**Location: Africa**

Moxa's Redundancy Solutions Help Build a Reliable Network for a Large Tramway System

Application: Tramway

Background

Encompassing almost 40 stations and 25 kilometers of track, a major tramway links the eastern and western communities of a city in Africa. The system runs multiple services between a centralized control room and numerous subsystems. These services include Terrestrial Trunked Radio (TETRA), ticketing offices, IP surveillance, and public announcement systems. In order to ensure the tram operates in a safe and reliable manner, the signaling system must be able to maintain smooth and continuous communications between the trams and the trackside. In addition, the tramway network infrastructure must have high availability and reliable performance.
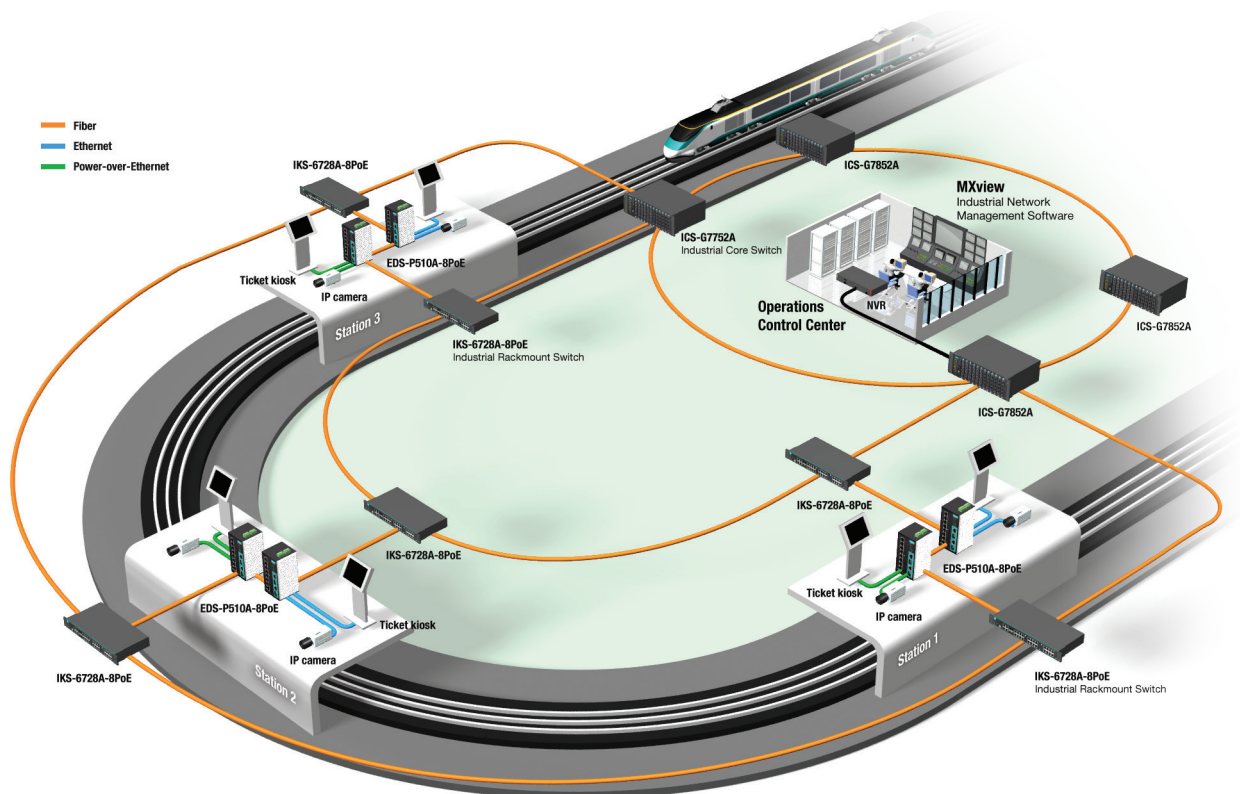
▶ Requirements

The network connection has to be very reliable as it hosts over ten different systems across 40 VLANs, which include layer 2 and layer 3 networks that connect tramway stations and a control center.

- Network redundancy that guarantees at least 300 ms recovery time on both layer 2 and layer 3 networks.

- A network redundancy protocol that is capable of supporting both unicast and multicast streams for over 250 IP cameras across multiple VLANs.

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▶ Moxa's Solution

For this tramway project, seamless system processes and high network availability are essential to ensure reliable operation of multiple services. The primary reason that Moxa's solution was chosen was because our V-ON technology supports millisecond-level fast recovery that ensures the system does not experience downtime.

Most redundancy technologies only support layer 2 and unicast communications. However, the tramway system includes layer 2 and layer 3 networks, which require advanced redundancy technologies. Moxa's V-ON technology provides unicast and multicast routing optimization and resilient redundancy protocols. By using Moxa's V-ON-enabled switches, the tramway company is able to build a network infrastructure that supports recovery in less than 300 ms for both unicast and multicast streams on layer 2 and layer 3 networks.

Furthermore, Moxa's network management suite, MXstudio, helps customers monitor all stages of the network lifecycle more efficiently including configuration, operation, and maintenance.

▶ Why Moxa

01	Turbo Ring, Turbo Chain, and V-ON technologies guarantee reliable data transmission by supporting network recovery within 50 ms for layer 2 networks and within 300 ms for layer 3 networks.
02	For layer 2 networks, V-ON can help achieve both unicast and multicast recovery within 50 ms, which is six times faster than the customers' requirement.
03	MXstudio industrial network management suite helps users with installation, operation, maintenance, and diagnostics.

Featured Products

ICS-G7852A/G7752A
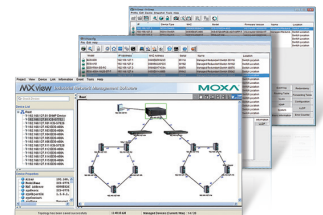
52-port full Gigabit modular managed Ethernet switches

IKS-6728A-8PoE

28-port modular managed PoE+ Ethernet switches

EDS-P510A-8PoE

10-port Gigabit PoE+ managed Ethernet switches

MXstudio

Industrial network management suite

Reliable Networks Help Avoid System Downtime

Background

Many companies want to automate their system processes as the benefits can be huge. However, this migration is not risk free. One of the largest mining companies in Australia upgraded the majority of their production lines so that they would perform automated processes. However, if their system experienced downtime they were liable to incur huge financial losses. According to a senior manager at the mine, 'We estimated that we would lose around $1 million AUD for every 10 seconds of system downtime'.

In order to increase output, additional sensors had to be deployed to monitor the status of the production line. Data completeness within the mining industry is very important in order for business owners to make decisions based on accurate information. However, within the harsh environments of the mining industry, vibration and electromagnetic interference can cause disruptions to networks. For networks deployed at mining sites, if data cannot be delivered between PLCs located along the production line within 500 milliseconds, the PLC will shut down the system to avoid any production errors. It is clear that network reliability is very important to avoid the system crashing and for business owners to avoid incurring significant financial losses.
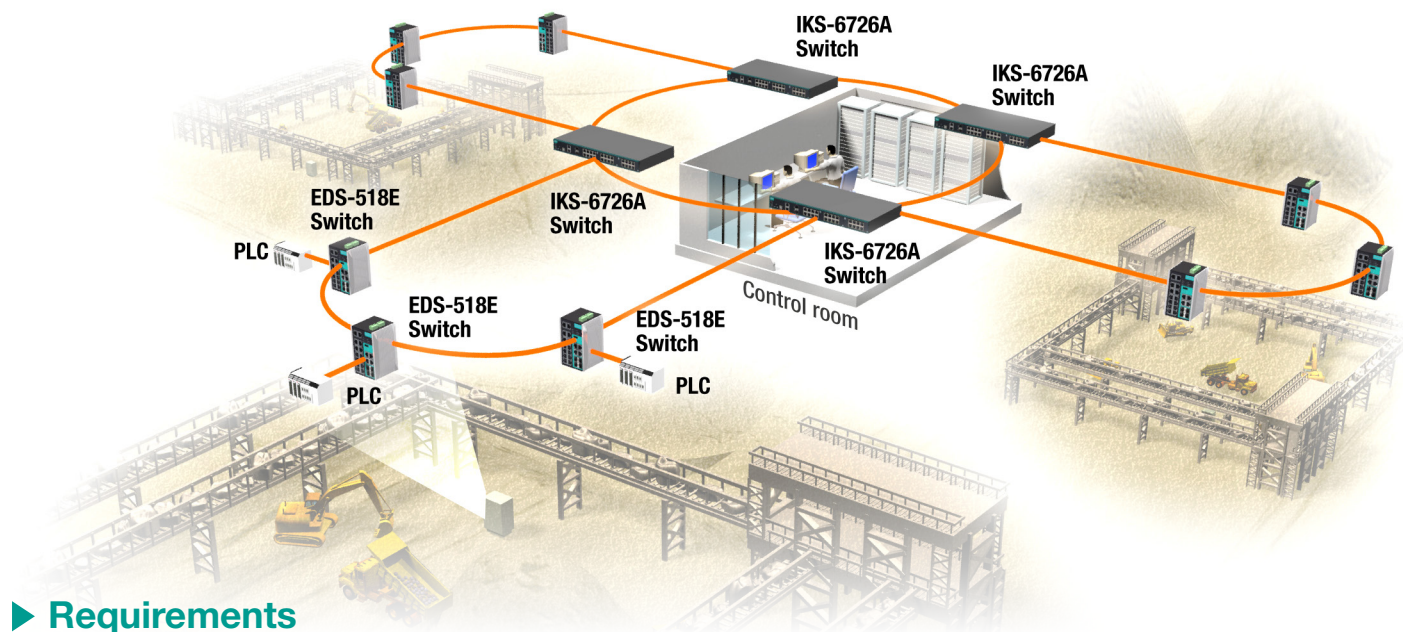
▶ Requirements

- All of the 1000 switches deployed need to be rugged enough to withstand the harsh environment of the large mining site and need to be able to recover within 500 ms.

- When a PLC experiences a disruption to data transmissions, the network must be able to recover within 500 ms.

- When the mine expands, any new switches that need to be added must be able to seamlessly integrate into the existing network.

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▶ Moxa's Solution

Moxa was chosen because of our total redundancy solution that includes Turbo Ring, Turbo Chain, and V-ON technologies. Our total redundancy solution supports millisecond-level fast recovery to ensure that there are no interruptions to the production line, even when deployed in harsh and unpredictable mining environments.

Turbo Ring was used to build the network backbone and ensure uninterrupted long-distance communications even under extreme weather and environmental conditions. To help the PLCs keep the production line functioning, V-ON supports both unicast and multicast recovery within 50 ms, which is faster than the project requirement of 500 ms. Turbo Chain was used to gain flexibility and allows the creation of multiple redundant networks beyond the limitations of current redundant ring technology. Moxa's complete redundancy solution allows the mining company to enjoy the benefits of automation and ensure that their network will not experience downtime.

▶ Why Moxa

01 With over 30 years of industry experience, Moxa's industrial switches have features that are designed for harsh environments, such as wide operating temperature ranges and vibration resistance.

02 Moxa's Turbo Ring technology allows networks to recover within 20 ms* on a network with up to 250 nodes.

03 V-ON was designed to overcome the challenges of multicast recovery and guarantee transmission recovery in less than 50 ms for both unicast and multicast communications on layer 2 networks.

04 Moxa's Turbo Chain is a very flexible redundancy technology that offers unlimited redundant network expansion.

*10G/1G Ethernet recovery time within 50 ms

Featured Products

EDS-518E
18-port Gigabit managed Ethernet switches

IKS-6726A
26-port modular managed Ethernet switches

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Redundant Wireless for Crane Slewing Control

**Application: Heavy Industry**

Background

Downtime in crane operations could spell disaster and lead to losses, especially if it occurs during a manufacturing operation or at busy ports. A crane manufacturer integrated Moxa's redundant wireless solutions into their heavy lift mast cranes that are used for offshore wind turbine installation to ensure maximum operational uptime.
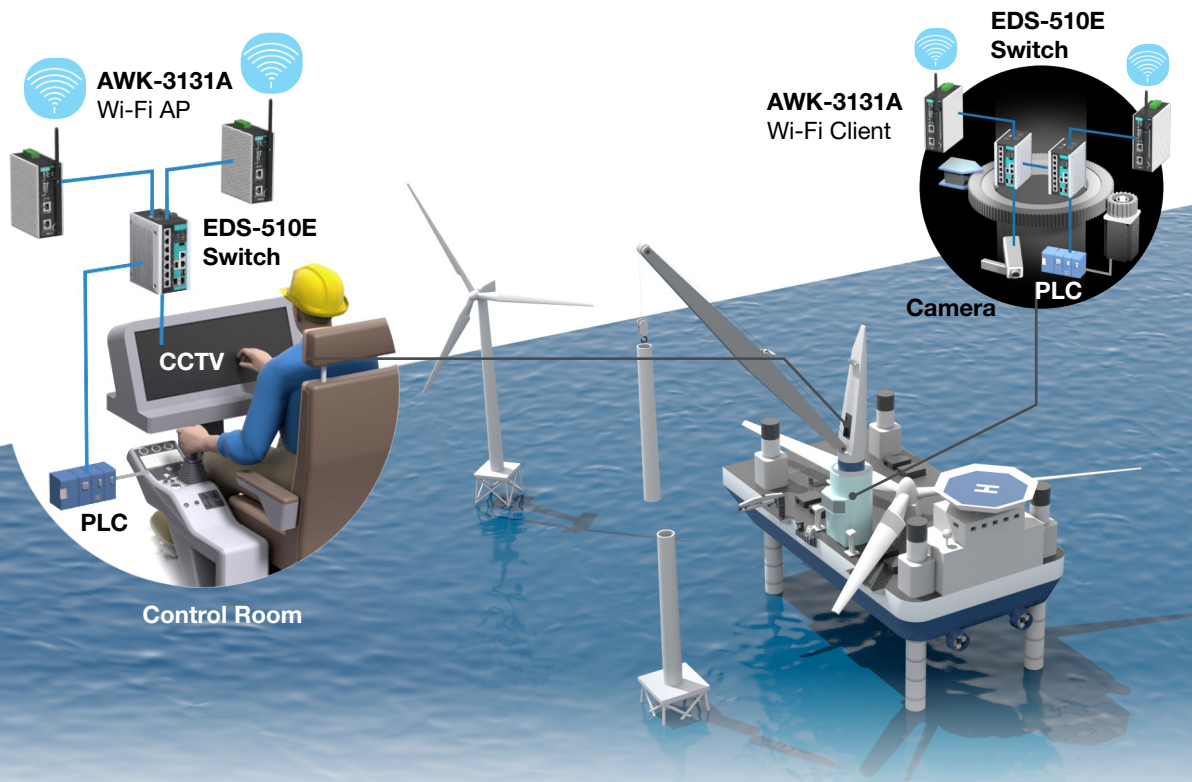
▶ Requirements

- PROFINET communication for efficient PLC operations
- Network-level redundancy to ensure maximum uptime

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▶ Moxa's Solution

An end-to-end redundant wireless network was built to help the crane operator rotate the crane superstructure using a PROFINET-based slewing drive system located beneath the operator's cabin. The crane slewing system is monitored by a field CCTV surveillance system, and controlled by a PROFINET-based PLC system, both of which connect to an AWK-3131A wireless client to send real-time information to the control center. The master/slave mode setting on the AWK-3131A provides transparent transmission of PROFINET traffic to the control center.

At the control end, two AWK-3131A wireless APs were used to set up dual-band hotspots to transfer the video recording and data received to an upstream EDS-510E Ethernet switch, which in turn transferred the information to the control center to enable monitoring and control of the crane operations.

To ensure maximum network availability and system reliability, the AWK-3131A wireless clients use AeroLink Protection technology to build redundant wireless connections between the slewing drive systems and the control center. AeroLink Protection enables one of the AWK-3131A wireless clients to be on standby as a backup node in a different frequency (5 GHz) and take over within 300 ms if the primary device fails or if the link goes down.

Featured Products

AWK-3131A
802.11n wireless AP/bridge/client

EDS-510E
10-port Gigabit managed Ethernet switches

▶ Why Moxa

| 01 | AeroLink Protection enables redundant network communication for maximum uptime |

| 02 | Master/slave connection enables transparent PROFINET communication |