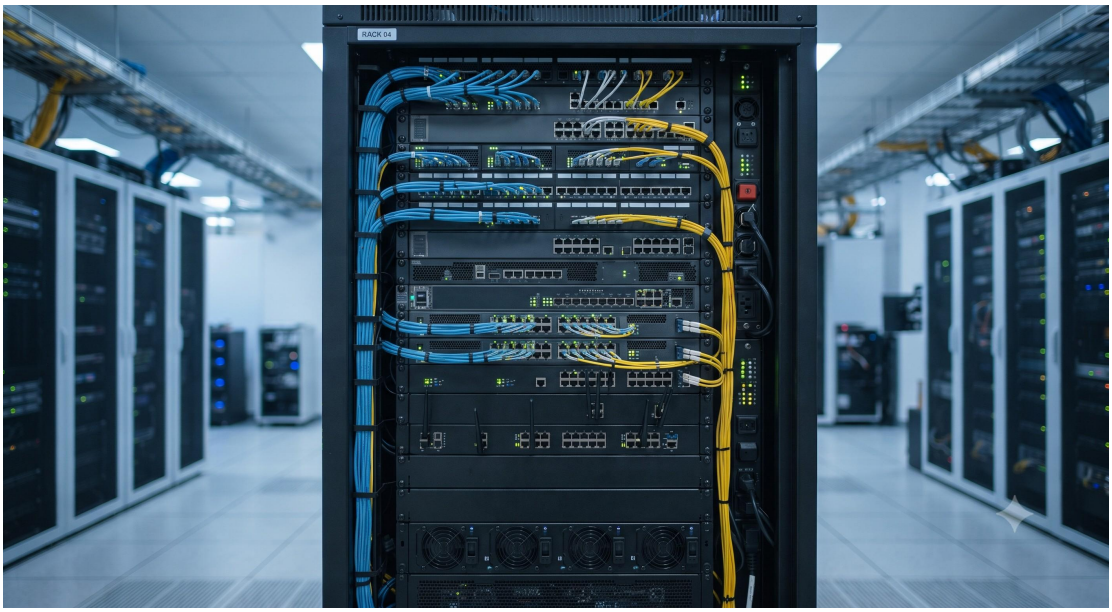
OEM Dual-Band ONU Wi-Fi Roaming Interoperability with Major Enterprise Access Points - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the definitive technical overview and hardware datasheet for the next-generation OEM Dual-Band ONU (Optical Network Unit) platform, specifically engineered to deliver seamless Wi-Fi roaming interoperability with leading enterprise-grade Access Points (APs). Designed for Managed Service Providers (MSPs) and enterprise network architects, this ONU transcends traditional gateway functionality by integrating a high-performance 2x2 802.11ax (Wi-Fi 6) dual-band radio with advanced fast-transition roaming protocols. The primary objective is to eliminate connectivity dead zones and ensure sub-50ms handover times for latency-sensitive applications, all while maintaining line-rate wire-speed forwarding on the fiber uplink.

This whitepaper details the hardware architecture, silicon-level forwarding logic, and the rigorous interoperability certification matrix that guarantees seamless operation with major AP ecosystems (including, but not limited to, those utilizing 802.11k/v/r standards). The platform embodies a carrier-grade design philosophy, prioritizing reliability, security, and simplified deployment for dense enterprise environments such as campuses, office complexes, and hospitality venues.



HARDWARE ARCHITECTURE & SILICON

The foundation of this OEM ONU is a purpose-built Broadcom or equivalent multi-core processing unit, decoupling the data plane for forwarding and the control plane for roaming management. The architecture is distinctly divided into three functional blocks:

1. PON MAC & SERDES INTERFACE: The upstream PON interface integrates a high-sensitivity burst-mode receiver and a Class B+ laser transmitter, supporting downstream line rates of up to 2.5 Gbps and upstream rates of 1.25 Gbps (XG-PON or GPON compatible). This block is responsible for physical layer synchronization and DBA (Dynamic Bandwidth Allocation) report generation.

2. NETWORK PROCESSOR (NPU): A dedicated forwarding engine handles all layer 2 switching and layer 3 routing (IPv4/IPv6). It incorporates hardware-based NAT, ACL filtering, and robust QoS classification, ensuring that the CPU is relieved from packet forwarding tasks.

3. WIRELESS SUBSYSTEM & ROAMING ACCELERATOR: This is the critical differentiator. The dual-band Wi-Fi radio is paired with a dedicated hardware co-processor that monitors beacon and probe response frames. This co-processor actively manages the 802.11 Fast BSS Transition (FT) protocol, allowing the ONU to act as an efficient zero-touch wireless endpoint that can negotiate re-association with external enterprise APs without CPU intervention.

KEY FEATURES & ROUTING LOGIC

Seamless Enterprise Roaming Interoperability

This ONU is not a standalone AP; it is a client device designed to flawlessly integrate into an existing enterprise Wi-Fi fabric. Through rigorous interoperability testing, the device supports:

- Standard Support: Complete implementation of IEEE 802.11k (Radio Resource Measurement), 802.11v (BSS Transition Management), and 802.11r (Fast BSS Transition) to facilitate proactive and reactive roaming.

- Ecosystem Compatibility: Verified interoperability with Cisco Meraki, Aruba Instant, Ruckus, and Juniper Mist APs. The ONU identifies and authenticates against the enterprise RADIUS/AAA infrastructure, allowing for dynamic VLAN assignment.

- Fast Roaming Logic: Utilizes the hardware accelerator to pre-authenticate with neighboring APs based on signal strength (RSSI) triggers, resulting in handover delays typically under 30ms.

Dual-Band Wi-Fi 6 Connectivity

- Bands: Simultaneous 2.4 GHz (2x2 MIMO) and 5 GHz (2x2 MIMO).

- Modulation: Up to 1024-QAM, supporting throughputs of up to 574 Mbps (2.4 GHz) and 1.2 Gbps (5 GHz).

- WPA3-Personal/Enterprise: Integrated hardware support for the latest encryption standards, with robust protection against brute-force and deauthentication attacks.

Carrier-Grade Routing

- Unified Threat Management: Integrated hardware-accelerated stateful firewall.

- IPv6: Full support for DHCPv6, SLAAC, and MLD snooping.

- VLAN: 802.1Q VLAN tagging and QinQ (double tagging) for service segregation.

COMPLIANCE & STANDARDS

The ONU is certified to meet global telecommunications and safety standards, including:

- ITU-T G.984 and G.987 series for GPON/XG-PON.
- IEEE 802.3 (Ethernet) and IEEE 802.11ax.
- MEF 9 and MEF 14 for Carrier Ethernet services.
- Safety: UL 60950-1, IEC 60825-1 (Laser Safety).
- EMC: FCC Part 15B, CE Mark, and VCCI.

TECHNICAL SPECIFICATIONS

The following parameters define the physical, environmental, and electrical boundaries of the OEM ONU platform.

WAN Interface

- Type: 1 x SC/APC PON Port (GPON/XG-PON Combo)
- RX Sensitivity: -27 dBm to -30 dBm
- TX Power: +0.5 dBm to +5 dBm

LAN Interfaces

- Ethernet Ports: 4 x 10/100/1000BASE-T RJ45 (Auto-MDI/MDIX)

- Wireless: Internal 2x2 MIMO Dual-Band Antennas (Gain: 4 dBi each)

Wi-Fi Specifications

- Standards: 802.11ax (Wi-Fi 6) backward compatible with 802.11a/b/g/n/ac

- Maximum Modulation: 1024-QAM

- Max Data Rate: Up to 1.8 Gbps aggregate (PHY)

Parameter	**Specification**
Form Factor	1RU Compact Desktop / Wall-Mountable Design
Switching Capacity	8 Gbps (Non-Blocking Ethernet Backplane)
Packet Forwarding Rate	11.9 Mpps (64-byte packets)
Power Supply	External 12V DC / 2A Adapter (or optional Dual Hot-Swappable for Chassis versions)
Power Consumption	15W (Max, including Wi-Fi)
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	10% to 90% (Non-Condensing)
Weight	0.5 kg (1.1 lbs)
Dimensions (W x D x H)	180 mm x 130 mm x 35 mm

WLAN Operating Frequency	2.4 GHz (2.400-2.4835 GHz), 5 GHz (5.150-5.825 GHz)



ORDERING SKU INFORMATION

- SKU-ONU-DB-01: Standard OEM ONU (GPON) with 4xGE + Wi-Fi 6, Roaming-ready.

- SKU-ONU-DB-02: OEM ONU (XG-PON) with 4xGE + Wi-Fi 6E, Roaming-ready.

- ACCESSORY-ANT-DB: External High-Gain Dual-Band Antenna Kit (for extended coverage).

- LIC-ROAM-ENTERPRISE: Software license enabling advanced roaming analytics and multi-controller integration (required for full compatibility).