Seamless Roaming Infrastructure for Factory Inspections

System Requirements

- Network infrastructure that is easy to deploy and scale up
- Reliable Wi-Fi connectivity to ensure real-time data collection and communication

Why Moxa

- Eliminates Ethernet cabling, reducing installation and management costs
- Devices that automatically identify and recover connection issues to help users build adaptive Wi-Fi networks
- Compact, rugged product design that easily fits in constrained spaces and can resist constant vibrations
- Wireless resilience technologies such as Turbo Roaming and AeroMesh for reliable wireless connectivity

Moxa Products

AWK-3252A Series
802.11ac Wireless AP/Client

AWK-1151C Series
802.11ac Wireless Client

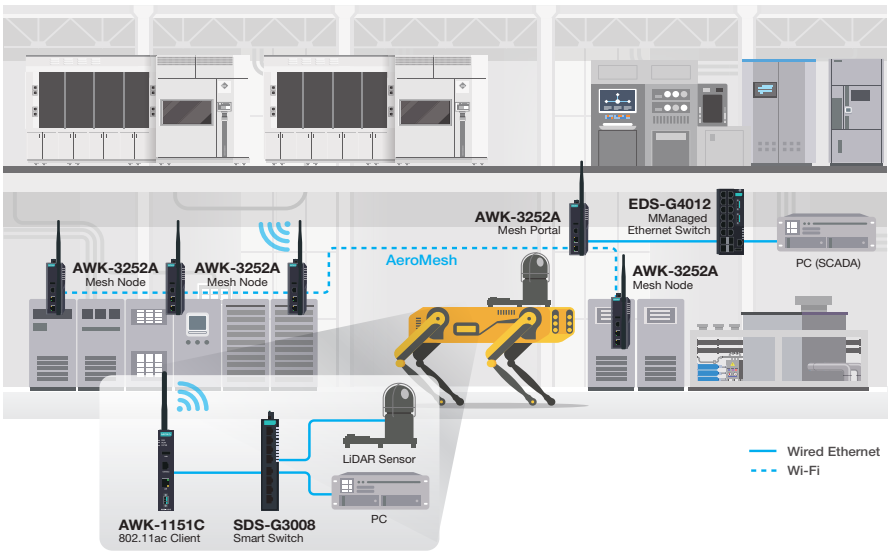
SDS-G3008 Series
Smart Ethernet Switches

EDS-G4012 Series
Managed Ethernet Switches

To improve worker safety and help advance their sustainability goals, a global leading semiconductor company in Taiwan deployed robotic dogs in unmanned and inaccessible areas of the factory. In the event of an emergency such as an earthquake or a chemical leak, operators use these robotic dogs to conduct operational health and safety inspections to ensure compliance in the plant. This method allows maintenance engineers to review site data remotely and safely assess suspected hazards to quickly perform the appropriate action and minimize downtime.

The robotic dogs are equipped with cameras and a multitude of sensors, such as LiDAR. The industrial-grade AWK-1151C Series 802.11ac clients and SDS-G3008 Series smart switches feature a compact and rugged design that easily fits onboard the robotic dogs and ensures reliable data transmissions. Moxa's client-based Turbo Roaming technology enables millisecond-level handoffs for AWK-1151C Wi-Fi clients to allow robotic dogs to seamlessly transmit collected data to the control center and receive instructions. The AWK-3252A Series acts as Wi-Fi access points mounted on the walls around the facility. These AP devices support Moxa's AeroMesh technology to form an intelligent mesh network in hard-to-wire areas with self-forming and self-healing capabilities. These features help lower cabling costs and streamline the deployment of Wi-Fi backhaul infrastructure, saving both time and effort. The mesh network also ensures quick recovery of problematic connections, maximizing uptime. Since the client's facility covers hundreds of thousands of square feet, Moxa's Wi-Fi solutions take advantage of AeroMesh's five-hop capability and ultra-low 2-3 ms per-hop latency* to facilitate long-distance transmissions and real-time video streaming while minimizing installation complexity and costs.

Using Moxa's robust industrial Wi-Fi networking solutions, the client was able to simplify the deployment of robotic dogs for emergency inspections and improve plant safety and efficiency.



*The listed 2-3 ms per-hop latency is based on test results using test infrastructure under optimal conditions. Actual latency is subject to environmental conditions.

Confident, Stable Mobility for Open-pit Mining Operations

System Requirements

- Stable, high-bandwidth Wi-Fi coverage across the site
- Mobile Wi-Fi hotspots for off-road vehicles to connect to and send real-time maintenance and monitoring data
- Rugged design for harsh outdoor mining environments

Why Moxa

- Moxa's field-proven AWK Series APs deliver high-performance, dependable connectivity with broad coverage
- Continuous real-time data delivery through self-forming and self-healing AeroMesh hotspots
- Industrial-grade hardware with IP68-rated enclosure for long-lasting reliability

Moxa Products

AeroMesh

AWK-4262A Series

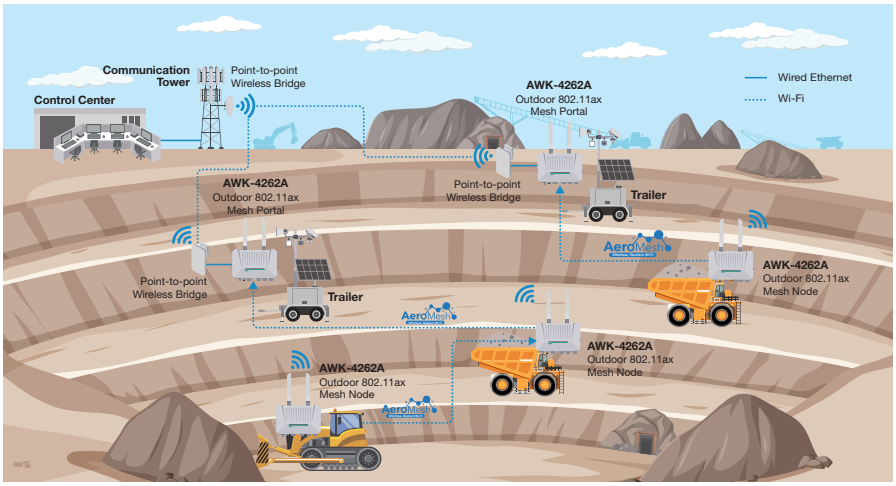
IP68 802.11ax Wireless AP/ Bridge/Client

An Australian open-pit mining operator was struggling with unreliable wireless connectivity, which hampered the operational efficiency and maintenance of its critical mobile fleet, including excavators, drills, and bulldozers.The operator needed a solution that could immediately enhance network reliability while also supporting ongoing operations and future infrastructure improvements.

After several successful field trials, the operator selected the Moxa AWK-4262A Series industrial Wi-Fi access points for deployment on its mobile equipment. The AWK Series features dual-band concurrent Wi-Fi up to 1.8 Gbps, supports over 100 concurrent connections, and provides Layer 2 VLAN segmentation for secure and efficient network management. The rugged IP68-rated and anti-vibration design, along with high EMC protection, protects the AWK Series against the demanding outdoor conditions and heavy mechanical stress in the mine.

The deciding factor was Moxa's AeroMesh technology—a self-forming and self-healing wireless architecture that operates without a centralized controller. As mining sites are constantly changing, the self-forming capability allows the network to automatically adapt and expand as equipment moves around, ensuring fluid connectivity without any manual setup. To maintain mission-critical stability, the self-healing mechanism identifies alternative paths and reroutes connections whenever signal shadowing occurs.

Moxa's AWK Series with AeroMesh technology provided the mining operator with robust wireless connectivity across its open-pit fleet. As massive excavators, drills, and bulldozers navigate the rugged terrain, the mesh maintains a rock-solid connection between communication towers, trailers, and mining trucks. By delivering true seamless connectivity, AeroMesh prevents communication timeouts that could trigger emergency halts on heavy machinery. This resilient wireless architecture minimizes potential disruptions while also laying the groundwork for future scalability as operations expand.



MOXA

Seamless & Resilient: End-to-end Network Solutions for High-density AS/RS

Why Moxa

- Directional antennas and non-overlapping channel allocations mitigate metal rack interference
- Moxa's Turbo Roaming ensures sub-150 ms handoffs for seamless mobility
- Robust wired redundancy (RSTP, MRP, Dual-homing) provides a resilient backbone for uninterrupted wireless operations
- Supports MXview One networking management system to centrally manage wired and wireless networks for holistic visibility and swift troubleshooting

Moxa Products

AWK-3262A Series
Wi-Fi 6 Wireless AP/Clients

AWK-1161C Series
Wi-Fi 6 Wireless Clients

SDS-G3010 Series
Industrial Smart Switches

EDS-G4012 Series
Industrial Managed Switches

MDS-G4028 Series
Industrial Modular Managed Switches

MXview One Series
Industrial Network Management Platform

System Requirements

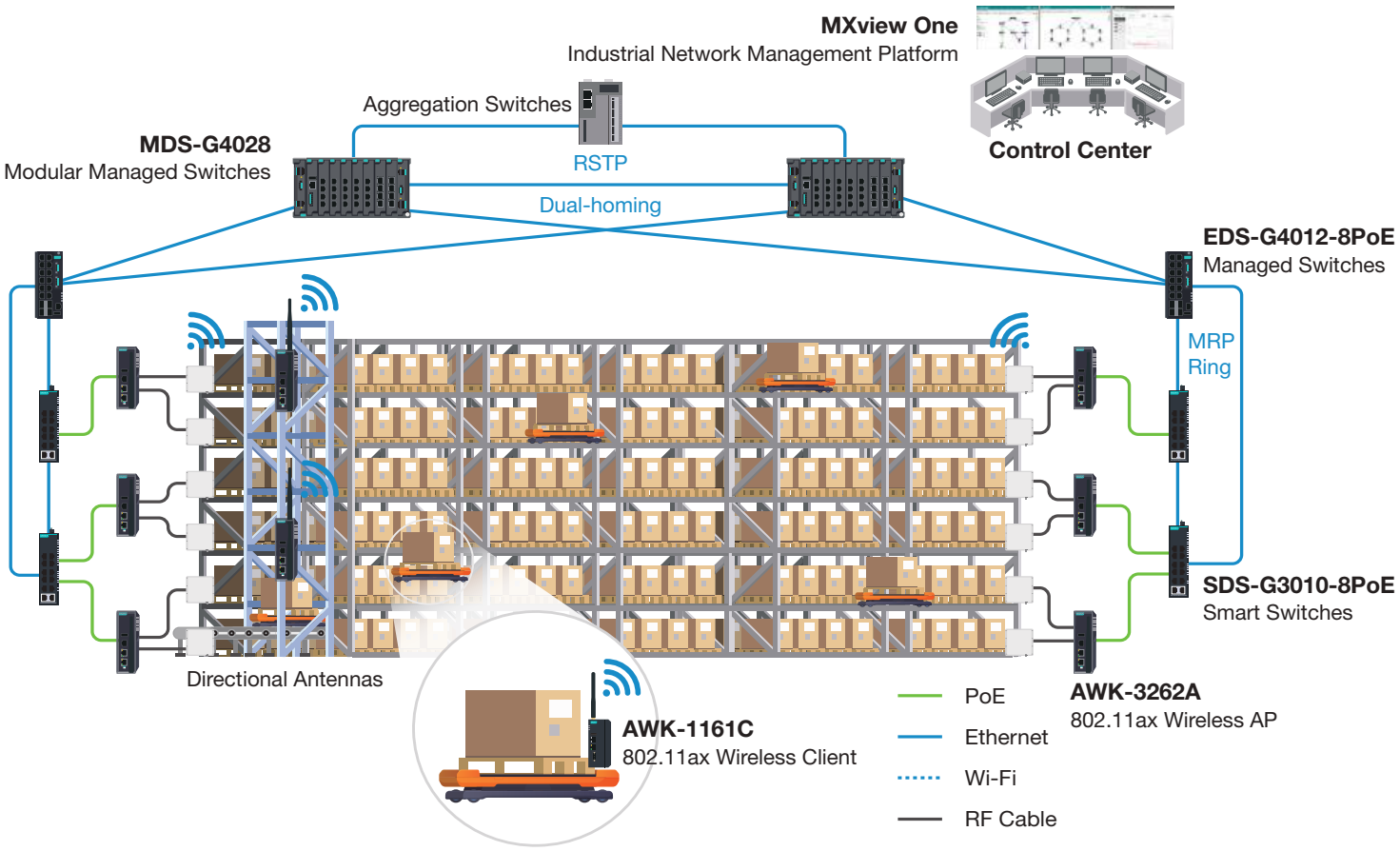
- Overcome signal loss from metal obstructions and multipath interference in high-density steel rack environments
- Ultra-low latency and minimal packet loss (<1%) to enable real-time scheduling for ensuring control precision and preventing shuttle collisions
- A highly resilient wired backbone to prevent single points of failure and support high-volume wireless traffic

A multinational consumer goods enterprise deployed an automatic storage and retrieval system (AS/RS) across its global logistics centers, transitioning from traditional stacker cranes to four-way shuttle systems to achieve a storage space utilization rate of over 70%. However, strong interference and signal reflection from the steel racks caused communication instability that affected the real-time scheduling for shuttles. To prevent collisions and ensure precise control, the operator needed a highly reliable network with ultra-fast roaming, minimal latency, and zero downtime.

Moxa delivered a comprehensive, standardized networking solution purpose-built for the demanding AS/RS environment. Leveraging alternate channel assignment, our AWK-3262A Series APs operating on the 5 GHz band established the resilient wireless foundation that minimized co-channel interference across the high-density rack system. APs equipped with directional antennas were placed along shuttle tracks to maximize coverage and cut through multipath interference. Omnidirectional APs installed inside lifter shafts every few floors maintained seamless connectivity during vertical transitions. Onboard the shuttles, AWK-1161C Series clients combined high-gain omnidirectional antennas with Moxa's Turbo Roaming technology for fast sub-150 ms handovers. Behind the scenes, MAC authentication and hidden SSIDs secured the wireless communication against unauthorized access.

Underpinning the wireless layer, our robust switches formed a resilient end-to-end wired backbone with RSTP, MRP Rings, and Dual-homing redundancy to prevent single points of failure. This ensured maximum fault tolerance for non-stop operations. To centrally manage this expansive wired and wireless infrastructure, MXview One provided operators with unified visibility and faster troubleshooting capabilities across all sites worldwide.

Our end-to-end networking solution enabled the enterprise to implement AS/RS with the reliability and precision that their high-throughput logistics demands. The standardized infrastructure deployable across global sites provided both operational resilience and long-term scalability to ensure investments in automation continue to deliver as their operations expand.


MXview One
Industrial Network Management Platform
Control Center
Aggregation Switches
RSTP
Dual-homing
MDS-G4028
Modular Managed Switches
EDS-G4012-8PoE
Managed Switches
MRP
Ring
SDS-G3010-8PoE
Smart Switches
Directional Antennas
AWK-1161C
802.11ax Wireless Client
AWK-3262A
802.11ax Wireless AP
PoE
Ethernet
Wi-Fi
RF Cable