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CISCO

Cisco Industrial Automation Solution – Mining

Improve business operations by securely digitizing mining process environments

The Cisco® Industrial Automation Solution for mining provides guidance for digitizing industrial mining environments in order to achieve significantly improved business operational outcomes. It provides network and security design and implementation guidance for mining industrial applications supporting extraction, crushing, conveyance, processing, smelting, and refining processes. The solution supports resilient, secure connectivity to Industrial Automation and Control Systems (IACS) and key mining assets that are the core of mining process environments, providing a complete, secure, end-to-end networking and security solution.

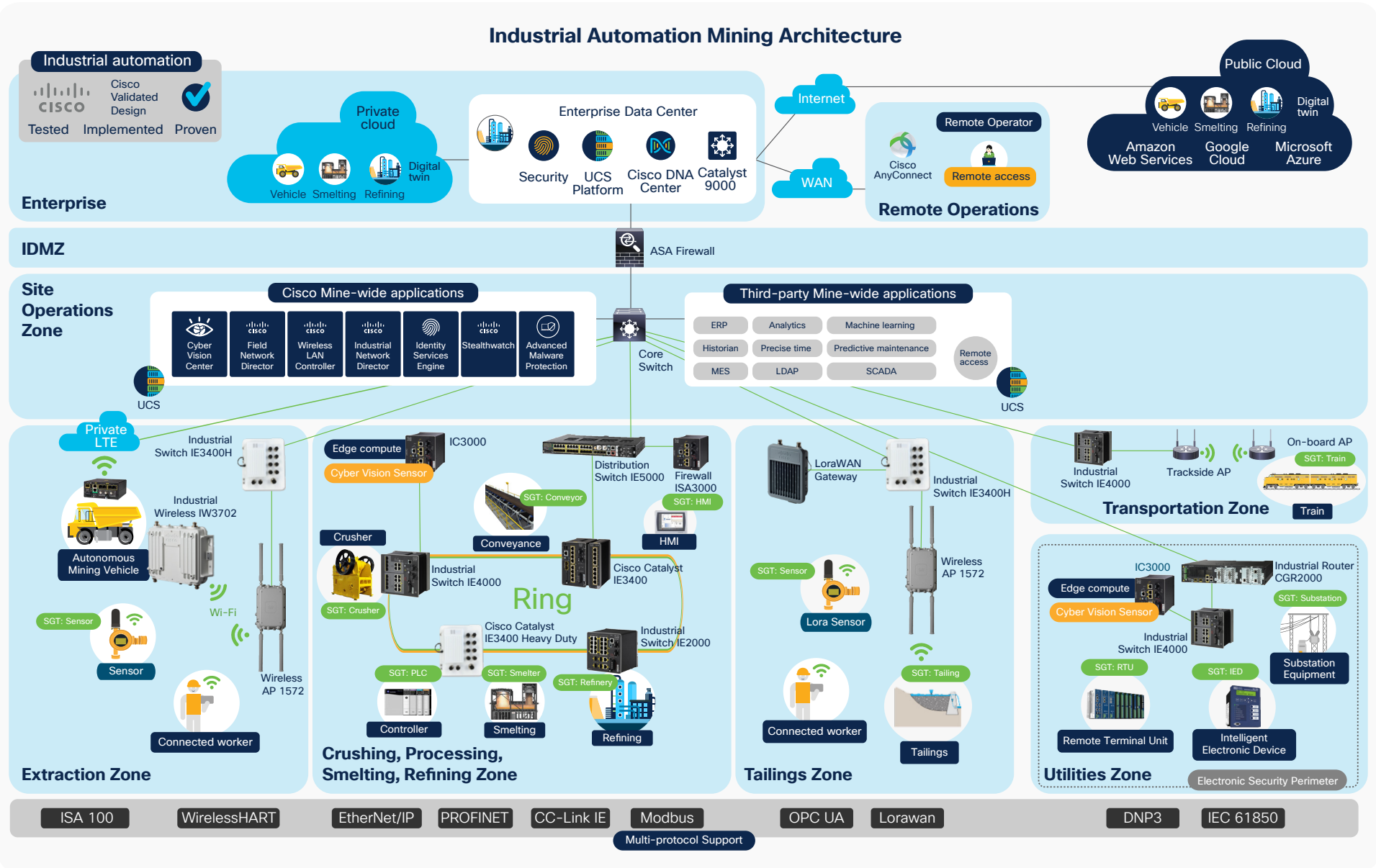Use this secure networking solution for the following applications:

- Connecting IACS devices, including sensors, actuators, and controllers, key machines, assets such as crushers, and more
- Securing mining environments through mine and area segmentation, anomaly detection, and policy deployment and enforcement
- Providing mining operations with visibility and continuous monitoring of the network and security status of the IACS devices and communication
- Enabling remote access to mining process assets and personnel to improve overall uptime
- Enabling mine site applications such as Supervisory Control and Data Acquisition (SCADA), historians, and asset management
- Implementing relevant network services, including authorization, authentication, access control, DNS, IP address management, network management, and sitewide precise timing distribution
- Enabling Internet of Things (IoT) applications with edge computing such as predictive analytics and maintenance, digital twin, and machine learning and optimization
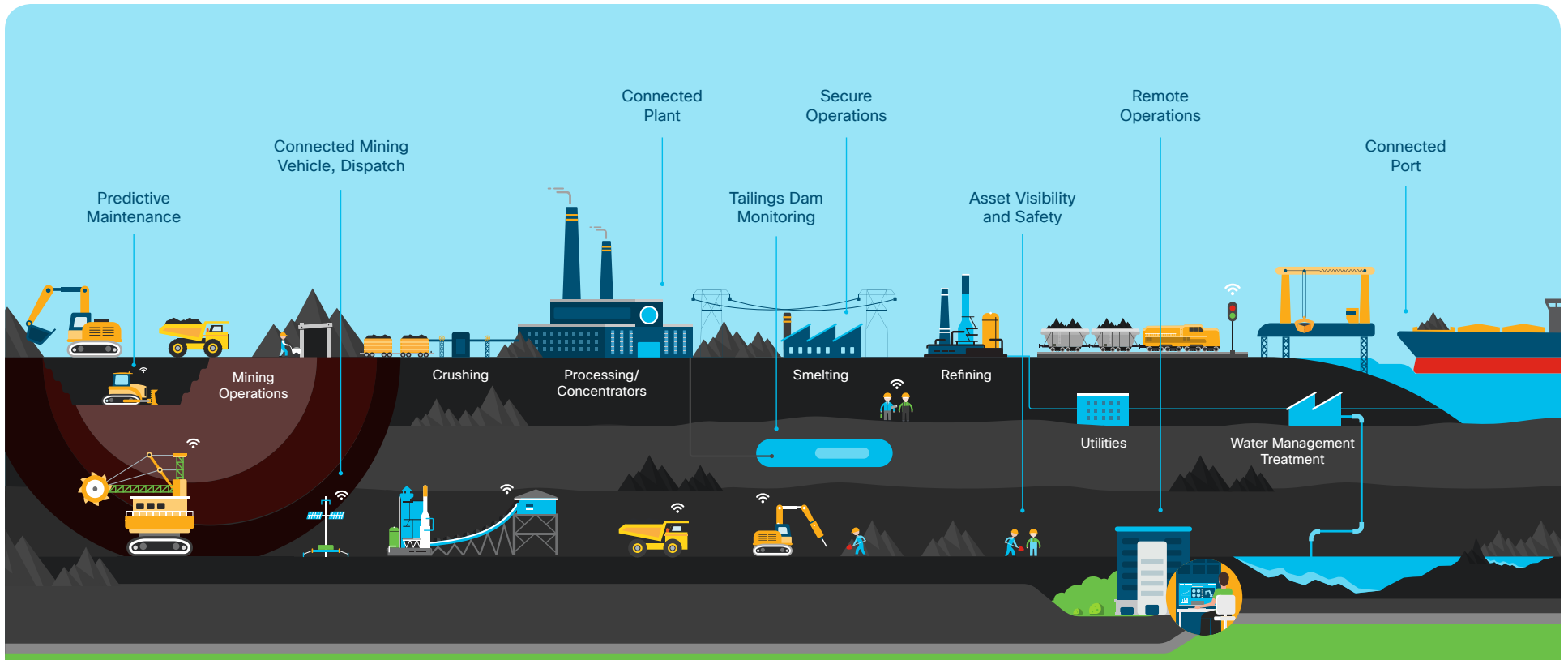
The Cisco Industrial Automation Solution – Mining can help you securely converge IT and OT operations through a Cisco validated approach and architecture.

Secured connectivity of mining industrial automation systems helps enable:

- Improved Operational Equipment Effectiveness (OEE) and asset utilization through increased production availability and asset visibility
- Reduced risk to the mining environment through industry-leading cybersecurity
- Increased extraction rates, improving product quality through early indication of quality-impacting events or conditions
- Faster deployments and troubleshooting and easier management of equipment
- Innovation (such as predictive maintenance) within production environments ready for cloud-based and edge-intelligent IoT applications
- Visibility into the mining operations production network and automation equipment

Industrial Automation Mining Architecture

Industrial automation

Cisco Validated Design

Tested · Implemented · Proven

Enterprise

Private cloud
Vehicle · Smelting · Refining · Digital twin

Enterprise Data Center
Security · UCS Platform · Cisco DNA Center · Catalyst 9000

Internet

WAN

Remote Operations
Remote Operator · Cisco AnyConnect · Remote access

Public Cloud
Vehicle · Smelting · Refining · Digital twin
Amazon Web Services · Google Cloud · Microsoft Azure

IDMZ

ASA Firewall

Site Operations Zone

Cisco Mine-wide applications
Cyber Vision Center · Field Network Director · Wireless LAN Controller · Industrial Network Director · Identity Services Engine · Stealthwatch · Advanced Malware Protection

UCS

Core Switch

Third-party Mine-wide applications
ERP · Analytics · Machine learning
Historian · Precise time · Predictive maintenance
MES · LDAP · SCADA
Remote access

UCS

Extraction Zone

Private LTE

Industrial Switch IE3400H

Industrial Wireless IW3702

Autonomous Mining Vehicle

Wi-Fi

SGT: Sensor

Sensor

Connected worker

Wireless AP 1572

Crushing, Processing, Smelting, Refining Zone

Edge compute — IC3000
Cyber Vision Sensor

Crusher

SGT: Crusher

Industrial Switch IE4000

Conveyance
SGT: Conveyor

Ring

Cisco Catalyst IE3400

Distribution Switch IE5000

Firewall ISA3000

SGT: HMI

HMI

Cisco Catalyst IE3400 Heavy Duty

SGT: PLC

Controller

SGT: Smelter

Smelting

Industrial Switch IE2000

SGT: Refinery

Refining

Tailings Zone

LoraWAN Gateway

Industrial Switch IE3400H

Wireless AP 1572

SGT: Sensor

Lora Sensor

SGT: Tailing

Connected worker

Tailings

Transportation Zone

Industrial Switch IE4000

On-board AP
SGT: Train

Trackside AP

Train

Utilities Zone

IC3000
Edge compute
Cyber Vision Sensor

Industrial Router CGR2000

SGT: Substation

Industrial Switch IE4000

Substation Equipment

SGT: RTU

Remote Terminal Unit

SGT: IED

Intelligent Electronic Device

Electronic Security Perimeter

Multi-protocol Support

ISA 100 · WirelessHART · EtherNet/IP · PROFINET · CC-Link IE · Modbus · OPC UA · Lorawan · DNP3 · IEC 61850

Predictive
Maintenance

Connected Mining
Vehicle, Dispatch

Connected
Plant

Secure
Operations

Tailings Dam
Monitoring

Remote
Operations

Asset Visibility
and Safety

Connected
Port

Mining
Operations

Crushing

Processing/
Concentrators

Smelting

Refining

Utilities

Water Management
Treatment

Machine Uptime and Predictive Maintenance

- Heavy equipment operations
- Crush/Convey instrumentation sensors
- Remote SCADA data collection
- DCS/PLC connectivity
- Asset monitoring

Safety and Security

- Cybersecurity
- Physical security
- Worker location
- Gas and leak detection
- Minimize environmental impact
- Tailing pond monitoring

Worker Productivity

- Work order processing
- Employee location
- Dynamic scheduling
- Work tickets via tablets

Autonomous/Semi-Autonomous Operations

- Digital dispatch
- Autonomous drilling/hauling
- Work force optimization
- Wireless to mobile machines
- Edge compute

Drive significant operational improvements with a leading industrial automation solution set

Are your core production and operational process systems disconnected and in unsecured operational siloes? Do you even know what equipment is currently deployed in your mining environment? Are you losing money due to limited operational visibility and nonoptimized assets and operations? Get the assurance you need by using Cisco Industrial Automation Solution – Mining for premier integration of IT expertise with OT requirements and applications. You can deploy the technology for connecting, securing, and starting industrial IoT-based improvements. For additional information, visit www.cisco.com/go/iotcvd.

Confidently deploy networks and cybersecurity in mining process environments

The Cisco Industrial Automation Solution – Mining is unique and distinguished in the marketplace, integrating industry-leading IT expertise with mining operations requirements and applications. Using this solution gives customers, partners, and system implementers the confidence to deploy Cisco's networking and security technology in any mining industrial automation setting.

This unique solution outlines how to achieve a set of key OT requirements:

- High availability for all key industrial automation communication systems and operational management services
- Scalable, easy-to-deploy, IT-preferred security architecture, integrating OT context for industrial applications
- Converged network to support communication from sensor to cloud
- Based upon open standards to help ensure vendor choice and protection from proprietary constraints
- Capable of deploying IoT applications with support for edge computing
- Continuous cybersecurity monitoring of IACS devices and communications
- A trusted hierarchy for secure mining environments, with a firewall-based industrial demilitarized zone and Cisco TrustSec® based micro-segmentation for mining zones
- Real-time, deterministic application support with low network latency and jitter for the most challenging applications, such as motion control
- Deployable in a range of harsh environmental conditions with industrial-grade and commercial off-the-shelf IT equipment
- Scalable from small (tens to hundreds) to very large (thousands to tens of thousands) device deployments
- Intent-based manageability and ease of use to facilitate deployment and maintenance, especially by OT personnel with limited IT capabilities and knowledge
- True visibility across the OT network and baselining network traffic for anomaly detection

The solution is proven to work with industrial vendors including Rockwell Automation, Schneider Electric, Siemens, Mitsubishi Electric, Emerson, and Honeywell. A broad set of customers from above ground and below ground mining have used this solution.

Industrial Automation Networking + Security Portfolio

Industrial Switching

IE 1K, 2K, 3200, 3300, 3400,
3400H, 4K, 5K, CGS

IoT Gateways / Compute

IR807, IR809, IR829,
IR1101, IC 3000

Industrial Wi-Fi

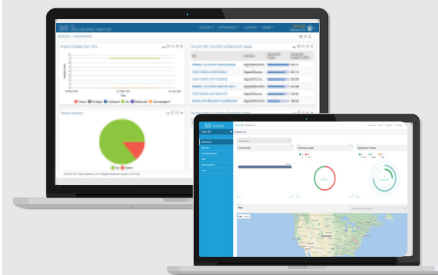IW3702, IW6300

Enterprise Network and Security

Cat 9300/9500, ASA5500,
5520/9800 WLCs
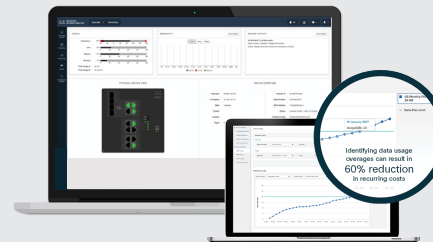Aironet 1560/1570 APs

Industrial Security

ISA 3000
Cyber Vision

Edge Computing Software

IOx
Edge Intelligence

OT Management and Automation

Field Network Director
Gateway Management Module
Industrial Network Director
Control Center

IT Network and Security Management and Automation

Identity Services Engine,
Cisco Prime, Stealthwatch
Firepower Management Center

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