

Ring network industrial switches are categorized into

Article Overview

Ring network industrial switches are categorized based on redundancy protocols, network layers, and deployment roles in industrial Ethernet networks.

1. Based on Redundancy Protocols

Industrial switches in ring networks are often classified by the redundancy protocols they support, which determine how the network handles link failures:

- o Ethernet Ring Protection (ERP): Provides fast recovery in ring topologies, ensuring minimal downtime by rerouting traffic around failed links .
- o Rapid Spanning Tree Protocol (RSTP): An IEEE standard that quickly recalculates paths to maintain network connectivity .
- o Multiple Spanning Tree Protocol (MSTP): Extends RSTP for multiple VLANs, offering flexible and faster convergence in complex industrial networks .
- o Vendor-specific protocols: Some manufacturers implement proprietary protocols like Moxa's Turbo Ring or Hirschmann's HRP for enhanced recovery times and interoperability .

2. Based on Network Layer

Industrial switches can also be categorized by the OSI layer they operate on:

- o Layer 2 (Access) Switches: Connect end devices and provide basic switching functions within the ring. They often support redundancy protocols like RSTP or ERP .
- o Layer 3 (Distribution/Core) Switches: Aggregate multiple access switches, provide routing capabilities, and manage larger network segments. These switches are typically used in backbone or hierarchical ring networks .

3. Based on Deployment Roles

Switches are further categorized by their deployment role in the ring network:

- o Core/Backbone Switches: Form the main ring loop, handling high traffic volumes and ensuring network resilience .
- o Distribution Switches: Connect multiple access switches to the core ring, often providing Layer 3 services and redundancy management .
- o Access Switches: Interface directly with industrial devices, sensors, and controllers, often designed for harsh

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environments with features like IP67 ratings, redundant power, and PoE support .

4. Based on Form Factor and Environmental Resilience

Industrial switches are also categorized by physical design and environmental tolerance:

- o Compact/Space-Constrained Switches: Suitable for machine-level integration or tight enclosures, often IP67-rated .
- o Modular Switches: Allow expansion with additional ports or modules to accommodate network growth .
- o Ruggedized Switches: Built to withstand extreme temperatures, dust, vibration, and other industrial conditions .

Summary

Ring network industrial switches are categorized primarily by redundancy protocol support (ERP, RSTP, MSTP, proprietary), network layer (Layer 2 vs Layer 3), deployment role (core, distribution, access), and physical/environmental characteristics (compact, modular, ruggedized). Understanding these categories helps in designing resilient, scalable, and high-performance industrial Ethernet ring networks suitable for IIoT and automation applications .

ERPS is one of the most widely used redundant ring protocols. This guide explains ERPS concepts, operating

This solution builds a basic two-layer ring network architecture designed to decrease complexity, enhance security, and increase

Administration and diagnostics, availability, security, data transfer and performance: An overview of all functions of the industrial

Industrial Ethernet switches are critical components in network infrastructures, often used in harsh environments and mission-critical

In fact, select manufacturers claim much better recovery times for their proprietary ring networks sometimes to

Built for diverse industrial applications, these switches feature all-gigabit, high-density, all-copper or mixed copper and fiber ports,

Common ring network topology structures include single ring, multiple rings, etc. The single-ring structure is

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relatively

Learn how to design a fiber optic ring network with practical diagrams, topologies, and switch setup tips.
Explore ring

Reliability: Industrial switches are built to ensure uninterrupted network connectivity,

Industrial Ethernet switches are designed to take into account the complex conditions of the industrial site, so that they can be more

Next, we introduce "redundant ring" technology, and point out the advantages that redundant rings have over traditional systems. In

For a ring network topology it is required to use Spanning Tree Protocol (STP) to avoid network loops. This protocol is only present in

In industrial Ethernet infrastructures, there are various types of ring redundancy protocols. This article focuses on the

N-Ring requires an N-Tron managed switch (700, 7000, NT5000, and NT24k) to be configured as a Ring Manager and

Device Level Ring (DLR) is a Layer 2 protocol that enables redundancy in a ring topology, providing fast network fault

Compare star vs ring topology for Allen-Bradley EtherNet/IP networks using Stratix switches, 1783-ETAPS, and Point

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