

SDH to OTN Migration - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the official Technical Overview and Hardware Datasheet for the next-generation optical transport platform designed specifically to facilitate the strategic migration from legacy Synchronous Digital Hierarchy (SDH) networks to modern Optical Transport Network (OTN) infrastructure. As global telecommunications carriers face the dual challenge of maintaining lucrative TDM-based legacy services while aggressively expanding high-bandwidth packet and wavelength services, this platform provides the architectural bridge necessary for a seamless, cost-effective, and operationally efficient transition.

The solution detailed herein represents a paradigm shift in optical networking, combining the deterministic performance and circuit-switching reliability of SDH with the scalable bandwidth, robust forward error correction (FEC), and multi-service transparency of OTN. Designed as a carrier-grade, modular multi-service platform, it enables service providers to preserve and extend the life of their existing fiber plant and revenue-generating E1/T1 and STM-N services while systematically deploying OTN switching, WDM transport, and flexible client mapping. By leveraging a unified switching fabric that supports both TDM and packet-optical traffic, this platform eliminates the need for costly

parallel networks, reduces operational complexities, and dramatically lowers the total cost of ownership (TCO) throughout the migration lifecycle.

This datasheet provides a comprehensive analysis of the platform's hardware architecture, system specifications, feature sets, and compliance standards. It is intended for network architects, planning engineers, and procurement specialists involved in the strategic evolution of core and metro optical transport networks.



ARCHITECTURE & CHASSIS DESIGN

The platform is engineered around a high-density, modular chassis architecture that provides unparalleled scalability and investment protection. The physical design is optimized for standard 19-inch or 21-inch ETSI telecom racks, offering

a range of enclosure sizes to suit various deployment scenarios, from Central Office (CO) colocation spaces to regional data centers and remote hut sites. The chassis is constructed from ruggedized, electromagnetic-compatible (EMC) steel to ensure signal integrity and protection against environmental interference, and incorporates a sophisticated front-to-back or side-to-side airflow cooling system to manage thermal dissipation efficiently.

Central to the hardware design is a high-speed, mid-plane based backplane that interconnects all installed line cards, switching fabric modules, and control units. The backplane is designed with redundant electrical and optical paths, ensuring that no single point of failure can compromise system operation. It provides a non-blocking, low-latency communication channel for both the data plane and the control plane, with dedicated high-speed serial lanes capable of handling terabit-scale throughput.

The chassis architecture is built for high availability, with the capability to host redundant, hot-swappable components. This includes a 1+1 or N+1 redundant switching fabric, dual hot-swappable power supplies with load-sharing capabilities, and redundant fan trays for thermal management. All line cards and interface modules are designed for online insertion and removal (OIR), enabling service providers to add, remove, or upgrade modules without interrupting traffic on other active ports.

HARDWARE FEATURES

The platform is distinguished by a comprehensive suite of hardware features purpose-built for the SDH-to-OTN migration:

1. UNIFIED TDM & OTN SWITCHING FABRIC: The heart of the system is a proprietary, high-performance switching matrix that simultaneously supports pure SDH (STM-1/4/16/64) and OTN (ODU0/1/2/2e/3/4) switching. This enables a single platform to groom traffic at multiple granularities, from E1/T1 to 100G wavelengths, facilitating a phased migration where SDH circuits can be seamlessly encapsulated into OTN containers (e.g., via GFP mapping) before being switched to an OTN-only network.

2. FLEXIBLE CLIENT INTERFACES: The platform offers a wide variety of pluggable optical and electrical interface modules. Supported interfaces include legacy TDM interfaces (E1/T1, E3/T3, STM-1/4/16), Ethernet (Fast Ethernet, GigE, 10GigE, 40GigE, 100GigE), and a range of pluggable optics (SFP, SFP+, XFP, QSFP, QSFP28, CFP, CFP2) to support different reaches from 10km to 2000km+ over ultra-long-haul DWDM systems. This comprehensive port matrix ensures the platform can connect to any existing network element.

3. **INTEGRATED WDM AND OTN MUXPONDER CAPABILITIES:** Advanced line cards integrate full OTN framing, mapping, and multiplexing functions with integrated coarse/dense WDM transponders. This reduces the need for external WDM transponder shelves and minimizes the equipment footprint and cabling complexity, lowering both capital expenditure (CAPEX) and operational expenditure (OPEX).

4. **HIGH-PERFORMANCE FEC & DIGITAL SIGNAL PROCESSING (DSP):** Integrated DSP engines on line cards provide powerful FEC (including SD-FEC and enhanced HD-FEC) to improve optical signal-to-noise ratio (OSNR) tolerance and extend transmission distances. Advanced chromatic dispersion compensation and polarization mode dispersion (PMD) mitigation features are also embedded in hardware, eliminating the need for separate dispersion compensation units (DCUs) in many scenarios.

5. **SYNCHRONIZATION & TIMING ENGINE:** A built-in high-precision Stratum 3E clock, compliant with G.8262, provides robust synchronization capabilities. This is critical for guaranteeing the quality of legacy TDM services, whose performance is intrinsically tied to precise timing. The platform supports both ITU-T G.813 synchronous timing and Synchronous Ethernet (SyncE), ensuring flawless service quality during and after the SDH-to-OTN migration.

6. INTELLIGENT POWER & THERMAL MANAGEMENT: The platform incorporates an intelligent power distribution unit (PDU) that monitors per-card power consumption and adjusts power delivery dynamically. High-efficiency, platinum-rated power supplies (AC and DC variants) reduce energy costs. An advanced thermal management subsystem with variable-speed, high-flow fans controls the chassis' thermal profile based on real-time card temperature and ambient conditions, ensuring optimum reliability even in extreme environments (operating temperature range of -5°C to +55°C).

COMPLIANCE & STANDARDS

The SDH to OTN Migration Platform is designed to meet the most stringent international and industry-specific standards. A partial list of key compliance certifications includes:

- * OPTICAL TRANSPORT: ITU-T G.709 (OTN), G.798 (Architecture), G.872 (Architecture), G.874 (Management), G.8251 (Jitter), G.8261 (Timing).
- * SYNCHRONIZATION: ITU-T G.813 (SDH equipment clocks), G.8262 (SyncE), G.8264 (SyncE), IEEE 1588v2 (PTP).
- * ETHERNET: IEEE 802.3 (Ethernet), 802.1q (VLAN), 802.1ad (Q-in-Q), 802.1ag (CFM), ITU-T Y.1731 (OAM).
- * MANAGEMENT: ITU-T G.874.1 (Management), M.3100 (TMN), TL1, SNMP

v2/v3, NETCONF/YANG (for SDN integration).

* SAFETY & EMC: IEC 60950-1 / IEC 62368-1 (Safety), EN 300 386 (EMC), GR-1089-CORE (Network Equipment Building Standards - NEBS Level 3).

* ENVIRONMENTAL: GR-63-CORE (NEBS environmental requirements), RoHS, WEEE, and REACH compliant.

TECHNICAL SPECIFICATIONS

[IMAGE_1]

Parameter	Specification
Form Factor	Modular Chassis: 2RU, 5RU, 10RU and 14RU variants
Switching Capacity	Up to 3.2 Tbps (non-blocking, full-duplex)
Power Supply	1+1 or 2+2 Redundant AC/DC, Hot-swappable (100-240V AC, -48V DC)
Supported Interface Types	SFP, SFP+, XFP, QSFP28, CFP2; 10/100/1000Base-X, 10GBase-X, 40GBase-X, 100GBase-X, STM-1/4/16/64, OTU1/2/2e/3/4

Typical Maximum Power Consumption	~ 350W (Fully Loaded 5RU Chassis)
Operating Temperature Range	0°C to +45°C (Standard), -5°C to +55°C (Extended)
MTBF	> 250,000 hours (Telcordia SR-332, Issue 4, 50% confidence)
Management Interfaces	10/100/1000Base-T (RJ45) and RS-232 Console Port
Primary Compliance	ITU-T G.709, G.798, G.872, G.813, IEEE 802.3, MEF 2.0, NEBS Level 3
Security Features	Line-rate AES-256 encryption, Role-Based Access Control (RBAC), TACACS+, RADIUS

ORDERING OPTIONS

