

- Network Status At a Glance
- Flash Backup and Restore
- Timely Notification
- OT/IT Convergence Made Easy

MXsecurity

Enhanced Cybersecurity Protection

Firewall IPS DPI VPN NAT

- 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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