Micro-OLT Solutions for Rural and Low-Density Subscriber Deployment Guide - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

Micro-OLT Solutions for Rural and Low-Density Subscriber Deployment Guide represents a purpose-built, carrier-class optical line termination platform engineered to deliver Gigabit-class broadband services to underserved and sparsely populated regions. Unlike traditional chassis-based OLT systems that impose prohibitive capital expenditure and operational complexity, this solution integrates advanced PON MAC functionality, line-rate forwarding silicon, and comprehensive Layer 2/Layer 3 protocol support into a compact, environmentally hardened form factor. The platform enables service providers, municipalities, and rural cooperatives to deploy scalable FTTH/FTTP infrastructure with minimal real estate, power, and cooling requirements. Key architectural decisions include fanless thermal design, wide-temperature component selection, and flexible uplink options ranging from 1GE to 10GE, ensuring seamless integration with existing transport networks. This document provides a complete technical overview, hardware architecture analysis, deployment logic, compliance register, and ordering information for network planners and procurement engineers.



HARDWARE ARCHITECTURE & SILICON

The Micro-OLT platform is architected around a custom ASIC-based PON MAC controller paired with a non-blocking Layer 2/Layer 3 forwarding engine. The system-on-chip (SoC) integrates up to 8 GPON or XGS-PON interfaces, each capable of symmetric 2.5Gbps or 10Gbps throughput, alongside 4 x 1GE/2.5GE copper uplinks and 2 x 10GE SFP+ uplinks. The forwarding engine delivers 40Gbps switching capacity with a 32K-entry MAC table and hardware-based VLAN, QinQ, and IGMP snooping. Dedicated packet buffer memory of 1.5MB per PON port ensures zero packet loss under bursty traffic conditions. The onboard CPU, a dual-core ARM Cortex-A53 running at 1.2GHz, handles control plane operations, OMCI management, and DBA scheduling. Power is delivered via a 12VDC input with optional redundant DC feeds, and the fanless chassis employs an extruded aluminum heatsink with conduction cooling to passive

thermal zones. The silicon supports advanced power management modes, reducing consumption to under 15W typical when fully populated.

KEY FEATURES & ROUTING LOGIC

- Compact Form Factor: 1RU half-width chassis or DIN-rail mountable enclosure, suitable for pole, wall, or cabinet installation.
- Multi-PON Support: 4/8-port GPON (ITU-T G.984) and XGS-PON (ITU-T G.9807.1) combo configurations with pluggable SFP optical modules.
- Flexible Uplinks: 2 x 10GE SFP+ and 4 x 1GE/2.5GE RJ45 uplinks with link aggregation (LACP) and static routing.
- Layer 3 Routing: Hardware-based IPv4/IPv6 static routing, OSPFv2/v3, RIP, and VRRP for resilient edge routing.
- Advanced QoS: 8 queues per port, SP/WRR scheduling, 802.1p mapping, DSCP remarking, and rate limiting.
- Multicast Efficiency: IGMPv2/v3 snooping, proxy, and fast leave for IPTV and video services.
- Security: 802.1X authentication, MAC limiting, storm control, and ACL-based filtering.
- Management: CLI, SNMPv2c/v3, NETCONF/YANG, TR-069, and zero-touch provisioning via DHCP option 43/60.
- Resiliency: Dual boot images, hardware watchdog, and ERPS (G.8032) ring

protection.

COMPLIANCE & STANDARDS

The Micro-OLT Solution complies with major international telecom and safety standards. PON interfaces conform to ITU-T G.984 (GPON), G.987 (XG-PON), and G.9807.1 (XGS-PON). Ethernet functions adhere to IEEE 802.3, 802.3u, 802.3ab, 802.3z, 802.3ae, 802.1Q, 802.1ad, 802.1p, 802.1X, 802.3ad, and 802.1ag. Routing protocols meet RFC 791, RFC 2460, RFC 2328, RFC 5340, and RFC 3768. EMC and safety certifications include CE, FCC Part 15 Class A, IEC 60950-1, IEC 62368-1, and RoHS 2.0. Environmental compliance: ETSI EN 300 019-2-3 (Class 3.1E) for temperature and humidity, and GR-1089-CORE for lightning and AC power surges. The platform is NEBS Level 3 ready for central office deployments.

TECHNICAL SPECIFICATIONS

[Text detailing physical, electrical, optical, and performance parameters]

Parameter	**Specification**
Form Factor	1RU half-width rackmount / DIN-rail / wall-mount

PON Ports	4 or 8 x GPON/XGS-PON combo (SFP slot)
Uplink Ports	2 x 10GE SFP+; 4 x 1GE/2.5GE RJ45
Switching Capacity	40 Gbps non-blocking
MAC Table Size	32K entries
Packet Buffer	1.5 MB per PON port
Layer 3 Routing	Static, OSPFv2/v3, RIP, VRRP
QoS Queues	8 per port, SP/WRR
Management	CLI, SNMPv2c/v3, NETCONF, TR-069
Power Supply	12VDC nominal, dual redundant DC inputs
Power Consumption	<15W typical (fully populated)
Operating Temperature	-40°C to +65°C (hardened)
Cooling	Fanless passive conduction
Dimensions (WxHxD)	220mm x 44mm x 180mm (1RU half-width)
Weight	1.8 kg
Compliance	CE, FCC, RoHS, ITU-T G.984/G.9807.1, IEEE 802.3/802.1Q

ORDERING SKU INFORMATION

[Text describing available configurations, options, and accessories]

