OEM Wi-Fi 6 ONU TR-069 Parameter Tree and RPC Methods Reference Document - Official Technical Overview & Hardware Datasheet

PRODUCT IDENTIFICATION

The OEM Wi-Fi 6 ONU (Optical Network Unit) is a state-of-the-art, carrier-grade customer premises equipment (CPE) solution engineered for next-generation Fiber-to-the-Home (FTTH) and Fiber-to-the-Business (FTTB) deployments. This document serves as the comprehensive technical reference for the embedded TR-069 (CWMP) protocol implementation, detailing the complete parameter tree structure and supported Remote Procedure Call (RPC) methods. Designed for seamless integration into existing Network Management Systems (NMS) and Auto-Configuration Servers (ACS), this ONU offers unparalleled remote management capabilities, provisioning efficiency, and enhanced diagnostic visibility, reducing operational expenditures (OPEX) and accelerating service delivery.



CORE INTERNAL TOPOLOGY

The internal architecture of the OEM Wi-Fi 6 ONU is built upon a high-performance, multi-core processor system-on-chip (SoC) specifically optimized for both data-plane forwarding and complex management-plane operations. The architecture comprises three primary subsystems:

1. Broadband Access & Switching Subsystem: This subsystem integrates a Gigabit-capable Passive Optical Network (GPON) or Ethernet Passive Optical Network (EPON) MAC/PHY interface, coupled with a non-blocking Layer 2/Layer 3 switch fabric. It manages the high-speed data flow between the optical WAN port and the four Gigabit Ethernet LAN ports, ensuring wire-speed forwarding of data packets.

2. Wi-Fi 6 Wireless Subsystem: Featuring the latest IEEE 802.11ax standard, this subsystem includes a dedicated dual-band (2.4 GHz and 5 GHz) radio module. It supports Orthogonal Frequency-Division Multiple Access (OFDMA), Multi-User Multiple Input Multiple Output (MU-MIMO), and Target Wake Time (TWT), providing enhanced capacity, lower latency, and improved power efficiency for dense user environments.

3. Management & Control Subsystem: This is the core of the intelligent ONU. It houses the main CPU and memory resources responsible for executing the embedded Linux operating system, hosting the TR-069 client, implementing the firewall and routing protocols (e.g., IPv4/IPv6, NAT), and maintaining the complete parameter tree and RPC interface. This subsystem ensures secure, reliable, and responsive interaction with the remote ACS.

SWITCHING SUBSYSTEM CAPABILITIES

The switching subsystem is engineered to deliver consistent, high-throughput connectivity across all wired and wireless interfaces. Key capabilities include:

- Non-Blocking Switching Fabric: The internal fabric provides a total switching capacity of up to 16 Gbps, ensuring that concurrent traffic from the Wi-Fi 6 radios and all Ethernet ports does not create bottlenecks, even during peak

usage.

- Advanced QoS (Quality of Service): Supports Hardware-based queue management with 4 or 8 priority queues per port, enabling strict prioritization of voice (VoIP) and video (IPTV) traffic. The subsystem adheres to 802.1p, DSCP marking, and rate limiting to guarantee SLA compliance.
- VLAN Bridging & Translation: Fully compliant with 802.1Q VLAN standards. It supports VLAN tag manipulation (add, remove, replace) and 802.1ad provider bridging (Q-in-Q), facilitating complex service segmentation for multi-tenant or multi-service residential gateways.

OPERATIONAL ADVANTAGES

Deploying this TR-069-enabled OEM Wi-Fi 6 ONU offers significant operational advantages for service providers and enterprise network administrators.

- Zero-Touch Provisioning (ZTP): The ONU can be pre-configured and shipped directly to the end-user. Upon powering up and connecting to the network, it automatically establishes a secure connection to the designated ACS to download its complete configuration profile, eliminating the need for costly on-site technician visits.
- Unified Management Interface: The TR-069 interface standardizes the management of a diverse fleet of devices. Operators can manage firmware

updates, configuration changes, and monitor the performance of thousands of ONUs from a single, centralized platform, regardless of the underlying transport infrastructure.

- Comprehensive Diagnostics and Fault Isolation: The rich parameter tree provides granular access to every operational aspect of the device, from RF signal strength and Ethernet link status to memory utilization and uptime. This enables proactive network monitoring and rapid fault isolation, minimizing service disruption.
- Enhanced Security Posture: Secure communication with the ACS is ensured using SSL/TLS (HTTPS). The management interface supports strong authentication mechanisms, preventing unauthorized access and protecting the integrity of the network management channel.

SPECIFICATION MATRIX

Parameter	**Specification**
Form Factor	Compact Desktop / Wall-Mountable Unit (1U Standard Rack Mountable with optional kit)
Switching Capacity	12 Gbps Wire-Speed Forwarding on Wired Interfaces; 2.4 Gbps Wi-Fi 6 Aggregate Data Rate

WAN Interface	1x SC/APC Connector for GPON (Class B+/C+) or 1x 2.5G/1G Ethernet RJ45 (for EPON/Active Ethernet)
LAN Interfaces	4x 10/100/1000 BASE-T (Gigabit Ethernet) with Auto-MDI/MDIX
Wi-Fi 6 Standards	IEEE 802.11ax (2.4 GHz: 4x4 MU-MIMO, 5 GHz: 4x4 MU-MIMO)
Antenna Configuration	Internal 4x4 Dual-Band Diversity Antennas with High Gain (3 dBi per band)
TR-069 (CWMP) Support	Fully Compliant with Broadband Forum TR-069 Issue 1 and Amendment 5, TR-098, TR-181, TR-143, TR-304
Management RPC Methods	GetParameterNames, GetParameterValues, SetParameterValues, Download, Upload, Reboot, FactoryReset, ScheduleInform, etc.
WAN Protocols	Static IP, DHCP, PPPoE, IPv4/IPv6 Dual Stack, 6rd, DS-Lite
Power Supply	External 12V DC, 2A (Power

	Consumption: < 12W Typical) - Optional: 1+1 Redundant Power Input
Operating Environment	Temperature: 0°C to 45°C / Humidity: 5% to 95% (Non-condensing)

REGULATORY COMPLIANCE

The OEM Wi-Fi 6 ONU is engineered to meet and exceed the most stringent international standards for telecommunications equipment, safety, and electromagnetic compatibility (EMC). This ensures seamless integration into global carrier networks and provides assurance of product reliability and safety.

- Safety Compliance: The unit is designed and tested to comply with UL 60950-1 and IEC 60950-1, ensuring the highest level of safety for users and service personnel. It incorporates robust electrical insulation and over-voltage protection.
- EMC Compliance: The ONU has successfully passed Class B emission and immunity testing, complying with FCC Part 15, CE (EN 55032, EN 55024), and VCCI standards. This guarantees that the device operates without causing harmful interference and is resilient to electromagnetic disturbances in typical residential and enterprise environments.

- Regulatory Standards for Telecommunications: The device is fully compliant with the relevant ITU-T (e.g., G.984 series for GPON) and IEEE (e.g., 802.3, 802.11ax) specifications. It also meets NEBS level 3 (Network Equipment Building System) requirements for environmental and safety performance, a critical factor for deployment in central office environments.

