

10G PON Deployment Best Practices - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the definitive technical reference for the deployment of next-generation 10G PON (Passive Optical Network) infrastructure. As global bandwidth demands escalate driven by 4K/8K video, cloud computing, and enterprise-grade connectivity, the transition from GPON to 10G PON (XGS-PON and 10G EPON) represents a critical strategic imperative for service providers. This datasheet provides a comprehensive overview of our carrier-grade 10G PON OLT (Optical Line Terminal) platform, detailing its high-density architecture, unparalleled performance specifications, and the engineering best practices that ensure seamless interoperability, robust security, and a future-proof investment. The platform is designed for central office and remote terminal deployments, supporting symmetrical 10 Gbps line rates to deliver a premium subscriber experience while simplifying network operations.



ARCHITECTURE & CHASSIS DESIGN

The 10G PON OLT platform is engineered upon a highly modular, scalable chassis architecture designed to accommodate a wide range of deployment densities, from distributed access nodes to large-scale regional headends. The system is built around a high-speed, non-blocking backplane that provides a switching fabric capacity of up to 3.6 Tbps, ensuring line-rate forwarding across all PON ports and uplink interfaces.

The chassis design prioritizes service continuity through a fully redundant, hot-swappable architecture. Key components including the main control boards, power supply units, and fan trays are all 1+1 or N+1 redundant, enabling in-service upgrades and maintenance without traffic disruption. The physical layout is optimized for high-density optical termination, supporting up to 16

10G PON line cards per chassis, with each line card housing up to 8 or 16 PON ports. This allows for a maximum of up to 128 or 256 10G PON ports per chassis, significantly reducing the space and power footprint per subscriber compared to legacy solutions. The front-access design facilitates rapid installation and cable management in both ETSI and 19-inch racks, with integrated cable guides to support bend radius requirements for fiber optic cabling.

HARDWARE FEATURES

The platform's hardware feature set is meticulously designed to meet the stringent demands of modern access networks. The core of the system is powered by a network processor and forwarding engine that supports advanced Quality of Service (QoS), hierarchical scheduling, and sophisticated traffic shaping for thousands of individual subscribers.

Key hardware features include:

- ****Integrated PON MAC and PHY:**** The line cards incorporate the full PON Media Access Control (MAC) and Physical Layer (PHY) functions, supporting the latest ITU-T G.9807.1 (XGS-PON) and IEEE 802.3av (10G EPON) standards. This ensures native support for symmetrical 10 Gbps operation.
- ****High-Throughput Uplink Interfaces:**** The platform provides flexible, high-speed uplink options, including 40GE (QSFP+) and 100GE (QSFP28) ports,

enabling seamless aggregation to the core network and supporting the delivery of high-bandwidth services.

- **Precision Time Protocol (PTP) Support:** Hardware-level timestamping and support for IEEE 1588v2 ensure sub-microsecond synchronization, a critical requirement for mobile backhaul (fronthaul/backhaul) and business services.
- **Advanced Forwarding Table:** Line-rate L2/L3 forwarding tables, supporting up to 128K MAC addresses and 32K IPv4/IPv6 routes, guarantee optimal performance even in the most demanding subscriber aggregation scenarios.
- **Comprehensive Optical Diagnostics:** Integrated Digital Diagnostic Monitoring (DDM) provides real-time visibility into optical power levels, temperature, and bias current on every PON port, enabling proactive network maintenance and fault isolation.

COMPLIANCE & STANDARDS

The 10G PON platform is rigorously designed to meet and exceed all relevant national and international standards, ensuring seamless integration into a wide variety of network environments and regulatory regimes. The platform's stringent compliance framework provides operators with the assurance required for large-scale, carrier-grade deployments.

Key certifications and compliance standards include:

- ****Network & Telecommunications:**** Full adherence to ITU-T G.9807.1 (XGS-PON), IEEE 802.3av (10G EPON), IEEE 802.1D, 802.1Q (VLAN), 802.1ad (Q-in-Q), and MEF-compliant Carrier Ethernet services.
- ****Safety & Electromagnetic Compatibility:**** Complies with IEC 60950-1, IEC 62368-1 for product safety; and FCC Part 15 (Class A), EN 55032, EN 300 386 for EMC.
- ****Environmental Sustainability:**** Designed in accordance with RoHS (Restriction of Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment) directives, minimizing environmental impact.
- ****Optical Interoperability:**** The SFP+/SFP28 PON transceivers adhere to the SFF-8472 and SFF-8431 Multi-Source Agreements (MSAs), ensuring a robust and diverse supply chain.
- ****Security & Management:**** Strong security posture is maintained through compliance with NIST standards for network equipment, supporting robust AAA, TLS/SSH, and SNMPv3 protocols for management plane protection.

TECHNICAL SPECIFICATIONS

Parameter	Specification
Form Factor	Modular 4-slot or 12-slot Chassis (ETSI/19-inch rack mountable)
Switching Capacity	Up to 3.6 Tbps (non-blocking)

Max 10G PON Ports	Up to 128 (4-slot) / 256 (12-slot)
Uplink Ports	Up to 8 x 40GE (QSFP+) or 4 x 100GE (QSFP28)
Power Supply	1+1 or 2+2 Redundant, Hot-swappable AC/DC (600W)
Operating Temperature	-5 °C to +55 °C (short-term: -5 °C to +65°C)
Operating Humidity	10% to 90% (non-condensing)
MTBF	> 350,000 hours (per chassis)

ORDERING OPTIONS

Our 10G PON platform is available in a diverse range of configurations to meet specific operational and capacity requirements. The modular design philosophy extends to the ordering process, allowing operators to tailor a solution that perfectly fits their network architecture, budget, and scalability goals. All hardware components are designed for field-replaceability, minimizing downtime and simplifying logistics.

****Key Stock Keeping Units (SKUs):****

- ****CHASSIS-10G-12:**** A 12-slot chassis (8 line card slots + 2 control slots + 2

fabric slots). Designed for central office environments requiring maximum density.

- **CHASSIS-10G-4:** A compact 4-slot chassis (2 line card slots + 1 control slot + 1 fabric slot). Optimized for remote terminal and space-constrained deployments.

- **LC-10GS-8:** An 8-port 10G SFP+ XGS-PON line card for use with the main chassis.

- **LC-10GS-16:** A 16-port 10G SFP+ XGS-PON line card for maximum density.

- **LC-10GE-8:** An 8-port 10G SFP+ 10G-EPON line card.

- **LC-UPLINK-2Q:** A 2-port 40GE QSFP+ uplink module.

- **LC-UPLINK-4Q:** A 4-port 40GE QSFP+ uplink module.

- **LC-UPLINK-2C:** A 2-port 100GE QSFP28 uplink module.

Power Supply Options:

- **PSU-AC-600:** 600W AC Power Supply Module (100-240 VAC, 50/60Hz).

- **PSU-DC-600:** 600W DC Power Supply Module (-48 VDC).

Software Licenses:

- **LIC-ADV-QOS:** Advanced QoS and Hierarchical Scheduling License.

- **LIC-SEC-EDGE:** Enhanced Security Suite (Line-rate MACsec encryption, advanced ACLs).

- ****LIC-PTP-MB:**** IEEE 1588v2 Precision Time Protocol License for mobile backhaul.

