

How to use industrial switches in a company



Overview

An industrial Ethernet switch is a type of network switch designed to operate in harsh industrial environments.

Key Takeaways

Industrial switches are essential for connecting devices, ensuring reliable data flow, and maintaining robust communication in harsh industrial environments. Understanding Industrial Switches

Industrial switches differ from commercial switches in durability, environmental tolerance, and functionality. They are designed to withstand extreme temperatures, vibration, dust, moisture, and electromagnetic interference while providing stable, low-latency communication between devices like PLCs, sensors, cameras, and HMIs . They come in various types:

- Layer 2 Switches: Forward data based on MAC addresses, ideal for connecting devices within the same LAN. Low latency makes them suitable for real-time control .
- Layer 3 Switches: Include routing capabilities for multi-subnet networks, supporting VLANs and QoS policies, suitable for large industrial networks .



- Layer 4 Switches: Manage traffic based on transport layer ports (TCP/UDP), useful for fine-grained traffic control in complex automation systems .

Planning and Deployment

- Assess Network Requirements: Determine bandwidth, latency, scalability, and future expansion needs to avoid costly upgrades .
- Select the Right Switch: Choose managed switches for granular control (VLANs, QoS, remote monitoring) or unmanaged switches for simpler plug-and-play setups .
- Redundancy and Reliability: Implement Spanning Tree Protocol (STP) or ring protocols to prevent downtime. Dual power supplies and media redundancy enhance uptime .
- Environmental Considerations: Ensure switches meet appropriate IP ratings (e.g., IP67) and can operate within the facility's temperature range (-40°C to 75°C) .

Installation Best Practices

- Secure Mounting: Use DIN rails or shock-resistant brackets to prevent disconnections or damage from vibrations .
- Cable Management: Use shielded, industrial-grade Ethernet cables (Cat6/Cat6a) and route them away from power lines or moving machinery to reduce interference and wear .
- Power over Ethernet (PoE): Simplifies device placement by delivering power and data over the same cable, reducing installation complexity .
- Long-Distance Connectivity: Fiber-optic-enabled switches extend network reach to several miles, ideal for large or distributed facilities .

Configuration and Management

- VLANs and QoS: Segment networks and prioritize critical traffic to maintain deterministic performance in automation systems .
- Industrial Protocol Support: Ensure switches support protocols like EtherNet/IP and Modbus TCP for compatibility with industrial devices .
- Monitoring and Diagnostics: Managed switches allow remote configuration, real-time monitoring, and troubleshooting without physical access to the floor .
- Cybersecurity: Implement role-based access control, network segmentation, and other security features to protect sensitive industrial networks .

Maintenance and Optimization

- Regularly inspect connections, clean dust or debris, and verify firmware updates.
- Monitor network performance to detect bottlenecks or failures early.
- Plan for future expansion by leaving spare ports and considering modular switch designs . By following these guidelines, companies can maximize uptime, ensure reliable communication, and future-proof their industrial networks while maintaining safety and operational efficiency.

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