Single-fiber serial switch

Article Overview

A single-fiber serial switch converts RS-232, RS-422, or RS-485 signals to optical signals for bi-directional transmission over a single fiber, enabling long-distance, EMI-immune communication.

Overview

A single-fiber serial switch is a media converter that allows serial devices to communicate over a single optical fiber. It converts electrical serial signals into optical signals, which can then travel long distances without degradation or interference. These devices typically support RS-232, RS-422, and RS-485 protocols and are widely used in industrial automation, traffic control, power systems, and distributed data acquisition systems (Thor Broadcast, DYMEC, Moxa) .

Key Features

o Bi-Directional Transmission: Single-fiber switches use WDM (Wavelength Division Multiplexing) technology to allow simultaneous two-way communication over one fiber .
o Long-Distance Capability: Depending on the model, transmission distances can reach up to 120 km over single-mode fiber .
o Automatic Baud Rate Detection: Devices automatically detect and adjust to the baud rate of connected serial devices, ranging from 300 bps to 115.2 Kbps, without service interruption .
o EMI Immunity: Fiber optic transmission is immune to electromagnetic interference, voltage equalization currents, and lightning surges, ensuring reliable data transfer in industrial environments .
o Mounting Options: Many units support DIN rail, wall, or chassis mounting for flexible installation .
o Industrial Protection: Ruggedized units provide opto-isolation, surge protection, and temperature-hardened operation for harsh environments .

Applications

Single-fiber serial switches are ideal for:

o Industrial Control Systems: Connecting PLCs, sensors, and actuators over long distances.
o Power Utilities: Remote monitoring and control of substations and switchgear.
o Traffic and Transportation: Communication between traffic controllers, signals, and monitoring systems.
o Distributed Data Acquisition: Secure and reliable data transmission in factories, warehouses, and automation networks .

Example Products

o Thor Broadcast Multi-Serial Converters: Support RS-232/RS-485 over single-mode fiber with simplex or bi-directional operation up to 120 km .
o DYMEC Serial Links (DY-5878S): Industrial-grade converters with opto-isolation, surge protection, and support for 1x, 4x, or 8x serial links over a single fiber .
o Moxa Serial-to-Fiber Converters: Provide reliable RS-232/422/485 to fiber conversion for industrial applications .

Summary

A single-fiber serial switch is a robust solution for extending serial communication over long distances while protecting against electromagnetic interference. It is particularly suited for industrial, utility, and transportation applications where reliability, distance, and secure data transmission are critical. These devices simplify network design, improve system availability, and allow flexible deployment in challenging environments.

The DYMEC Serial Link Series supports RS-232, RS-422 & RS-485 Serial communications over Fiber

An optical fiber switch represents the single most dynamic element in an optical network which traditionally can switch data between

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Single-Mode Fiber-Optic Transceiver/Modem Improve safety, signal integrity, and reliability by using two optical fibers instead of wire

L-com"s Singlemode fiber A/B Network Switches are physical layer hardware solutions which support a variety of switching, or

The ICF-1150 serial-to-fiber converters transfer RS-232/RS-422/RS-485 signals to optical fiber ports to enhance transmission

Moxa"s industrial-grade serial-to-fiber optic converters can convert RS-232/422/485 to optical fiber, which

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Single-fiber serial switch

Learn what a single mode SFP transceiver is, how it works, key specs, common types, and real-world use cases for long-distance

The unidirectional single-fiber communication function can address this issue. A single fiber means that two optical modules are

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Lfiber"s optical switches (singlemode/multimode fiber switches) are micro-optic-based, opto-mechanical switches. These fiber

In fiber-optic communication, a single-mode optical fiber, also known as fundamental- or mono-mode, is an optical fiber designed

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