Generic EPON ONU Dynamic Loop Detection Interoperability on Huawei OLTs - Official Technical Overview & Hardware Datasheet

PRODUCT IDENTIFICATION

DOCUMENT CLASSIFICATION: PRODUCT OVERVIEW & HARDWARE DATASHEET

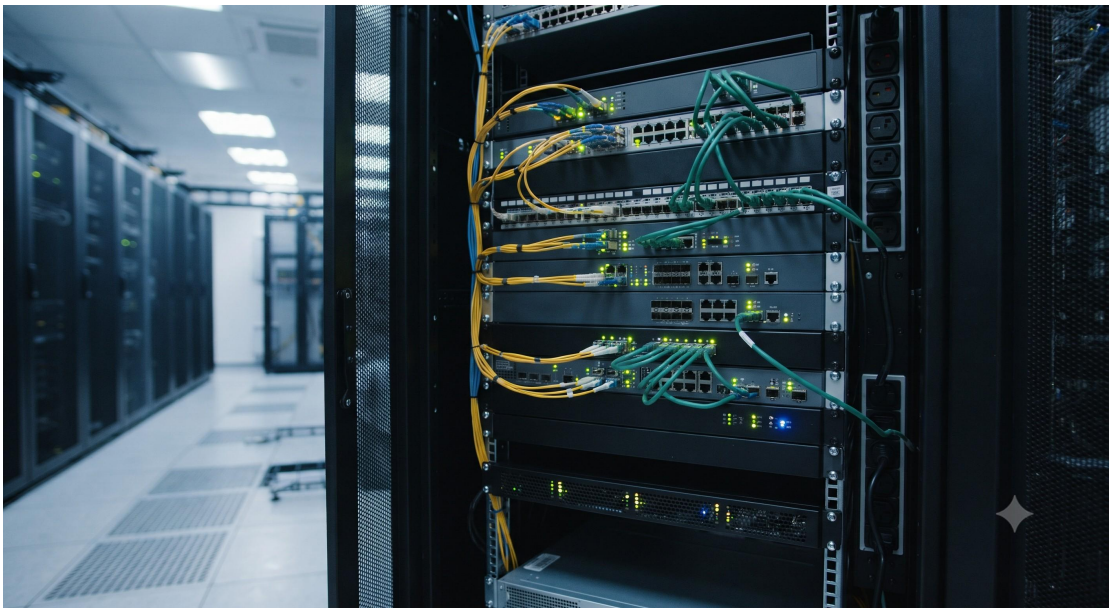
PRODUCT FAMILY: GENERIC EPON OPTICAL NETWORK UNIT (ONU) SERIES

INTEROPERABILITY TARGET: HUAWEI SMARTAX OLT PLATFORMS (MA5800/MA5600T SERIES)

DOCUMENT VERSION: 1.0

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This document serves as the definitive technical reference for the Generic EPON ONU Series, specifically detailing its advanced Dynamic Loop Detection (DLD) capabilities and seamless interoperability within Huawei OLT-managed Passive Optical Networks (PON). Designed for Carrier-Grade and Enterprise Fiber-to-the-Home/Office (FTTH/FTTO) deployments, this ONU series offers a robust, cost-effective customer-premises solution that does not compromise on network integrity or performance.



CORE INTERNAL TOPOLOGY

The internal architecture of the Generic EPON ONU is engineered around a high-performance, low-power System-on-Chip (SoC) that integrates the PON MAC, a packet processing engine, and the physical layer interfaces. The data plane is segmented into three primary domains:

1. **PON INTERFACE SUBSYSTEM:** This comprises the Burst-Mode Receiver and the Continuous-Mode Laser Driver, operating at the standard 1490nm (downstream) / 1310nm (upstream) wavelengths. The integrated clock and data recovery (CDR) circuit ensures robust synchronization with the OLT's upstream burst timing.

2. **PACKET FORWARDING ENGINE:** The heart of the ONU is a non-blocking

switching fabric capable of wire-speed Layer 2 forwarding. It incorporates a dedicated Dynamic Loop Detection (DLD) processing unit, allowing for real-time monitoring and suppression of network loops without taxing the main CPU.

3. **SERVICE INTERFACE SUBSYSTEM:** This area manages the physical User-Network Interfaces (UNIs), including 10/100/1000BASE-T Ethernet ports. The hardware includes a dedicated queue management system for implementing sophisticated Quality of Service (QoS) policies and traffic shaping.

SWITCHING SUBSYSTEM CAPABILITIES

The switching subsystem is purpose-built for stringent telecom environments, offering:

- **WIRE-SPEED PERFORMANCE:** Guarantees line-rate forwarding for all packet sizes, preventing bottlenecks in high-traffic scenarios.
- **HARDWARE-BASED DLD:** The ONU's silicon actively participates in the loop detection process. Upon detection of a potential loop (via broadcast/multicast storm patterns or protocol packet mirroring), the hardware can autonomously disable the offending UNI port for a configurable period,

isolating the fault at the customer premise before it can impact the OLT's PON interface.

- **INTELLIGENT INTEROPERABILITY:** The DLD mechanism is specifically tuned to operate in concert with Huawei OLTs. The ONU can interpret and respond to specific loop detection control frames or OAM (Operations, Administration, and Maintenance) messages, ensuring unified loop prevention across the entire access network.
- **MULTICAST OPTIMIZATION:** Supports IGMP snooping, ensuring that multicast traffic (e.g., IPTV) is only forwarded to ports that have explicitly requested it, optimizing uplink bandwidth utilization.

OPERATIONAL ADVANTAGES

Deploying the Generic EPON ONU with integrated DLD and Huawei OLT interoperability offers significant operational benefits:

- **NETWORK STABILITY:** Proactive loop prevention at the ONU level eliminates a major source of broadcast storms, ensuring high network stability and uptime.
- **REDUCED OPEX:** Automated detection and recovery reduce the need for manual troubleshooting and truck rolls, significantly lowering operational expenses.

- **VENDOR AGNOSTIC COMPLIANCE:** The ONU fully adheres to IEEE 802.3ah EPON standards, ensuring a smooth integration into existing Huawei OLT environments without vendor lock-in for the ONU layer.
- **SIMPLIFIED MANAGEMENT:** The ONU can be managed through standard OAM protocols, aligning with the Huawei OLT's management framework for unified network supervision.

SPECIFICATION MATRIX

Parameter	**Specification**
Form Factor	Desktop / Wall-Mountable, 1RU Optional Rackmount Kit
PON Interface	1x EPON (IEEE 802.3ah) SC/APC or SC/UPC Connector
Downstream Wavelength	1490 nm
Upstream Wavelength	1310 nm
Maximum Split Ratio	1:64
Switching Capacity	2.0 Gbps Non-Blocking
Forwarding Rate	1.48 Mpps (64-byte packets)
User Network Interfaces (UNI)	2x / 4x 10/100/1000BASE-T (RJ45)
MAC Address Table	1K Entries
Loop Detection	Hardware-based Dynamic Loop

	Detection (DLD) with Auto-Recovery
Management	OAM, SNMP, Web GUI, CLI
Power Supply	External 12V DC, 1A, (Optional: 802.3af PoE PD)
Power Consumption	< 5W (Idle), < 8W (Full Load)
Operating Temperature	0°C to 50°C
Storage Temperature	-40°C to 85°C
Operating Humidity	10% to 90% (Non-condensing)
Mean Time Between Failures (MTBF)	> 200,000 Hours at 25°C

REGULATORY COMPLIANCE

The Generic EPON ONU Series is designed and tested to meet the rigorous demands of the global telecommunications industry, complying with a comprehensive suite of international standards and regulatory directives to guarantee safety, electromagnetic compatibility, and environmental responsibility.

- **IEEE STANDARDS:** IEEE 802.3ah (EPON), IEEE 802.1D (Bridging), IEEE 802.1Q (VLAN), IEEE 802.1p (Priority Queuing).
- **ENVIRONMENTAL & SAFETY:** RoHS, REACH, WEEE compliant. Safety

certifications include CE, FCC Part 15 Class B, and UL/cUL.

- **TELECOM COMPLIANCE:** GR-1089-CORE (EMC & Safety), GR-63-CORE (NEBS Level 3).

- **OPTICAL SAFETY:** Class 1 Laser Product per IEC 60825-1 and FDA 21 CFR 1040.10.

