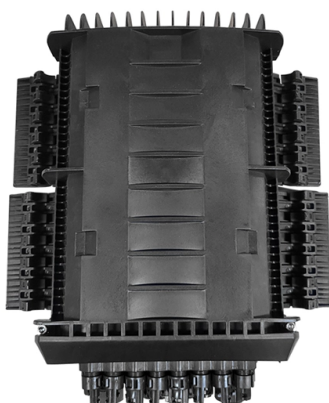


Optical modules in telecommunications data centers



Overview

Optical Communication Industry Trends 2026: AI, 800G/1.6T Optical. Explore optical communication industry trends in 2026, driven by AI infrastructure, 80.

Key Takeaways

Common optical modules in data centers include SFP, SFP+, SFP28, QSFP, QSFP28, QSFP-DD, OSFP, and CFP, supporting speeds from 1 Gbps to 400 Gbps and beyond. Overview

Optical modules, also known as optical transceivers, are essential for converting electrical signals into optical signals and vice versa, enabling high-speed data transmission over fiber optic cables in data centers and telecom networks. They are used in switches, routers, servers, and aggregation layers to support low-latency, high-bandwidth communication critical for cloud services, AI workloads, and 5G networks.

Common Types and Form Factors

- SFP (Small Form-factor Pluggable): Supports speeds up to 1 Gbps, typically used in enterprise networks and short-distance telecom links.
- SFP+: Enhanced SFP supporting 10 Gbps, widely deployed in data centers for high-speed server and switch connections.
- SFP28: Supports 25 Gbps, commonly used in modern data centers for top-of-rack (TOR) and aggregation layers.

- QSFP (Quad Small Form-factor Pluggable): Handles 40 Gbps, suitable for backbone and high-performance computing environments .
 - QSFP28: Supports 100 Gbps, often used in core aggregation and spine-leaf architectures .
 - QSFP-DD (Double Density): Supports 200 Gbps and 400 Gbps, designed for hyperscale data centers requiring ultra-high bandwidth .
 - OSFP (Octal Small Form-factor Pluggable): 400 Gbps modules optimized for next-generation AI and cloud networks .
 - CFP (C Form-factor Pluggable): Supports 100 Gbps and higher, suitable for long-haul and metro networks .
- Transmission Reach and Fiber Types

Optical modules are also categorized by reach and fiber type:

- Short-reach (SR): Multi-mode fiber, typically for intra-data center connections.
 - Long-reach (LR): Single-mode fiber, suitable for inter-data center or metro links.
 - CWDM/DWDM modules: Enable multiple signals over a single fiber using wavelength division multiplexing, ideal for high-capacity and long-distance networks .
- Emerging Trends

Modern data centers are increasingly adopting 400G modules as a baseline, with 800G and 1.6T modules under development for AI-driven workloads . Advanced technologies like Co-Packaged Optics (CPO), Optical I/O (OIO), and silicon photonics are being explored to reduce power consumption and improve bandwidth density .

Summary

In telecommunications data centers, SFP, SFP+, SFP28, QSFP, QSFP28, QSFP-DD, OSFP, and CFP modules are the most commonly used optical modules. Selection depends on required data rate, reach, fiber type, and network architecture, with emerging high-speed modules enabling future-proof, scalable, and energy-efficient network designs .

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