Maisvch

INDUSTRIAL NETWORKING
CASE STUDIES

INDUSTRIAL CONNECTIVITY IN PRACTICE

A collection of real-world network architectures that connect field devices, control systems and remote operations across demanding industrial environments.



Energy & Power

Intelligent Transportation

Smart Manufacturing

Mining

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Industrial networking projects organized by application industry.

Energy & Power

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Energy & Power

Explore resilient industrial communication architectures for wind, solar, battery energy storage, power transmission and EV charging - connecting distributed field assets with control, monitoring and remote O&M systems.

Standardizing Serial Data Collection Across a ±800 kV HVDC Project

Case Study



Requirements

- Connect serial protection and measurement devices to an upper-level data collection network.
- Accommodate RS-232, RS-422, and RS-485 field interfaces.
- Keep integration practical inside intelligent equipment cabinets.
- Use fiber for longer transmission segments in an electrically noisy substation environment.

Featured Product



Mport3101

1-port wall-mounted RS-232/422/485 industrial serial device server



MIEN1203-F

1x100M fiber port and 2×10/100M copper ports DIN-Rail industrial Ethernet to fiber media converter

Introduction

The Longdong-Shandong ±800 kV ultra-high-voltage direct-current (UHVDC) project spans five Chinese provinces. Substation protection and measurement equipment uses serial interfaces, while supervisory systems require Ethernet data collection. The challenge is to retain those field interfaces without extending copper serial links across longer, electrically noisy network segments.

Solution

The deployment uses 250 Mport3101 serial device servers inside intelligent equipment cabinets, close to field devices. They bring RS-232, RS-422, and RS-485 data onto Ethernet. Another 150 MIEN1203 Series switches provide local aggregation, with the featured MIEN1203-F supplying fiber uplinks. Serial access stays local; fiber carries the longer network segment. This creates a repeatable cabinet-level connection pattern and clearer fault-isolation boundaries.

Deployment and validation

The project brief confirms device quantities and cabinet installation. Appropriate acceptance checks cover serial settings, end-to-end data acquisition, and fiber-link continuity. No commissioning logs or measured EMC results were supplied. This case concerns monitoring data, not a primary protection trip channel.

Results

- A consistent Ethernet handoff accommodates three serial interface types without replacing field equipment solely for connectivity.
- Fiber uplinks reduce reliance on long copper communication runs in the substation environment.
- A repeatable device-server and switch combination simplifies the connection pattern for deployment and maintenance.

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Ensuring Grid Stability for a Landmark ±800kV UHV DC Converter Station

Case Study



Project Overview

As nations transition to clean energy, the challenge of transmitting power from remote renewable sources to distant urban centers becomes paramount. A cornerstone of this effort is a new Ultra-High-Voltage (UHV) transmission corridor, the first of its kind dedicated to delivering clean energy from a massive desert solar PV base. At a critical node of this corridor sits a ±800kV High-Voltage Direct Current (HVDC) converter station, responsible for ensuring the stable, efficient flow of power across thousands of kilometers. Maisvch was entrusted to provide the mission-critical industrial network for the station's intelligent monitoring and auxiliary control systems, guaranteeing operational integrity and compliance with the world's most demanding power grid standards.

System Requirements

Compliance and Reliability in a High-Voltage Environment

Operating a network within an HVDC converter station presents a unique and demanding set of challenges. The immense electrical fields and potential for interference require a level of robustness far beyond standard industrial applications.

- **Strict Compliance with Power Industry Standards:**

The national power grid operator mandates that all digital equipment must meet exacting safety and performance criteria. The networking hardware had to be certified for IEC 61850-3, the global standard for communication networks in substations. This ensures the devices can withstand high levels of electromagnetic interference (EMI), electrostatic discharge (ESD), and electrical surges common in a high-voltage environment without data loss or hardware failure.

- **Zero-Tolerance for Downtime:**

A converter station is a critical national asset where system failure is not an option. The communication network for monitoring and control systems demanded a highly redundant architecture. A single point of failure, such as a failed switch or a broken cable, could not be allowed to bring down the entire system, as this could disrupt monitoring capabilities and compromise operational safety.

Solution

An IEC 61850-Certified Redundant Network by Maisvch

To meet these stringent requirements, Maisvch engineered a comprehensive networking solution for the station's intelligent inspection and auxiliary control systems. The architecture was designed from the ground up for reliability and seamless integration with the national grid infrastructure.
The solution centered on deploying approximately 200 Maisvch industrial managed Ethernet switches in a series of redundant fiber optic rings.

- **Data Aggregation and Transmission:**

Field data from various intelligent sensors, inspection robots, and auxiliary control units is collected by Maisvch switches at the access layer. This data is then aggregated and transmitted via a high-speed Gigabit Ethernet ring backbone to the central monitoring and control center for unified dispatch and analysis.

- **Guaranteed Redundancy:**

By utilizing a ring topology with fast-healing network protocols, the system ensures continuous data flow. If any link or switch in the ring fails, the network automatically re-routes traffic in milliseconds, maintaining system availability without any interruption to the monitoring services.

- **Certified Compliance and Integration:**

Critically, the Maisvch aggregation layer switches are fully compliant with State Grid security monitoring standards and certified to the IEC 61850-3 standard. This certification was a key requirement, guaranteeing that the switches could operate flawlessly in the harsh substation environment and that their data could be integrated seamlessly and securely into the national power system's SCADA network.

Conclusion

Maisvch was selected as the networking partner due to our deep expertise in the power industry and our product portfolio specifically designed for substation automation.

IEC 61850-3 Certified:
Our switches are rigorously tested and certified to meet the stringent EMC and environmental requirements of electrical substations, providing peace of mind and guaranteed performance.

Robust and Reliable Hardware:
Designed for harsh environments, our switches feature a fanless design, wide operating temperatures, and superior protection against electrical interference, ensuring a long operational lifespan.

Advanced Redundancy Protocols:
Support for industry-standard ring redundancy protocols provides the fast network self-healing necessary to eliminate single points of failure and achieve near-zero downtime.

Proven Track Record:
Maisvch has a long history of successful deployments in critical power grid projects, demonstrating our ability to deliver solutions that meet the industry's highest standards for safety and reliability.

Are you designing a network for a substation, power plant, or other critical infrastructure? Contact our industrial networking experts to ensure your project meets the highest standards of reliability and compliance.

Related Products



MISCOM7028G
Layer 2 Full Gigabit Managed Industrial Ethernet Switch



MISCOM7220G
Layer 2 Full Gigabit Managed Industrial Ethernet Switch



MISCOM7206G
Layer 2 Full Gigabit Managed Industrial Ethernet Switch

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Reducing Single-Path Risk in a 100 MW / 200 MWh Battery

Case Study



Requirements

- Provide redundant network paths for a 100 MW / 200 MWh battery energy storage system (BESS).
- Bring battery management system (BMS) RS-485 data onto an Ethernet-based collection network.
- Power IP cameras through PoE and support video linked to equipment operating data.
- Accommodate an operating temperature range of -40°C to 75°C.

Featured Product



MISCOM7210G

10-port layer 2 managed Gigabit DIN-Rail industrial Ethernet switch



MISCOM7210GP

10-port layer 2 managed Gigabit DIN-Rail industrial PoE switch



Mport3101

1-port RS232/485/422 wall-mounted industrial serial device server

Introduction

At Xuanwei Power Plant in Yunnan, a 100 MW / 200 MWh storage project combines batteries, power conversion systems (PCS), and step-up transformers. Its communication challenge spans three different needs: collecting serial BMS data, maintaining resilient network paths, and connecting powered video monitoring. A single-path network would leave operations exposed to link interruptions, while separate serial and camera cabling would add integration work.

Solution

Maisvch built an A/B dual-ring industrial Ethernet architecture with 100 MISCOM7210G switches and MW-Ring redundancy. Mport3101 Series serial device servers bring battery-container RS-485 data into the Ethernet network. More than 70 MISCOM7210GP PoE switches provide camera connectivity and power. This division assigns backbone resilience, serial access, and powered video to purpose-specific devices, instead of asking one interface to meet every requirement.

Deployment and validation

The project brief documents the deployed architecture and switch quantities. Commissioning priorities for this design are ring-path interruption checks, end-to-end BMS data checks, and camera power and video checks. Test logs and measured recovery times were not provided.

Results

- The A/B ring design addresses single-path exposure at the network backbone.
- Local serial integration retains BMS RS-485 interfaces while providing an Ethernet handoff.
- PoE reduces the need for separate camera power runs; distinct network roles help localize maintenance checks.



Four Physically Isolated Networks for a 100 MW/400 MWh BESS

Case Study

System Requirements

Physically isolated redundant paths for high-priority control commands and protection alarms, separated from monitoring and historical data traffic.
Industrial-grade operation under temperature variation, electro magnetic interference, dust, humidity, and continuous 24/7 duty.
A scalable, standardized topology that balances procurement, installation, commissioning, and lifecycle maintenance costs.

Why Maisvch

Four physically isolated networks remove shared transmission points between data and control paths.
Industrial Gigabit hardware supports fiber backbones and dense local device access in compact cabinets.
Managed diagnostics improve visibility into links, optical power, traffic, device status, and fault logs

Featured Product



MISCOM7212G-4GF-8GT
4 x GbE SFP8x GbE copper
12-port Layer 2 full-Gigabit managed DIN-rail industrial Ethernet switch

The Challenge

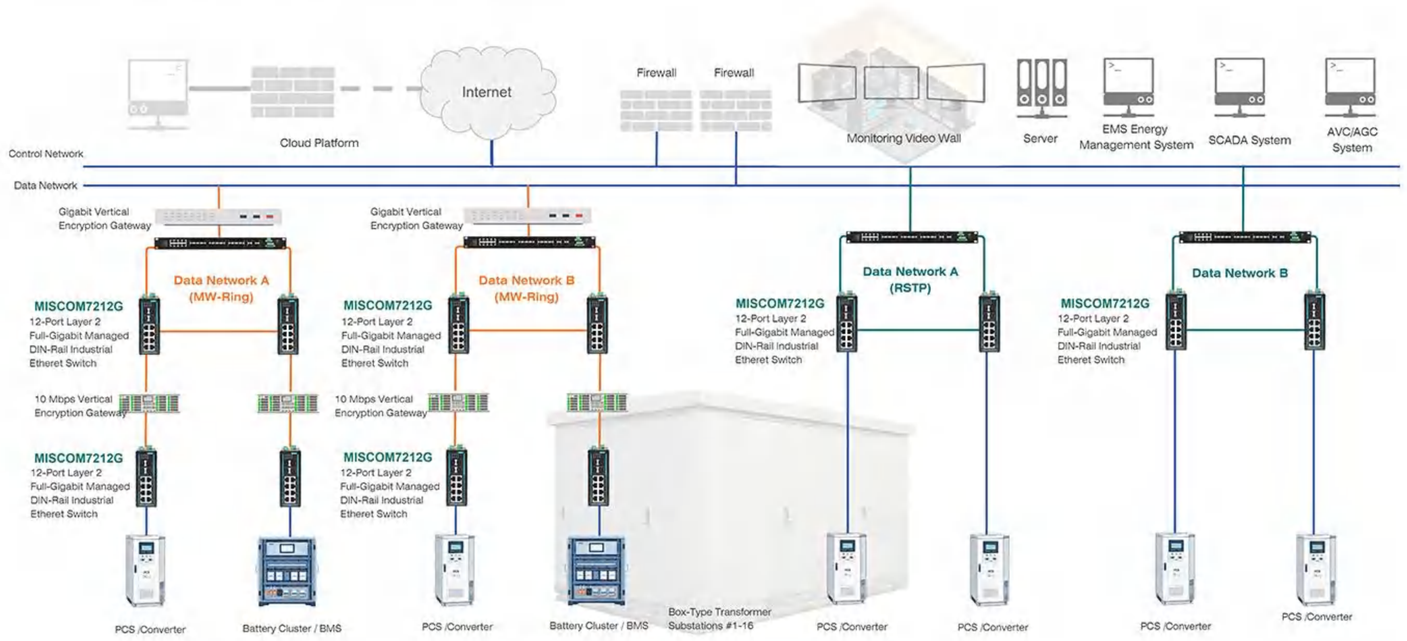
A 100 MW/400 MWh independent BESS in Hebei connects 60+ storage cabinets, 16 box-type transformer substations, and more than 100 intelligent devices. Control commands, protection alarms, PCS and BMS data, metering, fire protection, and environmental monitoring all depend on continuous communications.

Strong electromagnetic interference, outdoor temperature variation, dust, humidity, and wide equipment distribution made a conventional single-network design unsuitable. The project required traffic separation, redundant paths, fast recovery, and centralized diagnostics.

Network Architecture

Nearly 100 MISCOM7212G switches were deployed as local access and fiber-ring nodes. Each unit provides four Gigabit SFP ports for ring uplinks and eight Gigabit copper ports for PCS, BMS, meters, and site sensors

Data Networks A/B use independent MW-Ring fiber rings, while Control Networks A/B use separate RSTP rings. Switches, fiber paths, and power circuits are physically isolated, with no shared transmission node. Dual-homed field devices and dual-NIC central servers maintain service if one path fails.



Why Maisvch

Continuous communication for critical BESS operations

BMS status, PCS charging and discharging power, transformer parameters, and environmental data can be transmitted around the clock. A single switch or fiber-link failure does not interrupt charge-discharge control or grid-dispatch response.

Higher link resilience and faster fault recovery

The four-network design provides layered redundancy and milisecond-level ring recovery, reducing exposure to cable damage, strong electromagnetic interference, and other common site faults.

A repeatable architecture with lifecycle cost advantages

Standardized hardware and topology simplify bulk deployment, cabling. commissioning, diagnostics, and maintenance across a large station.

Room for new energy-market and O&M; services

The scalable network can support future capacity-leasing monitoring, electricity spot-market data exchange, remote grid dispatch, and unmanned inspection applications.

Discuss your BESS network: maisvch.com/contact-us/

Enhancing Distributed EV Charging Networks with Industrial Wireless Connectivity

Case Study



Project Overview

As the demand for Electric Vehicles (EV) grows, the infrastructure must expand into increasingly decentralized areas, including highways, suburban districts, and public transit hubs. Maisvch recently implemented a comprehensive industrial wireless solution for a regional charging pile upgrade project, successfully transitioning traditional "offline" stations into a smart, unified IoT network.

The Results: Quantifiable Value

The shift from traditional wired systems to Maisvch's wireless IIoT solution delivered immediate benefits to the project operators:

40% Faster Deployment: The "Plug-and-Play" nature of wireless routing allowed for rapid expansion across multiple districts without civil engineering delays.

60% Reduction in Maintenance Visits: Remote diagnostics and auto-recovery features minimized the need for on-site technical support.

Enhanced Grid Stability: Real-time data sync allows for better load balancing across the regional power grid.

Conclusion

This project serves as a blueprint for the digital transformation of EV infrastructure. By leveraging Maisvch's expertise in industrial communication, operators can build scalable, reliable, and cost-effective charging networks that are ready for the green energy demands of tomorrow.

Interested in optimizing your industrial network? Contact a Maisvch Specialist Today or Browse Our Industrial Router Catalog.

The Challenges: Beyond the City Center

Managing a vast network of distributed charging piles presents unique operational hurdles that traditional wired infrastructure cannot solve efficiently:

Complex Installation:
Trenching and cabling for fiber optics in established public areas or remote highway stops are cost-prohibitive and time-consuming.

High Operational Costs (OPEX):
In the absence of remote monitoring, technical teams must be dispatched for even minor resets, leading to high labor costs and station downtime.

Data Latency & Reliability:
Standard consumer-grade networking often fails in harsh outdoor environments or lacks the priority protocols (QoS) required for stable payment and grid-load data.

The Maisvch Solution: Intelligent IIoT Integration

Maisvch provided an "End-to-Edge-to-Cloud" architecture designed to simplify deployment and maximize uptime.

1. High-Speed Wireless Backhaul
By integrating Maisvch Industrial 4G Routers directly into the charging piles, the project eliminated the need for physical data lines. The 4G LTE link provides a secure, high-speed tunnel for real-time data exchange between the pile and the central management system.

2. Millisecond-Level Real-Time Transmission
Utilizing specialized industrial protocols and QoS (Quality of Service) optimization, the solution ensures that critical data—such as charging status, billing information, and emergency stop signals—is transmitted with ultra-low latency, even in areas with fluctuating signal strength.

3. Centralized Cloud-Based Management
All devices are linked to the Maisvch Cloud Platform, allowing operators to monitor heartbeat signals, perform remote firmware updates (OTA), and diagnose faults from a central dashboard.

Featured Product: MIR652S Industrial 4G Router

The MIR652S was selected as the core communication terminal for its ruggedized design and industry-specific features:



- Rugged Design: Built to withstand extreme temperatures and electromagnetic interference common in high-voltage charging environments.
- Dual Ethernet Ports: Enables simultaneous connection of the charging controller and auxiliary devices like surveillance cameras.
- Self-Healing Networking: Features hardware and software "watchdogs" that automatically detect and recover from network drops, ensuring 24/7 connectivity.
- Wall-Mounted Form Factor: Ultra-compact design allows for easy integration within the narrow internal cabinets of modern charging piles.



Seamless BMS and PCS Integration for a 200 MWh Grid-Scale BESS

Case Study

Project Overview

For a 100MW/200MWh centralized energy storage station, a system integrator needed to ensure flawless data acquisition from the Battery Management System (BMS) and Power Conversion System (PCS). Maisvch delivered a highly reliable industrial networking and data conversion solution, enabling seamless integration of legacy serial devices and a modern, PoE-powered intelligent surveillance system.

Results & Customer Benefits

The integrated Maisvch solution provides a robust foundation for intelligent and reliable BESS operations.

Unified Data Visibility:
Provides the central control system with real-time BMS data for optimized battery performance and extended asset life.

Maximum System Reliability:
The fault-tolerant dual-ring network guarantees 24/7 uptime for mission-critical grid support functions.

Enhanced Operational Safety:
Enables an intelligent surveillance system that helps operators quickly identify and respond to anomalies

The Challenge

A new 200 MWh BESS facility required a communication network that could overcome key integration and reliability hurdles to ensure safe and efficient operation.

- Data Protocol Conversion:

Needed to reliably collect critical battery health data from hundreds of BMS units communicating via the RS485 serial protocol.

- Network Uptime:

The core control network for the PCS and BMS demanded a fault-tolerant, "zero-downtime" architecture to guarantee continuous operation.

- Integrated Surveillance:

Required a simplified and cost-effective way to deploy and power high-definition cameras for intelligent safety monitoring.

Solution

Maisvch engineered an end-to-end industrial communication architecture to provide a unified and highly reliable data backbone for the entire facility.

- Seamless Data Integration:

Mport3101 Serial Servers were deployed to capture RS485 serial data directly from BMS units and convert it for the main Ethernet network.

- Fault-Tolerant Core Network:

A dual-redundant ring network was built with MISCOM721 switches, utilizing the MW-Ring protocol (<20ms recovery) to ensure uninterrupted data flow.

- Simplified Surveillance:

MISCOM721P PoE switches provided both Gigabit data connectivity and power to IP cameras over single cables, reducing installation complexity and cost.

Featured Products



Mport3101 Series
1-Port RS-232/485/422 to Ethernet Serial Server



MISCOM7210G
10-Port Layer 2 Full Gigabit Managed DIN-Rail Industrial Ethernet Switch



MISCOM7210GP
10-Port Layer 2 Full Gigabit Managed PoE DIN-Rail Industrial Ethernet Switch



Seamless Network Reliability for a 100 MWh Grid-Scale Battery Energy Storage System (BESS)

Case Study

Project Overview

A provincial-level energy provider developed a landmark 50MW/100MWh Battery Energy Storage System (BESS) to serve as a new regional power dispatching hub.
To guarantee uninterrupted grid support and operational safety, the project required a fault-tolerant communication network with zero downtime. Maisvch provided a redundant industrial Ethernet solution, ensuring maximum reliability for the system's critical Energy Management System (EMS).

Results & Customer Benefits

The implementation of Maisvch's solution provided the operator with a highly reliable and secure network, delivering significant benefits:

Maximized System Uptime:
The fault-tolerant design guarantees continuous BESS operation and reliable grid support.

Enhanced Proactive Safety:
Real-time monitoring enables immediate hazard detection and response, dramatically improving operational safety.

Lower Operational Costs:
Intelligent, remotely managed switches simplify network diagnostics and maintenance, reducing long-term costs.

The Challenge

A landmark 100 MWh BESS facility, designed as a regional power dispatching hub, required an exceptionally reliable communication backbone to connect its core Energy Management System (EMS). The key requirements were:

- Absolute Reliability:

The network needed a "zero-downtime" architecture to guarantee 24/7 control and monitoring, preventing any interruption to grid support operations.

- Integrated Safety Monitoring:

Each battery cabinet required real-time video and environmental data transmission for proactive safety, fault detection, and fire prevention.

- Industrial Durability:

All networking components had to withstand the harsh conditions inside the energy storage containers, including EMI and temperature fluctuations.

Solution

Maisvch engineered a robust and redundant industrial network to ensure mission-critical uptime. Over 50 Maisvch industrial managed switches were deployed to create a multi-layered, fault-tolerant architecture.
The solution featured:

- Dual Redundant Networks:

Separate, physically isolated "A" and "B" networks were created for both critical data and control signals, eliminating any single point of failure.

- Dedicated Monitoring Network:

A fifth, parallel network using PoE switches was deployed exclusively for high-bandwidth video surveillance, ensuring monitoring traffic never interfered with control data.

- Industrial-Grade Hardware:

All switches were industrial-grade, designed for reliable, long-term operation in demanding environments.

Featured Products



MISCOM7210GP
10-Port Layer 2 Full Gigabit Managed PoE DIN-Rail Industrial Ethernet Switch



MISCOM7212G
12-Port Layer 2 Full Gigabit Managed DIN-Rail Industrial Ethernet Switch



MISCOM7206G
6-Port Layer 2 Full Gigabit Managed DIN-Rail Industrial Ethernet Switch

Empowering a Landmark 700MW CSP Solar Power Plant with a Resilient Industrial Network

Case Study



Project Overview

In the vast expanse of a high-insolation desert region, a pioneering renewable energy project has set a new global benchmark. This landmark facility, one of the world's largest Concentrated Solar Power (CSP) and energy storage plants, integrates multiple energy sources to deliver a staggering 700MW of clean power. At the heart of its operation lies a massive field of thousands of heliostats (mirrors) that must track the sun with pinpoint accuracy. Maisvch was selected to provide the critical industrial communication network, creating a robust and intelligent digital backbone that ensures a stable and efficient energy generation process.

Conclusion

The project stakeholders chose Maisvch for our proven expertise in industrial-grade networking and our products' ability to deliver uncompromising performance.

Industrial-Grade Reliability:

All deployed switches feature a fanless design, IP40-rated metal housing, and can operate in a wide temperature range (-40 to 85°C), making them perfectly suited for the harsh desert environment.

Advanced Network Management & Redundancy:

Our switches support advanced Layer 2 and Layer 3 management features, including VLAN, QoS, and fast-healing ring redundancy protocols. This allowed the customer to build a secure, efficient, and self-healing network.

High-Performance for Real-Time Control:

The combination of Gigabit access and 10-Gigabit uplinks ensures that time-sensitive control commands are delivered with minimal latency, maximizing the plant's operational efficiency.

Scalable and Future-Proof Solution:

The modular and hierarchical design allows for easy expansion as the plant's needs evolve, providing a long-term, cost-effective solution.

Do you have a similar challenge in the renewable energy, power utility, or industrial automation sector? Contact our experts today to design a communication network that delivers reliability and performance.

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System Requirements

The success of a Concentrated Solar Power (CSP) plant hinges on its ability to precisely focus sunlight from a vast field of heliostats onto a central receiver tower. For this 700MW giga-project, featuring two massive heliostat fields, the operational challenges were immense:

- **Real-time & Precision Control:**
Each of the thousands of heliostats required constant, real-time commands from the central control system to adjust its angle and track the sun's path. Any communication latency or data loss would directly result in reduced thermal efficiency and power output. The network also needed to handle control commands for automated cleaning systems.

- **Massive Scale & Distributed Architecture:**
The heliostats, each with multiple control nodes, were spread across an enormous geographical area. The network had to reliably collect small data packets from thousands of endpoints and aggregate them for a unified, centralized management system without bottlenecks.

- **Extreme Environmental Conditions:**
Located in a desert, the networking equipment would be exposed to extreme temperature fluctuations, dust, and sand. The hardware needed to be industrially hardened to guarantee uninterrupted operation 24/7 in this harsh environment.

- **High Reliability and Redundancy:**
A network failure in any part of the heliostat field would mean immediate loss of power generation from that section. The communication infrastructure demanded a highly resilient design with fast-healing redundancy to prevent any single point of failure.

Solution

To address these complex requirements, Maisvch designed a multi-layered, redundant industrial networking solution that serves as the central nervous system for the entire heliostat field. The architecture was logically divided into four distinct layers: Field Control, Physical Communication, Application, and Management.The core of the solution involved deploying nearly 300 Maisvch industrial Ethernet switches across 17 robust fiber optic ring networks. This design choice was critical for ensuring maximum uptime and data integrity.

At the heart of the network, Maisvch MISCOM8028GX and MISCOM8036GX Layer 3 10G Industrial Ethernet Switches were deployed. Their high-bandwidth 10G uplinks provided the necessary throughput to aggregate data from all access rings without congestion.

The Layer 3 routing capabilities were essential for segmenting the network, managing traffic between the east and west heliostat fields, and ensuring efficient data flow to the central control room.

In the field, Maisvch MISCOM7220 Layer 2 Managed Industrial Ethernet Switches were installed in field control cabinets. These switches connected directly to the heliostat control nodes. They were organized into multiple redundant rings using industry-standard protocols, guaranteeing that if any single link or switch failed, the network would automatically re-route traffic in milliseconds, ensuring continuous operation.

This hierarchical topology successfully integrated the two sprawling heliostat fields, creating a unified, manageable, and highly reliable communication foundation for the entire CSP system.

Related Products



MISCOM8028GX
Layer 3 Managed 10G
Industrial Ethernet Switch



MISCOM8036GX
Layer 3 Managed 10G
Industrial Ethernet Switch



MISCOM7220
Layer 2 Managed
Industrial Ethernet Switch

Reliable SCADA Networking for a 700MW Desert Wind Farm

Case Study



A rugged industrial Ethernet and MaxView network management solution for remote wind farm O&M in harsh desert conditions.

Country: Middle East

Results:

Stable performance in harsh desert conditions:
The network equipment continued to support site operations despite high heat, dust, and demanding outdoor conditions.

Lower remote maintenance workload:
Centralized visibility and browser-based management helped reduce unnecessary site dispatches and improve response speed.

Scalable model for renewable energy sites:
The architecture can be adapted for wind, solar, oil and gas, transportation, and other distributed industrial applications.

Products:



MISCOM7028G-4GC-24GT
Layer 2 Full-Gigabit Industrial Ethernet Switch



MISCOM7028G-12GF-8GC-8GT
Layer 2 Full-Gigabit Industrial Ethernet Switch



MISCOM7028-4GF-24F
Layer 2 Gigabit Industrial Ethernet Switch

System Requirements

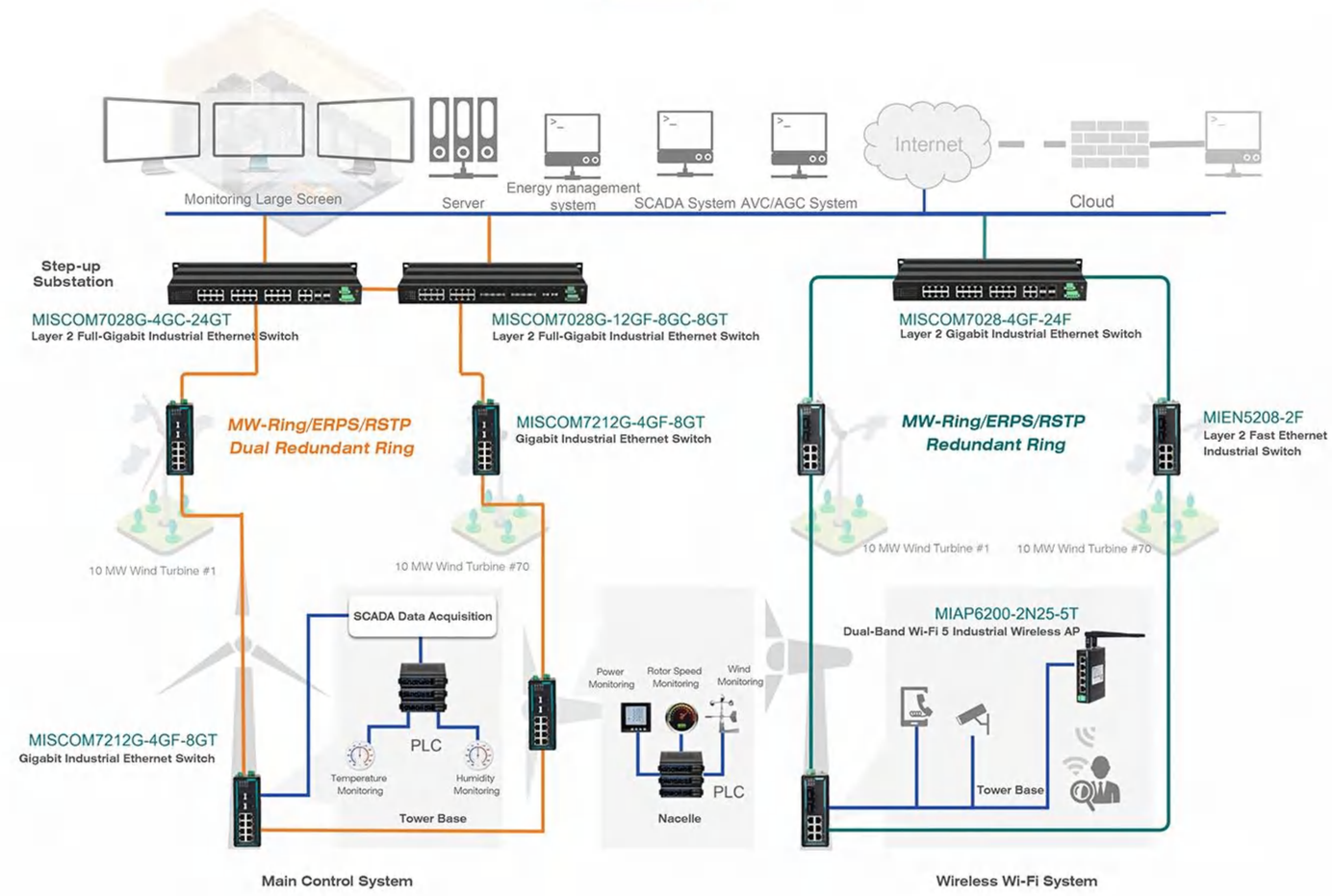
- Reliable operation in high heat, dust, and frequent temperature swings.
- Long-distance turbine-to-turbine communication with ring redundancy.
- Centralized SCADA visibility, remote configuration, and faster fault isolation.

The Maisvch Solution: Intelligent IIoT Integration

Maisvch designed a site-wide industrial Ethernet network with MISCOM7028 Series switches as the core network devices. The switches provide web-based management for remote configuration and troubleshooting, while SNMPv1/v2c/v3 enables integration with upper-level management systems.

Operational functions such as port mirroring, RMON, LLDP, tiered logs, and remote log output help engineers identify abnormal conditions and locate communication faults more quickly. MaxView gives the operations team unified visibility of switches, optical modules, and link status through a topology view.

Network Architecture



Why Maisvch

- Rugged industrial Ethernet design for harsh and distributed assets.
- Remote web management plus SNMP integration for easier maintenance.
- MaxView topology visualization for centralized operations and faster troubleshooting.

Powering a Million-kW-Scale Wind Farm with a High-Reliability Industrial Wireless Network

Case Study



Project Overview

As the world accelerates its transition to green energy, the development of large-scale wind farms has become a global priority.

This case study focuses on a major onshore wind power base located in a region with exceptionally rich wind resources. This "New Energy + Ecological Governance" project is a benchmark in smart energy, featuring a total installed capacity of 100 MW and a 30,000 kW / 2-hour electrochemical energy storage system.

Once operational, the wind farm will generate 340 million kWh of clean electricity annually, saving approximately 67,000 tons of coal and reducing CO2 emissions by over 121,000 tons per year.

To achieve this, the project required a state-of-the-art, highly reliable communications network. This "digital nervous system" is essential for monitoring turbine status, enabling smart operations and maintenance (O&M), and ensuring the safety and efficiency of the entire facility.

Maisvch was selected to provide the core industrial networking solution.

Conclusion

Robust Industrial-Grade Hardware:

All Maisvch products are designed to withstand the harsh environmental conditions of a wind farm, including extreme temperatures, vibration, and electromagnetic interference, ensuring long-term stable operation.

High-Performance Connectivity:

The combination of Wi-Fi 5 (MIAP6500) and a full gigabit backbone (MISCOM7210G) provides the high bandwidth necessary for 4K video streams and large data backhaul, enabling advanced smart O&M.

Superior Network Reliability:

The dual-ring redundant topology with fast-failover (≤20ms) guarantees the 7x24 network availability required for critical power generation infrastructure.

End-to-End Solution:

Maisvch provided a complete, integrated solution, from the media converter and AP in the nacelle to the managed switches at the tower base, simplifying deployment and ensuring compatibility.

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System Requirements

The operator needed a robust network capable of handling the harsh environment and massive data loads of a modern wind farm. The key challenges were:

- Comprehensive Wireless Coverage:

The network had to provide 100% high-speed wireless coverage in complex, signal-obstructing environments, specifically from the wind turbine nacelle (at the top) down to the tower base.

- High-Bandwidth for Smart Operations:

The solution needed to support data-intensive applications, including 4K video surveillance for security and real-time data backhaul from intelligent inspection sensors.

- Seamless Roaming:

O&M personnel using handheld terminals required seamless Wi-Fi roaming as they moved throughout the turbine and the farm, with no connection drops.

- Extreme Reliability & Redundancy:

As a critical power infrastructure, the network must run 7x24 without interruption. The requirement was a dual-ring redundant fiber optic backbone with a network failover and self-healing time of less than 20 milliseconds (≤20ms).

Solution

Maisvch delivered a complete, industrial-grade network solution, deploying over 200 industrial switches and wireless APs to meet these demanding requirements. The architecture was designed for maximum reliability and performance using a dual-network redundant structure.

1.In-Turbine (Nacelle & Tower Base):

- Nacelle (Top): A MIAP6500 Industrial Wireless AP was deployed inside the nacelle to provide localized Wi-Fi for sensors and maintenance crews. It connects to a MIEN1203-F Industrial Media Converter, which converts the data signal to fiber for the long-distance vertical transmission down the tower.
- Tower Base (Bottom): A MISCOM7210G Layer 2 Managed Switch aggregates the data from the nacelle. A second MIAP6500 AP is also installed at the tower base to ensure seamless Wi-Fi coverage on the ground level.

2.Redundant Fiber Backbone:

- The MISCOM7210G switch at the base of each turbine serves as a node on a dual-ring fiber optic backbone.
- These rings connect all turbines and link back to core aggregation switches located in the main substation.
- This dual-ring topology, managed by Maisvch's industrial switches, creates a high-reliability, gigabit-speed Wi-Fi backbone that ensures redundant data paths. If any single point of failure (like a fiber cut) occurs, the network automatically reroutes traffic in under 20ms, ensuring zero data loss for critical operations.

This architecture successfully provides uninterrupted, high-speed wireless coverage across the entire wind farm and a highly resilient backbone for all data transmission.

Related Products



MIAP6500
Dual-Band Wi-Fi 5
Pole-Mount Industrial
Wireless AP



MISCOM7210G
10-Port Layer 2 Full Gigabit
Managed DIN-Rail
Industrial Ethernet Switch



MIEN1203-F
3-Port 100M DIN-Rail
Industrial Ethernet Media Converter
(1x Fiber, 2x Copper)

Enhancing a 500MW Onshore Wind Farm with a High-Reliability Industrial Network

Case Study



Key Results & Impact

Maximum Uptime:
Redundant network architecture guarantees continuous operation of the mission-critical SCADA system.

Improved Maintenance Efficiency:
High-speed wireless access enables faster diagnostics, remote support, and smart inspection workflows, reducing downtime.

Industrial-Grade Reliability:
All hardware is purpose-built to withstand the extreme temperatures, vibration, and interference of a wind farm environment.

Simplified Deployment:
An integrated, single-vendor solution for both wired and wireless needs ensures seamless compatibility and management.

Featured Products

MISCOM7208BP-2GF

8-Port Gigabit Managed Industrial Ethernet Switch



MIAP6500

Dual-Band Wi-Fi 5 Pole-Mounted Industrial Wireless AP



Project Overview

Maisvch provided the critical communication backbone for a landmark 500MW onshore wind farm, a key renewable energy project. Our integrated networking solution ensured record-breaking grid connection speed and guaranteed long-term operational stability and efficiency.

The Challenge

The project required a robust, dual-purpose network capable of withstanding a harsh environment while delivering flawless performance.

- High-Reliability Control Network:

A 24/7 redundant fiber network was essential for the SCADA system to ensure millisecond-level real-time data monitoring and meet stringent grid stability requirements.

- Complete Wireless Coverage:

A high-speed, secure Wi-Fi network covering all turbine bases was needed to support mobile terminals for efficient, data-driven maintenance and intelligent inspections.

Solution

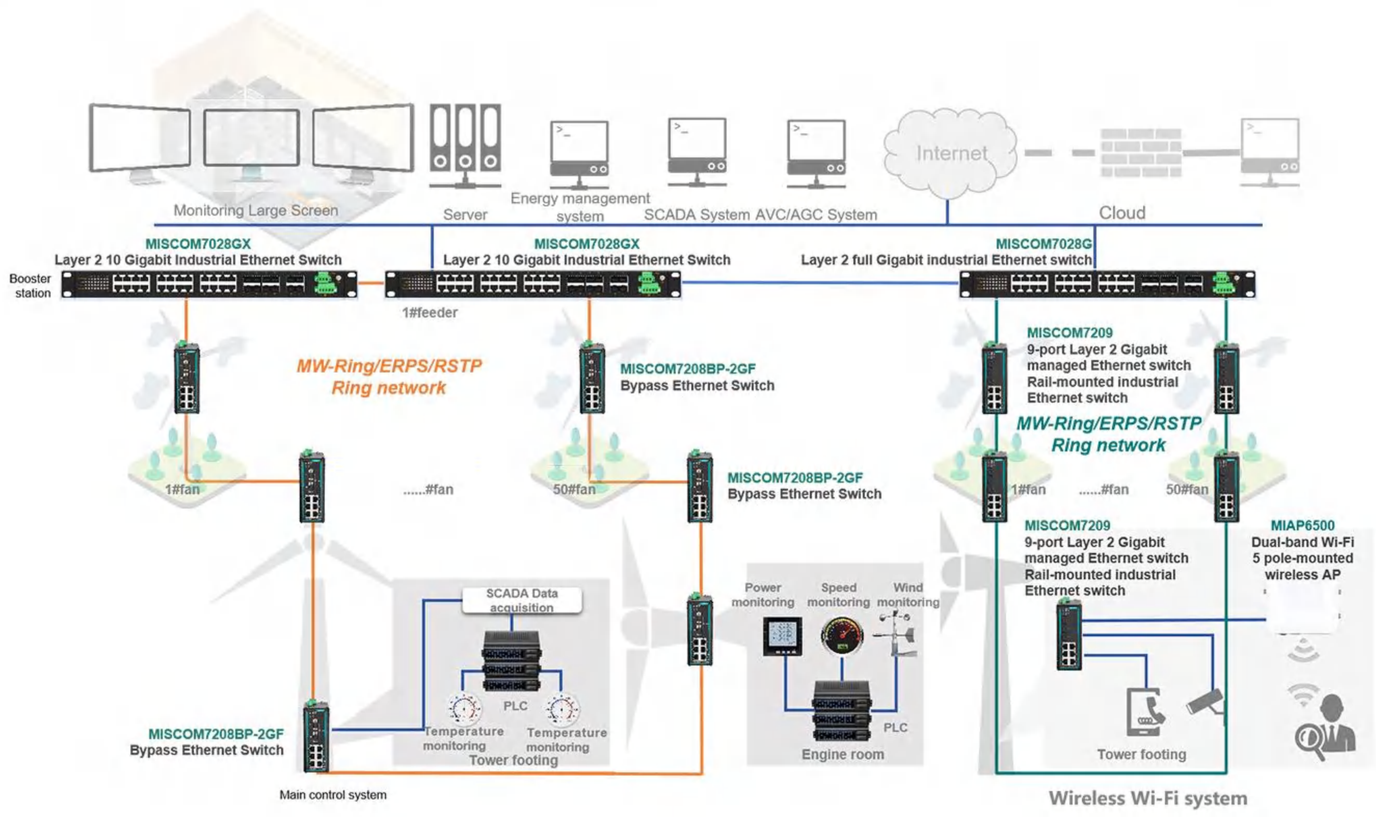
Over 400 Maisvch industrial-grade devices were deployed to create two distinct, resilient ring networks.

- Main Control System (Wired):

A dual-ring fiber network was established using MISCOM7208BP switches with Bypass functionality within each turbine. These rings connect to MISCOM7028GX core switches at the substation, guaranteeing maximum uptime for critical SCADA data.

- Operations & Maintenance System (Wireless):

At each turbine base, MIAP6500 industrial wireless APs were installed, creating a separate, high-availability Wi-Fi ring network. This provides seamless and secure connectivity for on-site maintenance crews.



Offshore Wind Farm Communications System Implementation

Case Study



Featured Products

MIEN5208-2F

Layer 2, 8-Port Industrial Ethernet Switch



MISCOM6208-4F

Layer 2, 8-Port Industrial Ethernet Switch



MISCOM6024-4F-AD220

Layer 2, 24-Port Rack-Mounted Managed Industrial Ethernet Switch



Project Overview

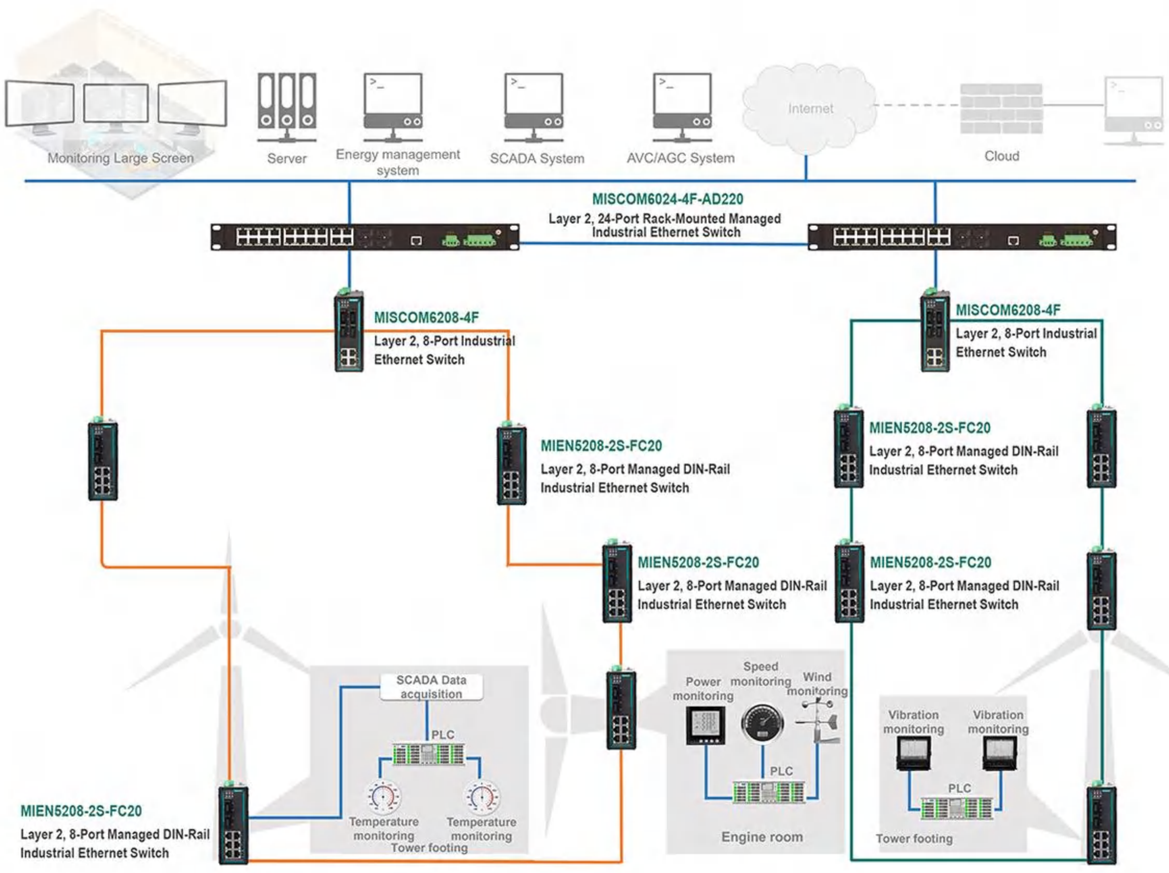
This offshore wind farm, part of a major renewable energy initiative, aims to provide clean energy with a total capacity of over 3,000 MW. It is one of the largest deep-water wind farms globally, contributing significantly to carbon reduction goals.

Requirements

- Long-Distance Communication Coverage:
  The system needed to support communications between wind turbines located 20 kilometers apart, ensuring low-loss, long-distance transmission.
- Adapting to Harsh Marine Conditions:
  The solution had to be resilient to extreme weather conditions at sea, ensuring stable communication and accurate data transmission in varying environmental conditions.
- Data Security and Integrity:
  Secure transmission of sensitive data, preventing unauthorized access or tampering, while maintaining the integrity and confidentiality of the data.

Solution

To meet the stringent requirements, Maisvch provided a robust industrial communication system, which included over 80 MIEN5208 and MISCOM6208 industrial Ethernet switches. The network was designed in a ring topology, ensuring continuous communication. The system connects the wind turbine controllers to offshore and onshore substations, transmitting real-time data to the mainland data center for monitoring and management.



This communication solution ensured seamless, real-time data transmission from offshore wind turbines to the onshore data center, allowing efficient management and monitoring of the entire wind farm. The solution was built to withstand the challenging marine environment and provided strong data security, contributing to the success of the project.



Intelligent Transportation

Explore industrial networks for smart highways, tunnels, tolling and traffic monitoring - connecting distributed roadside systems with centralized operations.

Enhancing Safety and Efficiency in Smart Tunnel Operations for a Strategic Ring Road

Case Study



Project Overview

To strengthen the transport network of a major economic circle in Western China, a strategic urban ring road project required a state-of-the-art Smart Tunnel System. The goal was to optimize traffic flow and ensure absolute safety in complex tunnel environments. Maisvch provided a robust industrial network solution comprising over 300 industrial Ethernet switches. This infrastructure seamlessly connects critical subsystems, including lighting, ventilation, and fire alarms, delivering a unified, highly reliable platform for intelligent operation and maintenance (O&M).

Results

The implementation of the Maisvch solution has delivered tangible benefits to the highway operator:

Enhanced Safety:

The low-latency network ensures that emergency automated systems trigger within milliseconds during critical incidents, complying with strict safety regulations.

Operational Efficiency:

Automated control of lighting and ventilation has reduced energy consumption and operational costs.

24/7 Reliability:

The rugged hardware has proven resilient against the harsh tunnel environment, providing all-weather operational support for the regional logistics network.

The Challenges

Tunnel environments are harsh and enclosed, making network reliability a matter of life and safety. The project outlined three stringent requirements for the communication infrastructure:

- Ultra-Low Latency for Critical Safety:

In the event of a fire or accident, the system must trigger emergency responses instantly. The network required a control signal transmission latency of ≤20ms to ensure immediate activation of fire alarms, smoke exhaust fans, and emergency evacuation lighting.

- Advanced Data Security & Management:

The network carries multiple traffic types: high-bandwidth video surveillance, sensitive sensor data, and critical control commands. The system required VLAN (Virtual LAN) isolation to separate these flows, preventing broadcast storms and ensuring security. Additionally, the operator needed remote diagnostic capabilities to upgrade firmware and troubleshoot without sending technicians into the tunnel.

- Extreme Environmental Adaptability:

Tunnels are subject to dust, dampness, and vehicle exhaust. The equipment had to be Industrial-Grade, capable of stable operation in a wide temperature range of -40°C to 75°C, ensuring reliability during freezing winters and scorching summers.

Solution

Maisvch delivered a comprehensive, redundant industrial networking solution that serves as the "digital nervous system" for the tunnel.

Unified Critical Device Connectivity:

The deployment of over 300 Maisvch industrial switches enabled the seamless connection of front-end devices. The network integrates:

- Intelligent Lighting Control: Adjusting brightness based on ambient light to save energy and improve driver safety.
- Ventilation Systems: Real-time control of fans based on air quality sensors (CO/VI).
- Safety Systems: Instant linkage to fire alarms and emergency phones.

High-Speed & Redundant Backbone:

To handle the data load, the solution utilizes a high-bandwidth backbone. Layer 3 switches manage the routing between different subnets (lighting vs. video), ensuring efficient data traffic. The network topology is designed for high availability; if a cable is severed, the network reroutes traffic instantly, guaranteeing that the control center never loses contact with the tunnel assets.

Intelligent O&M:

By supporting advanced management protocols, the Maisvch switches allow operators to monitor network health remotely. This capability significantly reduces maintenance costs and improves the overall operational efficiency of the highway.

Featured Products



MISCOM8028GX

Layer 3 10G Industrial Ethernet Switch

Role: Core/Aggregation Layer
Key Features: 10-Gigabit uplinks for high data throughput; Layer 3 routing for efficient inter-VLAN communication; High port density to aggregate multiple tunnel zones.



MISCOM7212G

Gigabit Managed Industrial Ethernet Switch

Role: Access Layer (Device Connectivity)
Key Features: Full Gigabit ports to support bandwidth-hungry devices; Robust industrial design (-40°C to 75°C); Supports VLANs and fast redundancy protocols.

Enabling Next-Gen Smart Toll Operations for a Major Regional Expressway

Case Study



Project Overview

To achieve a benchmark for "unmanned and low-manpower" highway operations, a key regional expressway project required a digital infrastructure upgrade. The goal was to transition from traditional manual toll collection to a fully automated, intelligent system.

Maisvch supplied over 600 industrial Ethernet switches to create a robust, layered communication network. This solution ensures the seamless transmission of ETC transaction data, AI video analytics, and emergency command signals, operating 24/7 in harsh outdoor environments.

Conclusion

The implementation of the Maisvch industrial networking solution has successfully modernized the expressway's toll operations:

24/7 Unmanned Operation:

The high reliability of the network supports the "unmanned, low-manpower" operational model, significantly reducing labor costs and improving lane efficiency.

Zero Data Loss:

The redundant network architecture ensures the integrity of financial transaction data and video evidence, even during network maintenance or component failure.

Environmental Resilience:

The industrial-grade hardware has proven its durability in extreme outdoor temperatures, maintaining stable operation without the need for climate-controlled cabinets.

Scalable Architecture:

The Gigabit network backbone provides ample headroom for future ITS upgrades, protecting the operator's long-term investment.

System Requirements

Transitioning to an unmanned system places immense pressure on the network infrastructure. The project faced three critical challenges:

- High-Bandwidth & Redundancy for Critical Data:

The network must connect high-bandwidth devices (AI cameras) and latency-sensitive devices (ETC antennas) simultaneously. The operator required a Ring Topology with millisecond-level self-healing capabilities. A single link failure cannot disrupt the toll transaction process, as downtime leads to immediate revenue loss and traffic congestion.

- Harsh Outdoor Environment:

The equipment is installed in roadside cabinets exposed to the elements. The region experiences significant temperature fluctuations. Therefore, the switches must be industrial-grade, capable of operating strictly between -40°C and 75°C without fans, and resistant to dust and electromagnetic interference.

- Security and Traffic Isolation:

The network carries different types of data: financial transactions (ETC), video surveillance, and general management data. To prevent cyber threats and data congestion, the system required strict VLAN (Virtual Local Area Network) isolation to logically separate these services on the same physical infrastructure.

Solution

Maisvch delivered a highly reliable, layered industrial network solution tailored for Smart ITS applications.

Layered Network Architecture:

The solution utilized a hierarchical design involving over 600 managed switches.

- Access Layer: Installed in the toll islands, connecting lane controllers, ETC antennas, barrier gates, and IP cameras.
- Aggregation Layer: Aggregating data from multiple lanes and transmitting it to the toll station control center via fiber optics.

Uninterrupted Connectivity:

The deployed Maisvch switches support G.8032 ERPS (Ethernet Ring Protection Switching). This open-standard redundancy protocol ensures that if a fiber cable is cut, the network recovers in less than 20ms, ensuring zero interruption to toll transactions or video recording.

Security and Future-Proofing:

To meet security compliance, the network was configured with distinct VLANs, isolating toll business data from the surveillance network. Furthermore, the Gigabit bandwidth capacity ensures the infrastructure is ready for future expansions, such as V2X (Vehicle-to-Everything) communication and autonomous driving support.

Related Products

To meet the specific needs of the toll lanes and aggregation points, the following Maisvch products were deployed:



MISCOM7028G
Layer 2 Full Gigabit Managed Industrial Ethernet Switch



MISCOM7206G
Layer 2 Full Gigabit Managed Industrial Ethernet Switch

maisvch.com sales@maisvch.com

Building a Resilient Smart Highway Surveillance Network for a Strategic Logistics Corridor

Case Study



Project Overview

To boost regional economic development and facilitate cross-border logistics between China and the ASEAN region, a major transit line highway project required a robust Upgrade. The core of this modernization was a Smart Highway Surveillance System designed to ensure traffic safety and operational efficiency. Maisvch provided a highly reliable, 10-Gigabit industrial network backbone utilizing over 400 industrial Ethernet switches, ensuring seamless data transmission for real-time monitoring under harsh outdoor conditions.

Conclusion

The deployment of the Maisvch industrial network infrastructure has delivered immediate and tangible benefits to the highway's operation management:

Uninterrupted Surveillance Coverage:

With approximately 400 industrial switches operating stably, the control center now maintains 24/7 visibility over the highway. The redundant ring topology has proven resilient, ensuring zero data loss even during network maintenance or link fluctuations.

Enhanced Operational Efficiency:

The high-bandwidth, low-latency 10GbE backbone successfully supports the real-time transmission of uncompressed HD video streams and sensor data. This capability allows operators to detect accidents, congestion, or road hazards instantly, significantly reducing incident response times.

Strategic Logistics Support:

By ensuring a safe and intelligent flow of traffic, the system efficiently supports the high volume of cross-border logistics, fulfilling the project's economic objectives.

Future-Ready Infrastructure:

The robust network architecture provides a solid digital foundation for future expansions, including V2X (Vehicle-to-Everything) communication and autonomous driving support, without the need for hardware replacement.

System Requirements

The highway environment presents unique challenges for network equipment. The project owners established strict criteria for the communication network:

- High Availability & Network Redundancy:

Given the critical nature of highway safety, network downtime is not an option. The system required a Ring Topology architecture to ensure that if a single point of failure (cable break or device failure) occurred, the network would self-heal instantly (milliseconds recovery time) to prevent data loss.

- Advanced Network Security:

With the rise of cyber threats in critical infrastructure, the network required comprehensive security features. This included:

- VLAN Isolation: To separate video data from control data.
- ACL (Access Control Lists): To filter unauthorized traffic.
- Port Security (MAC Binding) & 802.1X Authentication: To prevent illegal device access at remote roadside cabinets.

- Industrial-Grade Ruggedness:

The equipment would be installed in roadside cabinets subject to extreme weather. The devices needed to operate reliably in temperatures ranging from -40°C to 75°C and meet strict Industrial EMC standards to resist electromagnetic interference from passing heavy vehicles and power lines.

Solution

To meet these rigorous demands, Maisvch deployed a comprehensive industrial networking solution comprising approximately 400 units of managed industrial Ethernet switches.

10-Gigabit Backbone for Massive Data:

The network utilizes a multi-ring architecture. At the core and aggregation layers, Maisvch Layer 3 10-Gigabit switches were deployed. This high-bandwidth backbone ensures that the massive throughput generated by hundreds of HD cameras and sensors is transmitted to the control center with low latency and no video lag.

Robust Safety and Reliability:

The deployed switches support Maisvch's proprietary fast ring redundancy protocol. In the event of a fiber cut along the highway, the network recovers in under 20ms. Furthermore, the robust cybersecurity features (802.1X, ACLs) effectively locked down the network edge, ensuring only authorized cameras and sensors could communicate with the central server.

Seamless Integration:

The solution successfully integrated data from video surveillance, traffic detectors, and environmental sensors into a single, unified Ethernet network. This allows the operations center to visualize traffic conditions in real-time, respond to accidents faster, and optimize traffic flow.

Related Products



MISCOM8028GX
Layer 3 10G Rack-mount Industrial Ethernet Switch



MISCOM7212G
Layer 2 Managed DIN-rail PoE Industrial Ethernet Switch

A High-Reliability Network for an Intelligent Highway Tunnel System

Case Study



Project Overview

Modern highways are the arteries of the economy, and their tunnels represent critical chokepoints where safety and security are paramount. Any incident inside a tunnel can lead to massive congestion and significant safety risks. Because of this, a 100% reliable, real-time video surveillance system is not a luxury - it's an operational necessity.

This case study focuses on a major highway expansion project, a new 22-kilometer route designed to connect two major economic hubs. The project involved the construction of several long tunnels, which required a state-of-the-art intelligent transportation system (ITS). A core component of this system was the video surveillance network, which needed to provide clear, uninterrupted video feeds to the traffic control center 24/7. Maisvch was selected to provide the industrial-grade network backbone for this critical infrastructure.

System Requirements

The environment inside a highway tunnel is one of the most challenging for electronic equipment. The network solution had to be built from the ground up to guarantee performance and reliability under extreme conditions.

- Extreme Device Reliability:

The components must be industrial-grade, capable of 7x24x365 non-stop, stable operation. Given the difficulty of maintenance inside an active tunnel, a high MTBF (Mean Time Between Failures) was essential to prevent unexpected downtime.

- High-Bandwidth for HD Video:

The system required the transmission of concurrent video streams from hundreds of HD cameras. The switches needed to provide sufficient gigabit ports and a high backplane bandwidth to ensure non-blocking data transmission, eliminating any possibility of video lag, stutter, or frame loss.

- Industrial Environmental Tolerance:

Devices must be able to withstand the harsh tunnel environment, including constant low-frequency vibration from heavy vehicles, corrosive exhaust fumes, and high concentrations of dust. Support for wide operating temperatures was mandatory.

Solution

Maisvch provided approximately 500 units from its MISCOM7210 and MISCOM7210G series of gigabit industrial Ethernet switches to serve as the core transmission hub for the entire system.

These high-performance switches were installed in roadside cabinets and directly on the tunnel walls. Their primary role is to connect and aggregate the real-time video streams from all the HD surveillance cameras deployed throughout the 22km route.

Leveraging their full-gigabit ports and a non-blocking switching architecture, the Maisvch switches provide the low-latency, high-bandwidth data transmission required by the system. They ensure that all video feeds are reliably transmitted to the central monitoring center, giving operators a clear and continuous view of traffic conditions for rapid incident response and safe highway operation.

Conclusion

Proven Video Performance:

The MISCOM7210 series is optimized for high-bandwidth applications. Its non-blocking, store-and-forward architecture is ideal for handling massive, concurrent HD video streams without packet loss, ensuring a clear and fluid picture for operators.

Rugged Industrial Design:

Built to exceed industrial standards, these switches feature a fanless design, IP40-rated metal housing, and wide-temperature support. They are specifically hardened to resist the shock, vibration, dust, and fumes common in tunnel environments.

Long-Term Reliability:

With a high MTBF and robust components, the Maisvch switches are designed for "fit and forget" deployment in hard-to-access locations, minimizing maintenance cycles and guaranteeing the 24/7 uptime required for critical public safety systems.

Related Products



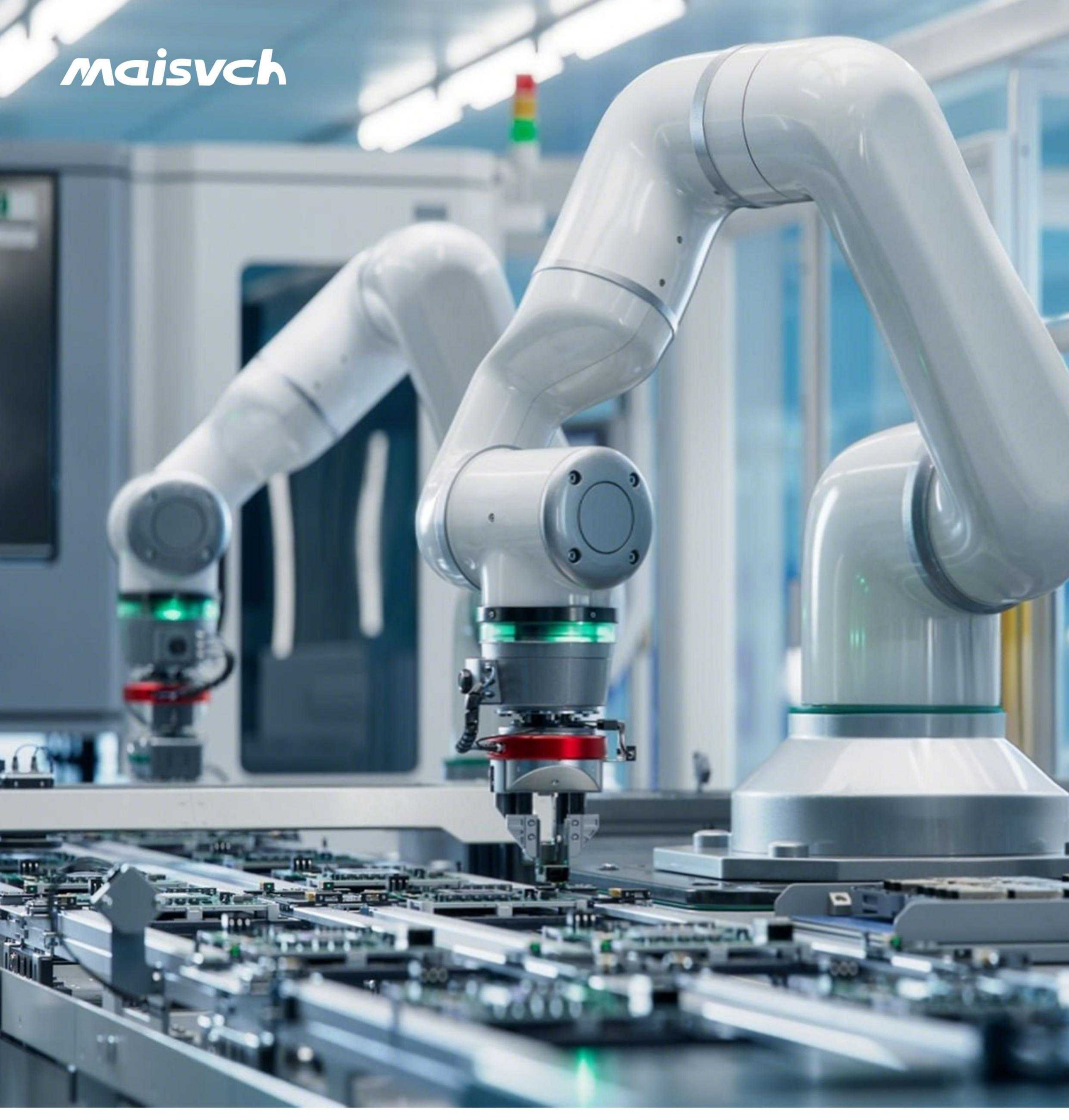
MISCOM7210-2GF

10-Port Layer 2 Gigabit Managed DIN-Rail Industrial Ethernet Switch



MISCOM7210G-2GF-8GT

10-Port Layer 2 Full Gigabit Managed DIN-Rail Industrial Ethernet Switch



Smart Manufacturing

Explore industrial Ethernet, wireless and protocol-conversion architectures that connect machines, robots and plant systems for more visible, flexible and maintainable production.

Connecting Production Equipment Across BYD Electronics' 1.7 Million m² Smart Factory

Case Study



Requirements

Convert Modbus RTU and serial machine data for Ethernet and Modbus TCP plant systems.
Use a command-transmission acceptance target of 50 ms or less.
Maintain stable wireless links in an EMI-intensive production environment.
Fit restricted machine-side space with wall or DIN-rail mounting and -40°C to 75°C operation.

Introduction

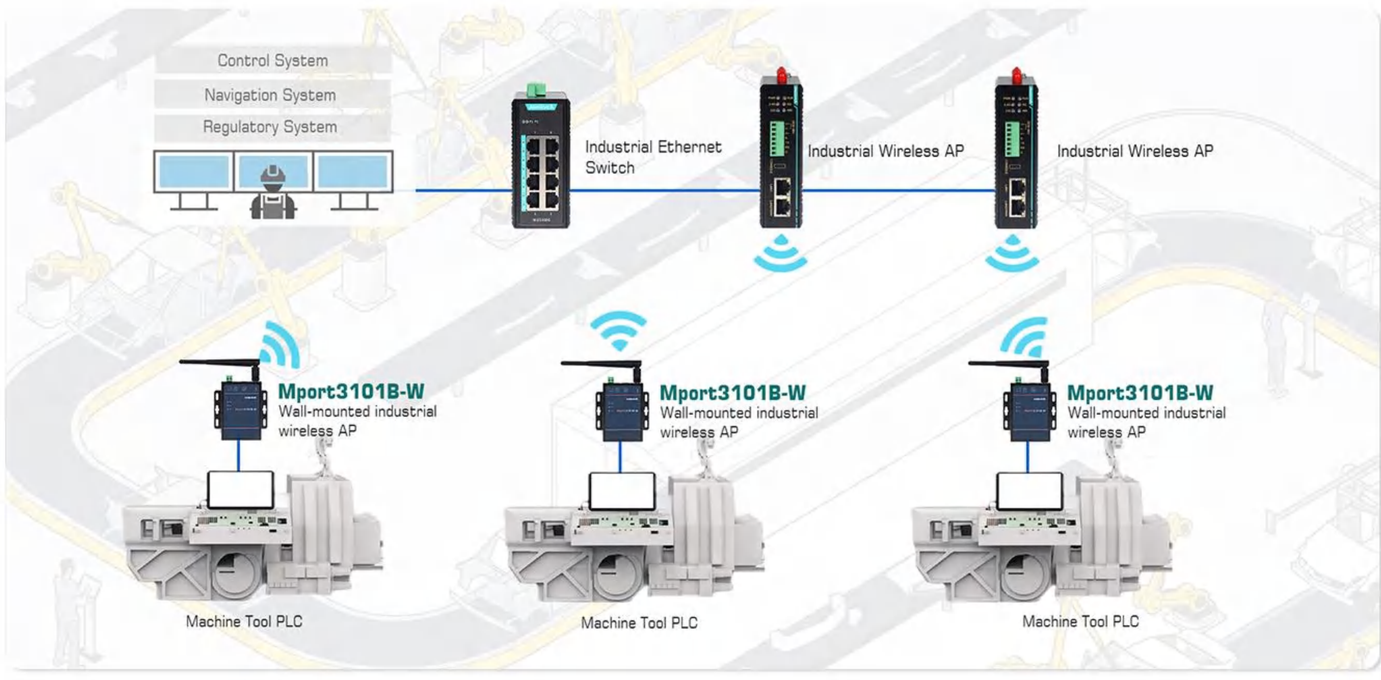
Huizhou BYD Electronics operates a major manufacturing campus spanning approximately 1.7 million m². Production machinery across the site must exchange data with control, manufacturing, and monitoring systems. The connectivity gap was at the machine edge: serial and Modbus RTU data had to reach Ethernet-based plant applications without making every machine a separate protocol and cabling project.

Solution

The architecture retained the wired industrial Ethernet backbone and added industrial Wi-Fi only at the access layer. An Mport3101-W was installed close to each machine PLC or serial endpoint, converting local Modbus traffic before it entered the plant network. This kept serial runs short and created one repeatable connection pattern for mixed-vendor equipment.

Deployment and verification

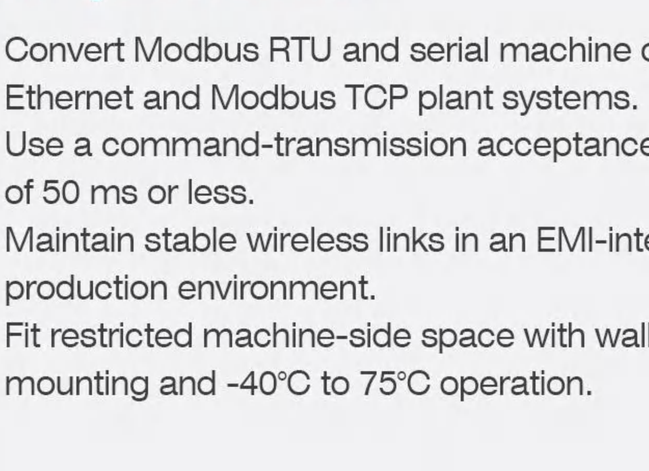
Commissioning focused on Modbus interoperability, continuous machine-data exchange, signal stability, and the 50 ms or less command-transmission target. The project brief confirms successful integration with Mitsubishi, FANUC, and Siemens machine platforms. Detailed latency traces, packet-loss results, and RF coverage records were not published.



Results

- Standardized the machine-to-network handoff across different automation platforms.
- Reduced dependence on long dedicated serial communication cable runs.
- Localized protocol conversion and fault isolation at the machine edge.
- Created a repeatable expansion path without replacing existing PLC interfaces.

Featured Product



Mport3101-W

Industrial Wi-Fi Serial Device Server

1-port 100 Mbps wireless serial-to-Ethernet connectivity

Seamless Connectivity for Mobile Robots in a Smart EV Assembly Plant

Case Study



Project Overview

To drive capacity expansion and embrace Industry 4.0 standards, a leading New Energy Vehicle (NEV) manufacturer constructed a state-of-the-art smart factory. A critical component of this facility was the automation of the general assembly line using mobile robots (AGVs). Maisvch deployed nearly 100 units of high-performance Industrial 5G/Wi-Fi 6 Routers, creating a high-speed, low-latency wireless network that ensures seamless roaming for mobile assets, setting a new benchmark for intelligent automotive manufacturing.

Results

The deployment of Maisvch's wireless solution has delivered significant operational improvements:

Enhanced Productivity:
AGVs operate without network-induced pauses, maximizing the throughput of the assembly line.

Real-Time Quality Control:
High-bandwidth stability allows for instant video upload and analysis, ensuring product quality defects are caught immediately.

Scalability:
The use of Wi-Fi 6 and 5G ensures the factory network is future-proof, ready for more advanced AI and IoT devices in the coming years.

Featured Products



MIR785-W
5G Industrial Cellular WiFi Router

The Challenges

In a metal-rich, high-interference factory environment, standard commercial Wi-Fi solutions fail to meet the strict requirements of automotive production. The project demanded:

- Zero-Interruption Roaming (Business Continuity):

AGVs and inspection robots are constantly moving between different Access Points (APs). To prevent the robots from stopping or "stalling," the network required a seamless fast roaming mechanism with a handover latency of <50ms.

- High Bandwidth for Visual Inspection:

The production line utilizes automated video quality inspection. This requires real-time transmission of high-definition video data from mobile terminals to the server. The network needed to guarantee a bandwidth of >100Mbps per terminal, necessitating Wi-Fi 6 or 5G capabilities.

- Industrial-Grade Anti-Interference:

The assembly line is filled with Variable Frequency Drives (VFDs) and heavy machinery that generate significant electromagnetic noise. The wireless equipment had to support Dynamic Frequency Selection (DFS) and industrial shielding to avoid interference and maintain signal stability.

Solution

Working closely with a top-tier robotics integrator, Maisvch provided a cutting-edge wireless communication solution tailored for the mobile robots in the assembly line.

Hybrid 5G & Wi-Fi 6 Technology:

The core of the solution is the Maisvch MIR785-W, a dual-function Industrial Router.

- Wi-Fi 6 Performance: By utilizing Wi-Fi 6 (802.11ax), the system handles high-density connections and provides the massive throughput required for video analytics.
- 5G Backhaul: The routers support 5G cellular connectivity, offering a flexible and high-speed alternative for data backhaul where cabling is difficult.

Seamless Handover:

The deployed routers are optimized for high-speed mobility. They successfully achieved the sub-50ms roaming requirement, allowing AGVs to switch network nodes imperceptibly. This ensures that control commands and video streams are never interrupted, maintaining the rhythm of the assembly line.

Standardized Reliability:

Approximately 100 units of the MIR785-W were installed on AGVs and robots throughout the facility. The solution has proven so robust that it has become a standard application blueprint for the integrator's future automotive projects.



Enabling Smart Steel Manufacturing with a High-Uptime Industrial Network

Case Study

Project Overview

In the modern steel manufacturing industry, "Industry 4.0" and "Smart Manufacturing" are key to achieving new levels of efficiency, safety, and environmental compliance. A leading steel producer, renowned for its high-grade structural, automotive, and shipbuilding steel, embarked on a major digital transformation of its "green steel" facility. This facility operates massive, complex production lines, including 4100mm wide-plate and 2700mm medium-plate mills. The goal was to create a unified, highly reliable industrial network to support real-time data collection and monitoring across the entire production process. This network would be the central nervous system for everything from molten steel treatment to continuous casting, where any network failure could result in millions in losses and significant safety risks.

Conclusion

Guaranteed Real-Time Performance:
The full-gigabit backbone and efficient edge-layer switching ensure that critical control data is transmitted with latency well below the 100ms threshold.

Extreme Network Resiliency:
The managed redundant ring, powered by MISCOM7210G switches, delivers the ≤50ms fast-failover essential for preventing costly downtime in a 24/7 production environment.

Advanced Traffic Management:
Layer 2 management features, including VLAN and QoS, successfully prioritize critical control data, ensuring that high-volume video surveillance never interferes with production processes.

Industrial-Grade Durability:
All Maisvch devices are designed with IP40 protection, fanless cooling, and wide-temperature operation, making them ideally suited to withstand the heat, dust, and interference of a steel mill.

System Requirements

The plant's environment is one of the most demanding in the world, with extreme heat, dust, and high electromagnetic interference. The network solution had to meet three non-negotiable requirements:

- Real-Time Data Collection:

The network must be capable of millisecond-level data acquisition from hundreds of PLCs and sensors, with a guaranteed transmission latency of less than 100ms (<100ms) for precise process control.

- Zero-Interruption Redundancy:

To prevent catastrophic production stoppages, the network backbone must feature a redundant ring topology (such as ERPS or RSTP) with a fault recovery and self-healing time of 50ms or less (≤50ms).

- Traffic Prioritization (QoS):

The network had to carry both critical control data and high-definition video surveillance streams. It required VLAN and QoS capabilities to prioritize control packets, ensuring zero packet loss or delay for production data, even under high video traffic load.

Solution

Maisvch provided a high-reliability industrial communication solution centered on nearly 200 industrial Ethernet switches and media converters, creating a robust, multi-layered network.

- Field Device Access (Edge Layer):

In the harshest areas next to the production line—such as molten steel treatment, hot metal desulfurization, and continuous slab casting—MIEN1203-F Industrial Media Converters were deployed. These units connect directly to critical PLCs and sensors, converting their electrical signals to fiber optics for error-free, low-latency data transmission over long distances, bypassing heavy EMI.

- Data & Video Aggregation (Aggregation Layer):

MIEN3205G 5-port Full Gigabit Switches were used to aggregate data from field devices and to connect HD surveillance cameras. Using VLAN partitioning, the network was logically segmented to isolate the high-bandwidth video traffic from the time-sensitive production control data.

- Redundant Backbone (Core Layer):

The core of the network was built using MISCOM7210G 10-port Managed Gigabit Switches. These switches were configured into a full-gigabit redundant ring topology. This managed ring architecture provides the high bandwidth needed for all traffic while guaranteeing the ≤50msrapid self-healing required for uninterrupted production, fully meeting the steel industry's strict demands for stability and real-time performance.

Related Products



MIEN1203-F
3-Port 100M DIN-Rail Industrial Ethernet Fiber Media Converter



MIEN3205G
5-Port Layer 2 Full Gigabit DIN-Rail Industrial Ethernet Switch



MISCOM7210G-2GF-8GT
10-Port Layer 2 Full Gigabit Managed DIN-Rail Industrial Ethernet Switch



Smart IoT System for Lithium Battery Manufacturing

Case Study

Featured Products

Mgate3202

2×RS232/485 To 2×Ethernet Modbus Industrial Gateway



MIAC6500-2GF

10-Port Industrial Wireless Access Controller



MIAP7200

2.4/5GHz Wi-Fi 6 Industrial Wireless AP



MIEN3205GP

Layer 2, 5-Port PoE industrial Ethernet switch



Project Overview

A leading energy tech company aimed to digitize its lithium battery manufacturing facility using Industrial IoT (IIoT) and Energy Management Systems (EMS). The goal was to enhance production efficiency, data collection, and energy management through digitalization.

Requirements

- Full Wi-Fi 6 coverage across the facility.
- Support for industrial protocols like Modbus/TCP and OPC UA.
- Power over Ethernet (PoE) for video cameras and environmental sensors.

Solution

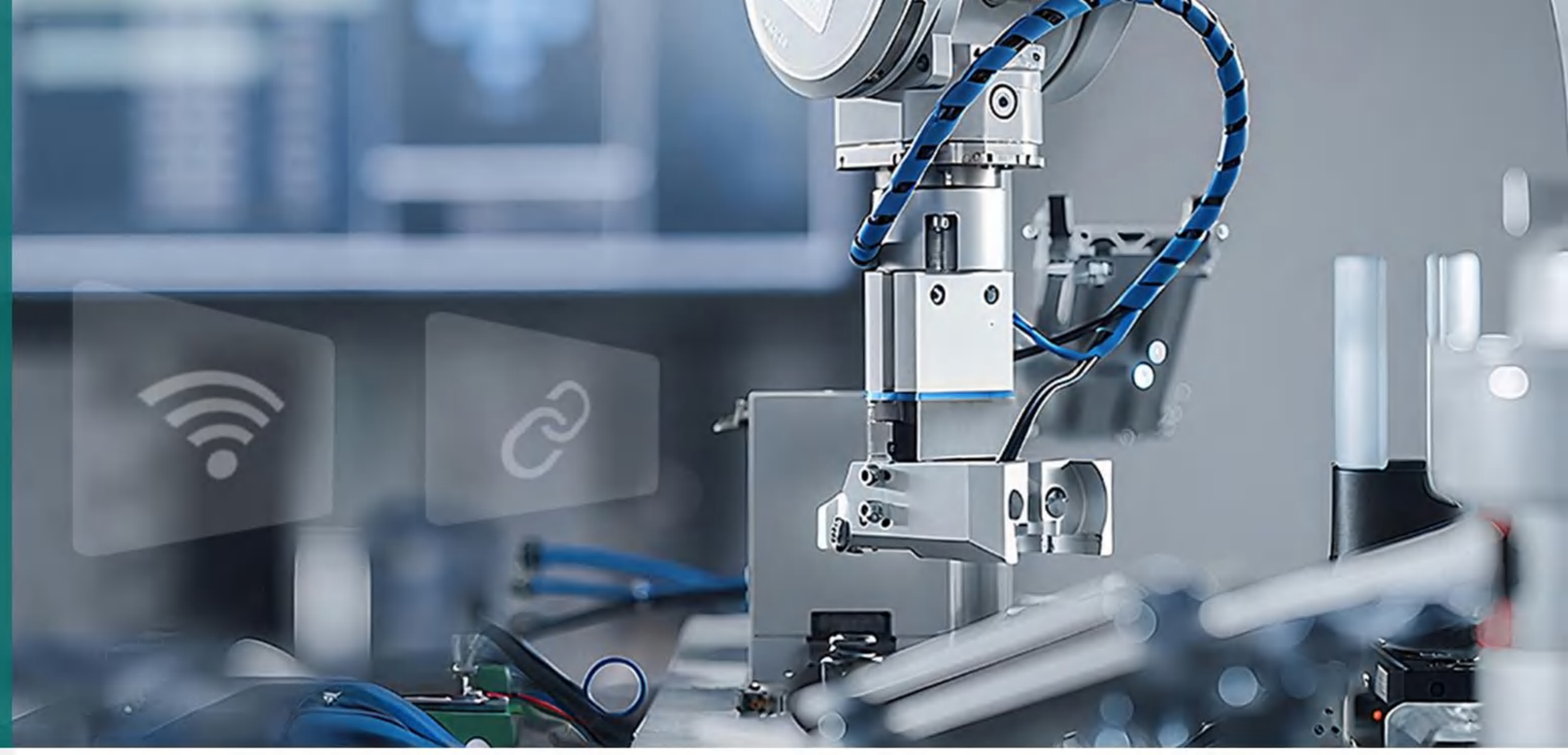
Maisvch deployed nearly 100 Wi-Fi 6 access points, a centralized wireless controller, IoT gateways for protocol conversion, and PoE switches to support sensors and cameras. This solution enabled seamless data integration, real-time communication, and enhanced operational efficiency.



The factory now operates as a smart facility, providing real-time data exchange, efficient monitoring, and improved production processes.

Revolutionizing CNC Machine Automation : Maisvch Smart Manufacturing Solutions

Case Study



Challenges

- Incompatible communication protocols
- Lack of real-time data transmission
- Physical space limitations
- High cost of equipment upgrades
- Integration of legacy systems

Why Maisvch

- Enhanced efficiency and reduced downtime
- Affordable smart manufacturing
- Improved operational insights
- Scalability for future growth

Related Products

Mport3101-W Wi-Fi Serial Device Server

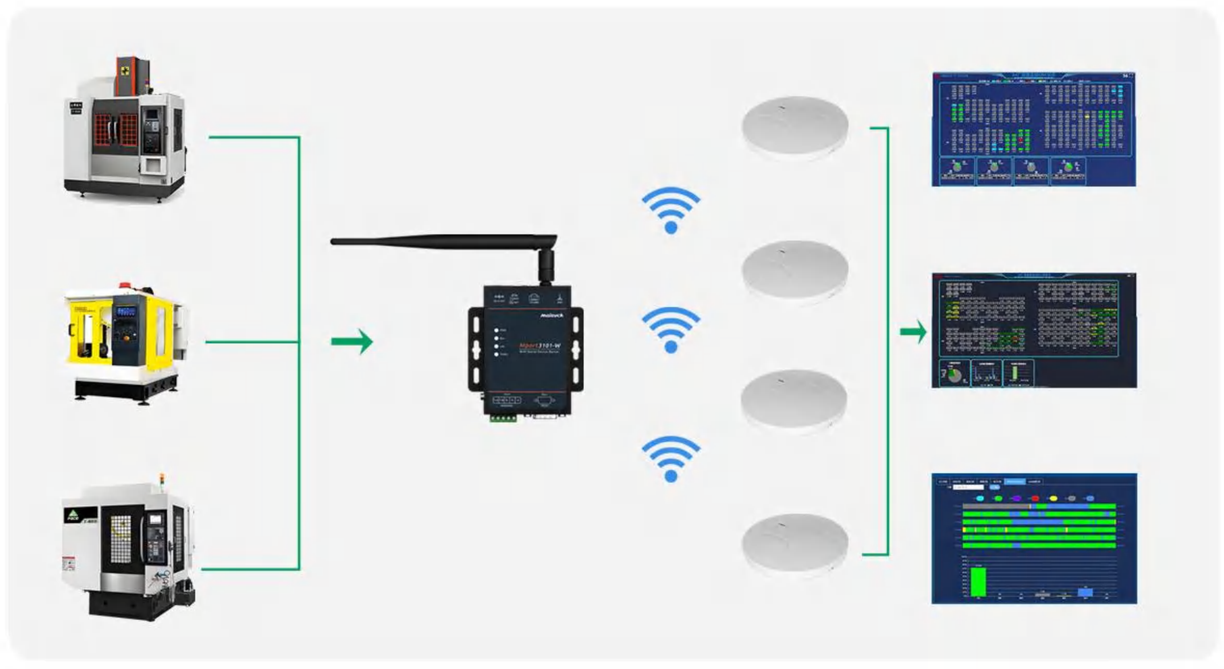
1×RS232/485/422 Serial Port, 1×100Mbps Ethernet Copper Port, Wall Mounted Wi-Fi Serial Device Server with Modbus Functions



For many manufacturers, CNC machines are the backbone of high-precision production. However, these machines often rely on older communication protocols, like Modbus RTU, which are incompatible with newer Modbus TCP systems. This lack of compatibility creates a significant barrier to integrating CNC machines with modern automation systems, which depend on real-time data transmission for optimization and control.

In addition to technical challenges, manufacturers also face physical constraints, such as space limitations on the factory floor, which complicate the installation of wired connections. The cost of replacing legacy equipment is often prohibitively high, making it difficult for companies to modernize without a major financial investment.

Maisvch's Mport3101-W wall-mounted Wi-Fi serial device server addresses these challenges by enabling seamless communication between legacy CNC machines and modern production control systems. This device allows machines that use Modbus RTU to communicate effortlessly with Modbus TCP systems via wireless connections, facilitating real-time data monitoring and enhanced automation.



Maisvch's Mport3101-W Wi-Fi serial device server provides a practical, cost-effective solution for businesses seeking to integrate legacy CNC machines into modern automation systems. By converting Modbus RTU to Modbus TCP and enabling wireless communication, this device ensures real-time data monitoring, reduces downtime, and boosts production efficiency—all without the need to replace existing machines.

With Maisvch, manufacturers can enhance their operations, streamline data flows, and embrace smart manufacturing without incurring unnecessary costs. This solution is ideal for businesses looking to modernize their CNC production lines and improve automation without a complete system overhaul.

Visit https://maisvch.com or reach out to out team at sales@maisvch.com to explore how we can empower your business.

Mining

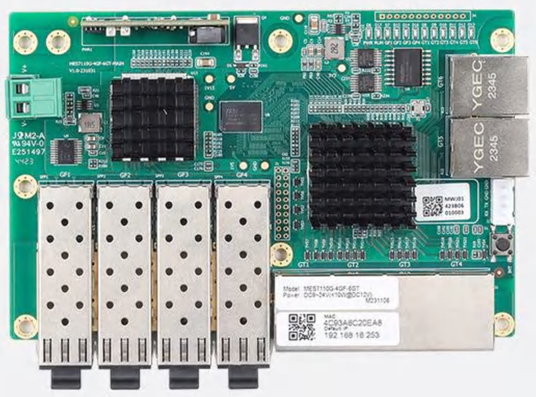
Explore rugged underground communication networks for safety monitoring, video surveillance and production systems - engineered for remote, high-interference and demanding environments.

Building a Robust Gigabit Communication Backbone for Smart Underground Coal Mining

Case Study



Related Products



MES7110G-4GF-6GT
10-Port Layer 2 Full Gigabit Managed Embedded Industrial Ethernet Switch

The Challenges

A leading large-scale coal mining group needed to upgrade its legacy infrastructure to a "Smart Mining" ecosystem. The goal was to unify production control, personnel positioning, and environmental monitoring into a single network.

Critical Pain Points:

- Extreme Environment: Constant humidity, water dripping, coal dust, and vibration from blasting.
- Severe Interference: Heavy underground machinery creates massive Electromagnetic Interference (EMI), disrupting standard signals.
- Bandwidth Bottlenecks: Legacy networks could not handle real-time HD video feeds from hundreds of safety cameras.

Solution

To build a "transparent" underground network, the mine deployed approximately 100 units of the Maisvch MES7110G-4GF-6GT. These switches were installed in explosion-proof enclosures across various substations to serve as the critical access layer.

Why Choose Maisvch:

- High EMC Immunity: Engineered to resist strong magnetic fields from transformers and motors.
- Full Gigabit Architecture: 6 Gigabit copper ports and 4 Gigabit SFP slots provided the high bandwidth necessary for latency-free video streaming.
- Industrial Resilience: Validated performance in damp, dusty, and vibrating conditions.

Result

The deployment created a stable, high-speed communication highway between the deep shaft and the surface command center.

- Unified Data: Successfully converged video, audio, and sensor data onto a single network.
- Zero-Lag Monitoring: HD video surveillance now transmits in real-time, allowing for immediate hazard response.
- Future-Ready: The Gigabit backbone provides ample headroom for future IIoT device expansion.

Ready to ruggedize your network? Contact our experts now!

Robust Connectivity for Underground Safety: Smart Surveillance in Gold & Copper Mines

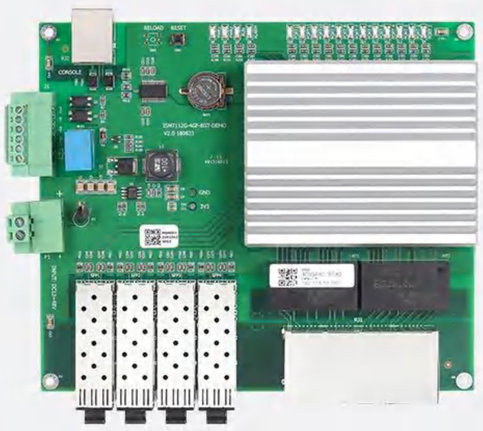
Case Study



Project Overview

The transition to automated and digital mining operations requires reliable data highways deep beneath the earth's surface. This case study focuses on two major mining sites: a large-scale Gold & Copper extraction facility and a prominent non-ferrous metal resource developer. Both sites operate complex underground tunnel systems where visibility is limited, and environmental hazards are high. To comply with modern safety regulations and improve operational efficiency, the operators initiated a project to deploy a comprehensive Underground Video Surveillance and Sensor System. The goal was to visualize production processes remotely and monitor environmental data (such as gas levels and temperature) in real-time.

Related Products



MES7112G-4GF-8GT

12-Port Layer 2 Managed Industrial Embedded Switch

The Challenges

Deploying a network infrastructure in an active mine shaft presents difficulties that standard IT equipment cannot overcome. The project faced two primary hurdles:

Mission-Critical Network Reliability:

The safety of underground workers depends on the "eyes" of the control room. The network needed to connect hundreds of explosion-proof HD cameras and environmental sensors to the surface.

- Requirement: The system required 7x24 continuous stability. Any packet loss or network downtime could result in a "blind" control room, creating unacceptable safety risks.
- Bandwidth: High-definition video streams require significant bandwidth, necessitating a high-throughput Gigabit network backbone.

Extreme Environmental Adaptation:

Underground mining environments are among the harshest on Earth for electronic equipment.

- Hazardous Atmosphere: The equipment had to meet strict Intrinsically Safe standards to operate safely in the presence of combustible gases and dust.
- Physical Stress: The devices needed to withstand constant high humidity, heavy dust accumulation, and corrosive elements typical of mineral extraction.
- Temperature Range: Equipment was required to function flawlessly across a wide temperature span (-40℃ to 75℃) without air conditioning.

Solution

Maisvch provided a tailored Industrial Communication Solution designed specifically for the unique constraints of underground mining.

To ensure seamless integration with the client's existing explosion-proof infrastructure, Maisvch deployed the MES7112G-4GF-8GT, an embedded industrial Ethernet switch.

- Stable Access Layer: Over 200 units were installed in underground substations, serving as the aggregation point for cameras and sensors.
- Gigabit Performance: The switches feature Full Gigabit ports, providing ample headroom for multiple concurrent HD video streams, ensuring smooth, lag-free footage at the surface control center.
- Redundant Architecture: The solution utilized a fiber optic ring topology. In the event of a cable failure due to rockfall or accident, the network automatically reroutes data in milliseconds, preserving the link to the control room.

Result

As the mining industry accelerates toward "Smart Mine" standards, ensuring the safety of personnel and equipment in deep underground shafts is paramount. Leading state-owned gold and copper mining conglomerates faced the challenge of digitizing their extraction sites. They required a communication backbone capable of withstanding explosive, humid, and dusty environments while transmitting high-definition video data without interruption. Maisvch delivered a ruggedized networking solution utilizing over 200 industrial ethernet switches, establishing a resilient 24/7 safety monitoring system.

Built for the Underground:

The MES7112G-4GF-8GT is engineered with industrial-grade components and a fanless design. It excels in environments with high vibration, dust, and moisture, significantly reducing maintenance costs compared to commercial-grade alternatives.

Safety Compliance:

Recognizing the explosive risks in mining, the equipment features low power consumption and high electromagnetic interference (EMI) immunity, meeting the rigorous requirements for underground safety certification.

Compact Integration:

The embedded form factor of the MES7112G-4GF-8GT allowed the client to integrate the networking hardware directly into their custom explosion-proof enclosures, saving valuable space in the cramped underground substations.

Enhancing Mine Safety And Operations with A Robust Underground Industrial Network

Case Study



Key Results & Impact

Enhanced Personnel Safety:
The central control room gained stable, real-time video and sensor data, enabling proactive incident prevention and faster emergency response.

Maximized Operational Uptime:
The self-healing ring network eliminated data loss and network downtime, ensuring continuous monitoring and smoother production cycles.

Proven Industrial Durability:
The MES7112G switches have performed flawlessly in the extreme environment, demonstrating their superior build quality and long-term reliability.

Future-Proof Foundation:
The high-bandwidth Gigabit network provides ample capacity for the client to expand their smart mining initiatives with more IoT devices in the future.

Featured Products

MES7112G-4GF-8GT
4×Gigabit SFP Ports, 8×Gigabit Copper Ports Industrial Embedded Switch



Project Overview

A major multi-site mining corporation required an ultra-reliable communication network for its critical underground safety and monitoring systems. The solution had to provide 24/7 connectivity for video and sensor data in one of the world's most hazardous industrial environments.

The Challenge

Connectivity deep underground is a mission-critical challenge. The client needed an "always-on" network to connect hundreds of explosion-proof cameras and environmental sensors. The network hardware faced two primary obstacles:

- Extreme Environmental Stress:

The equipment had to be intrinsically safe to prevent ignition in potentially explosive atmospheres while withstanding constant humidity, corrosive dust, and a temperature range of -40°C to +75°C.

- Absolute Reliability:

Any network interruption would create a critical safety and operational blackout. The system demanded 100% uptime with no single point of failure.

Solution

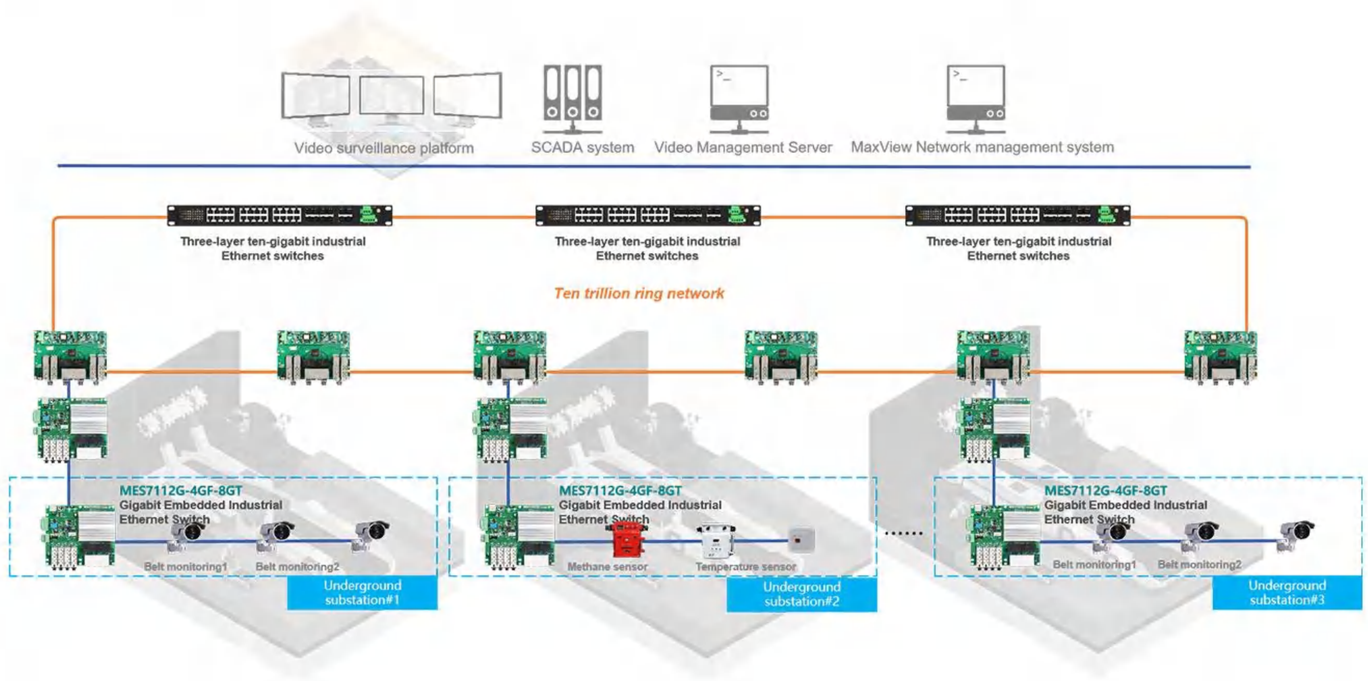
Maisvch engineered a robust and redundant networking backbone to meet these stringent demands. The core of the solution involved:

- Strategic Deployment:

Over 200 MES7112G Intrinsically Safe Switches were installed at key underground substations, providing rugged and reliable aggregation points for all endpoint devices.

- Resilient Architecture:

The switches were connected in a fiber optic ring topology. This self-healing architecture guarantees that data transmission continues uninterrupted, automatically rerouting traffic in milliseconds if a cable or device fails.



The implementation of the Maisvch solution delivered transformative results, directly enhancing both safety and productivity.

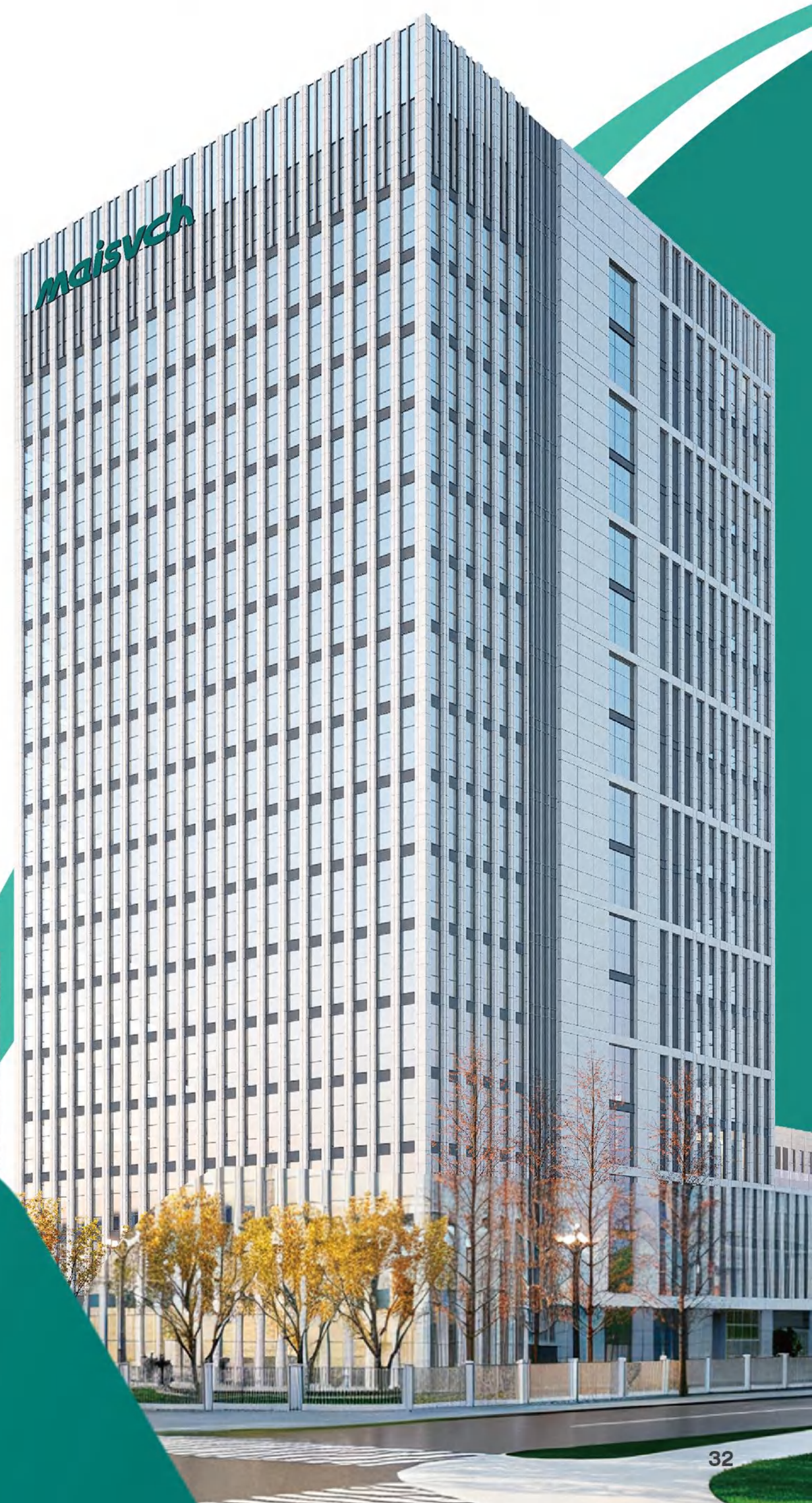
Your Trusted Partner in Industrial Connectivity, Since 2001

Maisvch is a developer and manufacturer of industrial communication products and networking solutions, backed by 25 years of industry experience. Our portfolio spans industrial Ethernet and PoE switches, serial communication devices, IIoT and edge computing gateways, industrial wireless products, cellular routers, etc.

Across energy, transportation, manufacturing, mining and other demanding applications, we help system integrators, OEMs and industrial operators build communication networks that are reliable, manageable and ready to scale.

Planning Your Next Industrial Network?

Tell us about your connected devices, operating environment and project requirements. Our team can support architecture selection, product matching and deployment planning.



Discuss your project with our team

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