FiberHome ONU Crypto-Key Exchange Interoperability on Huawei GPON Cards - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document provides a comprehensive technical overview and hardware datasheet for FiberHome Optical Network Units (ONUs) certified for crypto-key exchange interoperability within Huawei GPON access network infrastructures. As global telecom operators increasingly deploy multi-vendor GPON environments, seamless OMCI-based key exchange and encryption management become paramount for securing subscriber traffic. FiberHome's ONU portfolio, including the AN5506-02B series, is engineered to ensure full OMCI compatibility and secure key derivation functions when operating under Huawei GPON line cards, including the SmartAX MA5600T and MA5800 series platforms. This whitepaper details the architecture, security mechanisms, and performance specifications that underpin this critical interoperability.



HARDWARE ARCHITECTURE & SILICON

FiberHome GPON ONUs are designed with a unified silicon architecture that prioritizes seamless integration with industry-standard OLT platforms. The ONU's system-on-chip (SoC) integrates a dedicated hardware crypto-engine capable of performing AES-128 encryption for downstream traffic and managing the GPON Encapsulation Method (GEM) port security associations. This hardware-based approach ensures line-rate encryption performance without compromising data plane throughput. The device firmware is structured to support full OMCI (ITU-T G.988) managed entities, enabling the Huawei GPON line card to act as the sole OMCI controller for key derivation and key exchange during the ONU activation and ranging process. This interoperability is achieved through rigorous adherence to the ITU-T G.984.3 and G.988 standards, ensuring the cryptographic handshake follows the

defined state machine for key generation and synchronization .

KEY FEATURES & ROUTING LOGIC

- OMCI-Based Crypto-Key Management: Full compliance with ITU-T G.988 OMCI specifications for managing the GPON key exchange protocol. The ONU responds to key requests from the Huawei OLT and performs internal key derivation functions to secure the physical layer overhead (PLOAM) and encrypted traffic channels.
- Multi-Vendor OLT Compatibility: Explicitly designed to interoperate with a wide range of OLTs, including Huawei MA5600T and MA5800 series, FiberHome OLTs, and ZTE OLTs, ensuring flexible deployment scenarios for mixed-vendor network architectures .
- Advanced Security Features: Supports data encryption (AES-128), broadcast grouping prevention, port VLAN separation, and ACL-based packet filtering to maintain robust data isolation at the subscriber edge .
- Dynamic Bandwidth Allocation (DBA): Supports DBA mechanisms that work in conjunction with secure key exchange to maintain bandwidth efficiency and QoS without interrupting the secure channel.
- Remote Management and Maintenance: Integrated OMCI facilitates remote configuration, fault management, and software upgrades, allowing crypto-key policies to be centrally managed from the Huawei GPON line card.

- System Resilience: Incorporates specialized design features for system breakdown prevention and supports power-off alarm functionality, ensuring stable operation critical for maintaining session keys .

COMPLIANCE & STANDARDS

The interoperability of FiberHome ONUs with Huawei GPON line cards is underpinned by strict compliance with international telecommunications standards. Key certifications and standards include:

- ITU-T G.984.1/G.984.2/G.984.3 (GPON Physical Layer and Transmission Convergence Layer): Ensures physical and data link layer interoperability.
- ITU-T G.988 (OMCI): Defines the management and control interface for ONUs, directly supporting the crypto-key exchange protocol.
- CE, RoHS, and Anatel Certifications: Compliance ensures the hardware meets regulatory requirements for electromagnetic compatibility, environmental safety, and telecom standards across multiple global markets .
- IEEE 802.1P/Q (VLAN Tagging and Priority): Supports VLAN-based traffic separation and quality of service (QoS), essential for secure data segmentation.

TECHNICAL SPECIFICATIONS

The following table summarizes the core technical specifications of the FiberHome GPON ONU platform validated for crypto-key interoperability with Huawei GPON line cards. Parameters are defined per the operating conditions set by the Huawei SmartAX series OLTs.

Parameter	**Specification**
Form Factor	Compact Desktop / Wall-Mountable ONU
GPON Standard	ITU-T G.984.1, G.984.2, G.984.3
Optical Connector	SC/UPC or SC/APC (Selectable per SKU)
LAN Ports	1x GE (10/100/1000Base-T), 1x FE (10/100Base-T)
Voice Ports	1x FXS (TEL) - RJ11
Wi-Fi Standard	IEEE 802.11 b/g/n/ac (2.4GHz & 5GHz dual-band)
Antenna Type	External 5dBi Dual-Band Antenna (2x)
Forwarding Capacity	Non-blocking line-rate forwarding for 1GE + 1FE + Wi-Fi
Encryption Support	AES-128 (GPON downstream encryption)
Power Supply	12V DC, 1.5A (External Power Adapter)

Power Consumption	< 12W (Typical)
Operating Temperature	0°C to 40°C
MTBF (Hours)	> 100,000 hours
Compatibility (OLT)	Huawei SmartAX MA5600T/MA5800, FiberHome OLT, ZTE OLT
Management	OMCI (G.988), TR-069, SNMP, Web UI
Certifications	CE, RoHS, Anatel

ORDERING SKU INFORMATION

Enterprise asset managers and procurement departments may reference the following SKUs and configurations for network rollouts requiring verified crypto-key interoperability with Huawei GPON infrastructure. The platform is offered in multiple form factors to address various subscriber density and deployment scenarios.

- SKU: FH-AN5506-02B-GPON

  - Description: Single ONU supporting 1x GE, 1x FE, and 1x TEL interface with integrated 2.4GHz/5GHz Wi-Fi. Validated crypto-key exchange compatibility with Huawei GPON OLTs.

- SKU: FH-AN5506-02B-SFP

- Description: Modular variant supporting industry-standard SC/UPC or SC/APC optical connectors, ensuring physical layer compatibility with Huawei's GPON line card interfaces.

- Accessories: External power adapter (12V/1.5A) and 5dBi dual-band antennas are available as standard accessories to ensure optimal RF performance.



DEPLOYMENT ARCHITECTURE RECOMMENDATIONS

For successful integration of FiberHome ONUs in Huawei GPON networks, the following best practices are recommended:

1. OMCI Compatibility Check: Ensure the Huawei GPON line card firmware version supports standard OMCI managed entities (MEs) as defined in G.988 for encryption key management.

2. Authentication Mode: Configure the OLT to operate in auto-discovery mode with authentication based on ONU serial number or password, as supported by both the FiberHome ONU and Huawei OLT.

3. Key Derivation Timers: Align the encryption key exchange timers on the OLT with the default timeout values of the FiberHome ONU firmware to prevent timeouts during key synchronization.

4. Firmware Upgrades: Leverage the remote upgrade feature of the ONU via OMCI to ensure parity with the OLT's security patch levels.

5. VLAN Configuration: Utilize VLAN separation between services (data, voice, management) to ensure secure isolation of management traffic, which carries cryptographic key exchange messages.

LIFECYCLE ASSURANCE

The FiberHome ONU platform is engineered for carrier-grade reliability and long-term support. The device employs robust hardware components and heat dissipation design to ensure an MTBF (Mean Time Between Failures) of over 100,000 hours under normal operating conditions (0°C to 40°C). This reliability is critical for maintaining stable crypto-key exchange sessions and minimizing service disruption in large-scale FTTH deployments. The platform's support for remote software upgrades enables operators to swiftly deploy security patches, maintaining compliance with evolving GPON encryption standards. The

compatibility with Huawei's management systems allows for centralized monitoring of the encryption status, providing end-to-end visibility of the security posture of the access network.

CONCLUSION

FiberHome's commitment to standards-based engineering ensures its ONU product line offers seamless crypto-key exchange interoperability with Huawei GPON line cards. By adhering to the ITU-T G.984 and G.988 specifications and maintaining compatibility across major OLT vendors, FiberHome provides network operators with the flexibility and security needed for next-generation GPON deployments. This document serves as the official technical reference for network engineers and procurement specialists evaluating FiberHome ONUs for integration into Huawei-dominated access networks.