Maximum bandwidth optical module of the switch



Overview

Discover what an all-optical Ethernet switch is, how it works, and the key benefits it brings to modern networks, from higher bandwidth to lower latency.

Key Takeaways

The highest-bandwidth optical modules currently available for switches are 1. 6T and 3. 2T pluggable modules, with 400G and 800G modules widely deployed today.

Current High-

Speed Optical Modules

Modern switches support a range of pluggable optical modules standardized under Multi-Source Agreements (MSAs), including SFP, SFP+, SFP28, QSFP, QSFP-DD, and OSFP. The highest commercially deployed modules today include: 400G QSFP-DD and OSFP modules: These use 8 lanes of 50G PAM4 or 4 lanes of 100G PAM4, supporting short-reach (SR), long-reach (LR), and data center interconnect (ZR/ZR+) applications. They are widely used in hyperscale data centers and enterprise networks.

800G modules: Emerging in high-performance data centers, these modules typically use 8 lanes of 100G PAM4 or 16 lanes of 50G PAM4, requiring advanced switch ASICs and double-density form factors like QSFP-DD or OSFP. 1. 6T and 3.

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2T modules: Currently in development and early testing, these modules aim to scale switch bandwidth further, leveraging multi-lane PAM4 signaling and next-generation optical technologies. Form Factors and CompatibilityQSFP-DD (Quad Small Form-factor Pluggable Double Density): Supports 400G and 800G, backward compatible with QSFP+ and QSFP28, and allows high port density in switches.

OSF

P (Octal Small Form-factor Pluggable): Designed for 400G and 800G, with integral heat sinks for high-density deployments. SFP28: Supports 25G per lane, commonly used for server-to-switch connectivity, leaf-spine architectures, and HPC environments.

Practical Deployment Considerations

Switch compatibility: Ensure the switch ASIC supports the module's line rate and PAM4 signaling. For example, Cisco Nexus 9400 series switches can scale up to 25. 6 Tbps using 400G expansion modules.

Distance and reach: Modules like 400ZR and ZR+ support coherent optical links up to 120 km, while short-reach modules are optimized for intra-data-center connections. Power and cooling: Higher-bandwidth modules (800G+) require careful thermal management, often with heat sinks integrated into the module or cage.

Summary

Currently, 400G QSFP-DD and OSFP modules are widely deployed, 800G modules are emerging for high-performance data centers, and 1. 6T–3. 2T modules are in development for next-generation switch fabrics.

The choice of module depends on switch compatibility, link distance, and data center architecture, with QSFP-DD and OSFP being the primary form factors for ultra-high bandwidth deployments.

Article Content

All-Optical Ethernet Switch Explained: Features and Benefits

Discover what an all-optical Ethernet switch is, how it works, and the key benefits it brings to modern networks, from higher bandwidth to lower latency.

Charting the Path Toward 1.6T and 3.2T Optical Module Solutions

By integrating optics more closely with the ASIC, the length of electrical traces between the switch silicon and the optical I/O can be minimized, because the signals no longer need to be routed to a

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SFP Optical Module Specifications: Standards & Performance

From electrical and optical parameters to environmental limits and diagnostic capabilities, we explain what each specification means in practice, how it affects real-world performance, and the

Fiber SFPs Explained: Types, Speeds, and Buying Guide

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Co-packaged optics is the biggest change to switch design in a decade, and in 2026 it crossed from demo to shipping product. This guide explains what CPO is, the switches available

800G Client Optics in the Data Center

A new generation of double-density optical module form factors, QSFP-DD and OSFP, were developed to support the eight-lane switch interface. These form factors will also support DAC or active

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400 Gigabit Ethernet (400G) transceivers are optical modules capable of handling data rates of 400 Gbps. With a transmission rate of up to 400 Gbps, 400G transceivers offer double the capacity of

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Use this guide to learn about the Juniper Networks® 800G optical transceivers and cables, their specifications, and how to install, remove, and maintain these transceivers. 800 Gigabit

Cisco Compatible Optical Modules Catalog

The catalog is structured around a modular transceiver architecture, adhering sur electrical compatibility with a wide range of Cisco switches and routers. The reach, and optical interface type precise

Cisco 10GBASE SFP+ Modules Data Sheet

The Cisco® 10GBASE SFP+ modules (Figure 1) give you a wide variety of 10 Gigabit Ethernet connectivity options for data center, enterprise

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How To View Optical Transceiver Information On Huawei Switches

Optical transceivers are widely applied in switches, network cards, routers and other communication devices. Checking transceiver parameters allows users to monitor real-time

Broadcom CPO: Highest Power Efficiency and Bandwidth Density

Co-Packaged Optics (CPO) is an advanced integration of optics and silicon on a single packaged substrate addressing interconnect bandwidth and power challenges.

Cisco C9610 Series Smart Switches Data Sheet

Overview Introducing Cisco C9610 Series Smart Switches—the next-generation hardware designed to redefine campus switching with high port density and exceptional bandwidth capabilities.

Compute Optics Interface (COI): Energy Efficient Photonic

The “Compute Optics Interface” (COI) addresses the need for efficient optical connectivity between local AI compute elements, particularly over longer distances where optics provide clear energy advantages.

300m SFP+ Optical Module

This is a standard SFP+ optical module. It uses two multi-mode optical fibers and the speed rate can up to 10Gbps, transmission distance up to 300m. This product need to use in pair and match up with

OLT Board Procurement FAQ: GPON SFP Modules, Compatibility

Q8: What optical split ratio does a GPON SFP module and OLT board support? A single GPON port on an OLT board supports a maximum split ratio of 1:128 in theory, but practical deployments often cap

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