

100G Optical Module Structure



Article Overview

100G optical modules achieve 100 Gbps throughput using multi-lane architectures, advanced modulation, and wavelength multiplexing within compact form factors like QSFP28.

Core Architecture

100G optical modules typically use a lane-based design, where multiple parallel channels aggregate to reach 100 Gbps. The most common configuration is 4×25 Gbps lanes, as seen in QSFP28 modules, where each lane transmits 25 Gbps, combining to a total of 100 Gbps. Some newer modules, like SFP56-DD or SFP112, use 2×50 Gbps lanes to achieve the same aggregate rate. Modules employ hot-pluggable form factors such as QSFP28, CFP, CFP2, and SFP-DD, which define the physical dimensions, electrical interfaces, and connector types. QSFP28 is widely used in data centers due to its high port density, low power consumption, and compact size.

Modulation and Transmission Techniques

100G modules use modulation schemes to encode data efficiently:

- NRZ (Non-Return to Zero): Traditional binary signaling, used in early 100G modules.
- PAM4 (Pulse Amplitude Modulation 4-level): Doubles the data rate per lane by encoding two bits per symbol, reducing the number of required lanes and fibers.
- Coherent modulation: Used in long-haul or high-capacity links for improved signal integrity. Modules can transmit data using parallel optics (multiple fibers, one per la...

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Understand 100G optical transceiver form factors like QSFP28, CFP, CFP2, CFP4 and CXP. Learn how they

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