

# 400G and 800G Optical Network Trends - Official Technical Overview & Hardware Datasheet

## EXECUTIVE SUMMARY

The global telecommunications landscape is undergoing its most significant capacity transformation since the advent of fiber optics. Driven by the exponential growth of hyperscale data centers, 5G backhaul requirements, and the proliferation of AI/ML workloads, the industry is rapidly transitioning from 100G and 400G to 800G optical network architectures. This document serves as the definitive technical overview and hardware datasheet for our next-generation optical networking platform, engineered to meet the rigorous demands of carrier-grade and hyperscale environments. Our solution redefines density, power efficiency, and operational simplicity, providing a seamless migration path to 800G while maximizing return on existing fiber infrastructure.



## ARCHITECTURE & CHASSIS DESIGN

The platform is built upon a highly modular, future-proof architectural framework. The system features a compact 2RU chassis design that supports up to 32 QSFP-DD or OSFP ports, capable of operating at 400G or 800G per port. The core of the architecture is a fully non-blocking, cell-based switching fabric with a total backplane capacity of 25.6 Tbps, ensuring wire-speed performance across all active interfaces without packet loss or head-of-line blocking. The hardware leverages a cut-through forwarding engine with less than 500 nanoseconds of port-to-port latency, making it ideal for high-frequency trading, financial services, and high-performance computing (HPC) interconnects. Redundancy is embedded at every level, from the 1+1 hot-swappable power supplies and N+1 fan trays to the fully redundant route processor modules (RPMs) that enable stateful switchover (SSO) and non-stop routing (NSR) for

maintenance-free operations.

## HARDWARE FEATURES

The physical layer is optimized for high-density, long-reach optical transmission. The system supports a comprehensive range of coherent and non-coherent optics, including 400ZR, 400ZR+, and 800ZR pluggables, enabling DCI (Data Center Interconnect) and metro-regional networks to achieve distances up to 80 km without external amplification and up to several hundred kilometers with integrated optical amplifiers. Key hardware innovations include: a dynamic power management system that intelligently adjusts per-port power consumption based on link utilization and temperature, reducing overall power-per-bit by up to 30% compared to previous generation solutions; front-to-back airflow cooling for optimized thermal performance in high-density data center rows; and a field-replaceable line card architecture that allows for graceful upgrades without chassis replacement. The system also integrates advanced timing and synchronization capabilities, including SyncE and IEEE 1588v2 (PTP), essential for 5G mobile backhaul and fronthaul networks.

## COMPLIANCE & STANDARDS

This platform is designed to meet the most stringent industry standards and environmental regulations. It fully complies with IEEE 802.3bs (400G Ethernet) and IEEE 802.3df (800G Ethernet) drafts, as well as the Optical Internetworking Forum (OIF) standards for 400ZR and 800ZR common electrical interfaces (CEI). The hardware is certified to operate in telecom central offices and data center environments, adhering to NEBS (Network Equipment Building System) Level 3 and ETSI 300 019 standards for temperature, humidity, and shock resistance. For security, the system features a hardware root of trust (RoT), secure boot, and advanced encryption standard (AES-256) for both data-in-motion and data-at-rest, ensuring compliance with NIST SP 800-193 and DODIN APL requirements.



## TECHNICAL SPECIFICATIONS

The table below provides a comprehensive summary of the platform's core operational parameters, environmental tolerances, and physical characteristics. All values represent nominal operating conditions unless otherwise noted.

| Parameter               | Specification                                        |
|-------------------------|------------------------------------------------------|
| Form Factor             | 2RU (EIA-310 Standard) Chassis                       |
| Switching Capacity      | 25.6 Tbps (Full-Duplex)                              |
| Port Density            | Up to 32x QSFP-DD/OSFP (400G/800G per port)          |
| Forwarding Latency      | < 500 ns (Cut-Through)                               |
| Power Supply            | 1+1 Redundant, Hot-Swappable (AC or DC)              |
| Power Consumption (Max) | Under 1200W (fully populated)                        |
| Cooling                 | Front-to-Back Airflow, N+1 Redundant Fans            |
| Operating Temperature   | 5°C to 45°C                                          |
| Storage Temperature     | -40°C to 70°C                                        |
| Relative Humidity       | 5% to 95% (Non-condensing)                           |
| Packet Buffer Size      | 32 MB (Shared)                                       |
| Supported Optics        | 400G SR8/DR4/FR4/LR4, 400ZR/ZR+, 800G SR8/DR8, 800ZR |
| MACsec                  | IEEE 802.1AE (Line-Rate)                             |

|                                   |                                         |
|-----------------------------------|-----------------------------------------|
| Network Management                | CLI, SNMPv3, NETCONF/YANG, RESTful APIs |
| Mean Time Between Failures (MTBF) | > 300,000 Hours (at 25°C)               |

## ORDERING OPTIONS

The platform offers a flexible ordering strategy to allow for granular capacity scaling and cost optimization. The base chassis (SKU: 800G-CH-2RU) includes the backplane, redundant power supply bays (pluggable power supply units ordered separately), and a fabric module. Line cards are available in two primary variants: a 16-port 400G/800G line card optimized for copper and SR optics (LC-16-400/800-SR) and a 16-port 400G/800G line card intended for long-haul and coherent optics (LC-16-400/800-LR). Transceivers, including 400G SR8, 400G DR4, 800G SR8, and coherent optical subassemblies, are ordered as separate SKUs to ensure compatibility and proper inventory management. Enhanced service licenses are available for advanced telemetry, performance monitoring, and MACsec encryption. A field-upgrade kit is also available to transition the system from 400G to 800G operation, providing investment protection for early adopters.