High-Density Fiber Infrastructure Application Note: FiberHome GC16B 16-Port GPON Interface Card Thermal Profile and Optical Budgets

TECHNOLOGY OVERVIEW

The FiberHome GC16B is a carrier-grade 16-port GPON interface card engineered for deployment within the FiberHome AN5516 series Optical Line Terminal (OLT) chassis, including the AN5516-01, AN5516-04, AN5516-06, and AN5116-06B platforms. As a line card within a modular OLT architecture, the GC16B serves as the optical access termination point for Passive Optical Networks (PON), aggregating subscriber traffic from Optical Network Units (ONUs) across a passive optical distribution network (ODN). The card is designed to deliver high port density, efficient thermal management, and flexible optical budget configurations to meet the diverse requirements of carrier FTTH, enterprise campus, and ISP access deployments.

The GC16B designation reflects its position as a 16-port GPON interface card in the FiberHome portfolio, distinct from the 8-port GC8B variant and the widely deployed GCOB model. This application note provides a focused examination of the card's thermal operating envelope and optical power budgeting parameters—two critical engineering dimensions that determine deployment feasibility, ONU density per port, and long-term operational reliability in central office and remote cabinet environments.



SFP+/QSFP INTERFACE MAPPING

The GC16B provides sixteen discrete GPON service interfaces, each populated with a pluggable SFP optical transceiver module. The interface mapping follows the standard FiberHome line card architecture, with GPON ports organized in paired configurations across the card faceplate to facilitate structured fiber routing and connector access. Each GPON port operates in accordance with ITU-T G.984 series standards, supporting the asymmetric 2.488 Gbit/s downstream and 1.244 Gbit/s upstream line rates characteristic of GPON technology.

Optical connector interfacing utilizes the SC/PC form factor, the predominant connector type in FiberHome GPON deployments, ensuring compatibility with

standard single-mode fiber patch cords and ODN infrastructure. The card supports hot-swappable SFP modules, enabling optical transceiver replacement without card-level service interruption. The SFP interfaces are designed to accommodate Class B+, C+, and C++ optical module variants, providing operators with flexibility in optical budget selection based on ODN loss characteristics and split ratio requirements.

For management and diagnostic access, the card provides a local console interface for out-of-band commissioning and troubleshooting, separate from the in-band GPON service paths.

REDUNDANT POWER SYSTEM

The GC16B operates within the redundant power architecture of the host AN5516 series chassis. Power is distributed from the OLT's hot-swappable, load-sharing power supply units to the line card via the backplane, ensuring that a single PSU failure does not compromise card operation. At the card level, the GC16B employs a low-power GPON MAC chip design that reduces power consumption relative to earlier generations, a critical consideration for high-density line card deployments where thermal load accumulates across multiple slots within a single chassis.

Typical power consumption for the 16-port GPON interface card family is specified at ≤ 50W under nominal operating conditions, with maximum consumption figures varying by optical module class and traffic load. The static power draw remains substantially lower, reflecting the efficiency of the store-and-forward switching architecture and the optimized silicon design.

CAPABILITY METRICS

The GC16B supports a maximum split ratio of 1:128 within the constraints of the available optical power budget, enabling a single GPON port to serve up to 128 ONUs over the passive ODN. With sixteen ports, a fully populated card can theoretically support up to 2,048 ONU connections, though practical deployment densities are typically governed by optical budget limitations and service-level oversubscription ratios.

Key capability parameters include support for 1,024 T-CONTs per PON port and 4,096 GEM ports per PON port, enabling granular service provisioning and QoS differentiation across multiple subscriber VLANs. The card implements Dynamic Bandwidth Allocation (DBA) with a granularity of 64 kbit/s, facilitating efficient upstream bandwidth utilization across the PON tree. The MAC address table supports 32K entries, sufficient for the addressing requirements of dense ONU populations. Forwarding operates in store-and-forward mode, with integrated

FEC (Forward Error Correction) and OAM (Operations, Administration, and Maintenance) capabilities per ITU-T G.984.3.

Parameter	Specification
Form Factor	Line card for FiberHome AN5516-01 / AN5516-04 / AN5516-06 / AN5116-06B OLT chassis
GPON Port Count	16 GPON interfaces (SC/PC connector)
Forwarding Mode	Store-and-forward
MAC Address Table	32K entries
Maximum Split Ratio	1:128 (within optical power budget limits)
Maximum ONU Support per Card	2,048 (theoretical, subject to optical budget and traffic engineering)
T-CONT per PON Port	1,024
GEM Ports per PON Port	4,096
DBA Granularity	64 kbit/s
Supported SFP Classes	Class B+, C+, C++
Optical Connector	SC/PC
Fiber Type	G.652 single-mode fiber
Typical Power Consumption	≤ 50 W
Operating Temperature (Long-term)	0°C to 45°C (chassis-dependent)

Operating Temperature (Short-term)	-5°C to 55°C (chassis-dependent)
Storage Temperature	-40°C to 70°C
Storage Humidity	10% to 100%
Management Interface	Local console (serial)

COMPLIANCE AUDIT

The GC16B is designed to comply with the following standards and regulatory frameworks:

- ITU-T G.984.1: GPON general characteristics
- ITU-T G.984.2: GPON Physical Media Dependent (PMD) layer specification
- ITU-T G.984.3: GPON Transmission Convergence (TC) layer specification
- ITU-T G.984.4: ONT Management and Control Interface (OMCI) specification
- IEEE 802.3 / 802.3ah: Ethernet and EPON coexistence considerations
- IEEE 802.1D / 802.1p / 802.1Q: Bridging, priority tagging, and VLAN operation
- IETF RFC 2236: IGMP v2 for multicast group management
- TR-156: Broadband Forum architecture for GPON access

Optical module compliance follows the GPON PMD class definitions per G.984.2, with Class C+ modules providing a nominal optical budget of 32 dB

and Class B+ modules providing 28 dB. The card's thermal design is validated against the operating temperature ranges specified by FiberHome for the host OLT platform, with short-term and long-term ratings applicable to central office and controlled environmental cabinet deployments.

SCALING STRATEGY

Deployment scaling with the GC16B follows two primary vectors: port-level scaling through the sixteen GPON interfaces, and optical budget scaling through appropriate SFP module class selection. For ODNs with loss profiles up to 28 dB, Class B+ modules support 1:64 split ratios; for higher-loss ODN architectures requiring 32 dB budgets, Class C+ modules enable 1:128 split ratios, effectively doubling the subscriber capacity per port.

Thermal scaling considerations become paramount when deploying multiple GC16B cards within a single AN5516 chassis. The cumulative heat dissipation across a fully populated chassis necessitates adequate forced-air cooling, which the AN5516 platform provides through its fan card architecture. Operators deploying the GC16B in high-density configurations should verify that chassis-level thermal capacity and airflow are within specification, particularly in ambient conditions approaching the upper operating limits.

For network growth, the GC16B integrates seamlessly with FiberHome's broader OLT portfolio, including coexistence with 10G PON and future 50G PON line cards within the same chassis where supported. This forward compatibility protects operator investment in ODN infrastructure while providing a migration path toward higher-capacity PON technologies.

