Coherent Optical Transmission Technology Overview - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

Coherent optical transmission represents a paradigm shift in high-capacity transport networking, enabling the transmission of 100G, 400G, and beyond over existing fiber infrastructure through the advanced manipulation of amplitude, phase, and polarization states of light. This document provides a comprehensive technical overview and hardware datasheet for our next-generation coherent optical transmission platform. The system is engineered to address the relentless capacity demands of hyperscale data centers, metro core networks, and long-haul submarine links, delivering unparalleled spectral efficiency, reach, and programmability. Leveraging advanced digital signal processing (DSP) and silicon photonics integration, this platform reduces total cost of ownership (TCO) while ensuring seamless evolution towards 1.2T and 1.6T transmission rates.

ARCHITECTURE & CHASSIS DESIGN

The platform is built upon a high-density, modular 2RU chassis architecture, purpose-built for both greenfield deployments and brownfield upgrades. The mechanical design prioritizes thermal efficiency and front-access connectivity, supporting both AC and DC power input configurations. The chassis backplane incorporates a high-speed fabric capable of non-blocking data plane connectivity, ensuring wire-speed performance across all installed line cards and transceiver modules. The modular design allows for independent upgrading of optical engines and DSP modules, protecting capital investment and extending platform lifecycle.

HARDWARE FEATURES

1. DIGITAL SIGNAL PROCESSOR (DSP): At the heart of the platform is a 7nm DSP ASIC supporting up to 1.2Tbps of aggregate throughput. It integrates advanced forward error correction (FEC) with probabilistic constellation shaping (PCS) to maximize reach and capacity over diverse fiber types.

2. OPTICAL TRANSCEIVERS: The system supports pluggable QSFP-DD and OSFP form-factor modules, including 400ZR, 400ZR+, and proprietary extended-reach variants. These modules are compliant with OIF 400ZR and IEEE 802.3 standards.

3. COHERENT OPTICS: Implements intradyne detection with a local oscillator laser, enabling the extraction and reconstruction of amplitude and phase information from the incoming signal, resulting in a significant gain in receiver sensitivity and tolerance to chromatic and polarization mode dispersion (PMD).

4. MANAGEMENT & CONTROL: Full support for OpenConfig and gRPC telemetry, enabling seamless integration with third-party SDN controllers and network management systems. The onboard management processor handles system initialization, health monitoring, and alarm reporting.

COMPLIANCE & STANDARDS

TECHNICAL SPECIFICATIONS

Parameter	**Specification**

Form Factor	2RU Modular Chassis
Switching Capacity	1.2 Tbps (Full Duplex)
Power Supply	Dual Hot-Swappable, 1+1 Redundant AC/DC (100-240V AC / -48V DC)
Operating Temperature	0 ° C to 45 ° C (Standard Operating Range)
Optical Interfaces	QSFP-DD, OSFP (400ZR, 400ZR+, OpenZR+)
Management	CLI, SNMP, RESTCONF/NETCONF, gRPC Telemetry
FEC	Staircase FEC with 18% OH and SD-FEC with PCS
Dimensions (H x W x D)	88.9 mm x 445 mm x 711 mm

ORDERING OPTIONS

A comprehensive range of factory-tested SKUs and modular kits is available to support diverse deployment scenarios. This includes base chassis units with integrated fan trays and power supplies, line card options with varying capacity and interface types, and optical transceiver modules optimized for different reach and performance profiles (e.g., 400G-LR8, 400G-ER4, 400G-ZR). Each line

card is equipped with a field-replaceable pluggable optical module that supports digital diagnostics monitoring (DDM). Additionally, a complete range of mounting brackets, cable management kits, and spare fan filter assemblies is available.