

Article Overview

Industrial switches and routers must be carefully selected, configured, and integrated to ensure reliable, secure, and scalable IIoT network performance.

Selection and Deployment

Industrial Switches: Choose switches based on network topology, number of devices, and data traffic requirements. Options include:

- o Unmanaged switches for simple plug-and-play setups.
 - o Managed switches for advanced monitoring, SNMP support, and performance optimization.
 - o Industrial-grade switches designed for harsh environments with high reliability and stability. Hierarchical deployment with access, aggregation, and core layers enhances scalability, while redundancy through dual switches or stacking improves fault tolerance .
- Industrial Routers:** Select routers according to network environment and connectivity needs:
- o Wired routers for stable fixed connections.
 - o Wireless routers for mobile access, considering coverage and security.
 - o Industrial-grade routers with anti-interference capabilities and multiple WAN interfaces (ADSL, fiber, 4G/5G). Support for VPNs, static and dynamic routing protocols (RIP, OSPF), and proper IP address planning is essential for secure and efficient data transmission .

Connection and Configuration

Physical Connection: Use Ethernet cables (twisted-pair with RJ-45) or optical fibers depending on device interfaces and network environment .

IP Addressing: Assign IP addresses to ensure devices are in the same network segment or can communicate across subnets. Switch management IPs are typically on the LAN side, while router WAN IPs are provided by the ISP or configured manually .

Routing Configuration: Configure static or dynamic routing on routers to define data paths. In multi-router networks, use OSPF or RIP for interconnection .

VLANs: Optional VLAN configuration on switches allows traffic segmentation for different business areas, with inter-VLAN routing handled by routers .

Security Policies: Implement firewalls, access control lists (ACLs), and filtering rules to protect network segments and prevent unauthorized access .

Verification and Monitoring

After configuration, test connectivity using ping or network diagnostic tools. Evaluate latency, packet loss, and bandwidth utilization. Continuous monitoring with performance metrics and automated alerts helps detect anomalies and optimize network performance .

Best Practices

- o Hierarchical Network Design: Deploy switches at access and aggregation layers, routers at core or edge layers to simplify management and improve scalability .
- o Redundancy: Use dual switches, stacking, or redundant routing paths to enhance reliability.
- o Documentation: Maintain detailed records of network topology, IP schemes, routing protocols, and configuration changes for troubleshooting and future upgrades .
- o Integration with Analytics: Leverage network monitoring and analytics platforms to optimize traffic flow and proactively address potential issues . By following these guidelines, industrial networks can achieve high reliability, secure data transmission, and efficient management, supporting the demands of modern IIoT environments.

In industrial automation this is configured as an option for redundant star configurations when connecting between an access switch

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In order to enable communication between all participants "IP routing" is used. The available paths (routes) can be

The Routing section will teach you the fundamentals and knowledge required for planning, configuring, and operating network

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