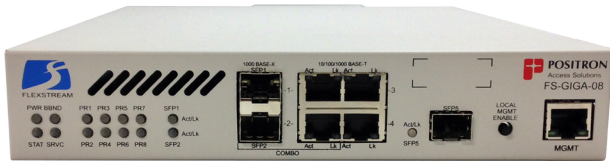


FlexStream FS-GIGA Ethernet Access Device (Up to 1 Gbps) Multi-Pair VDSL2/ADSL2+, G.hn / G.fast and GigE Fiber



FS-GIGA

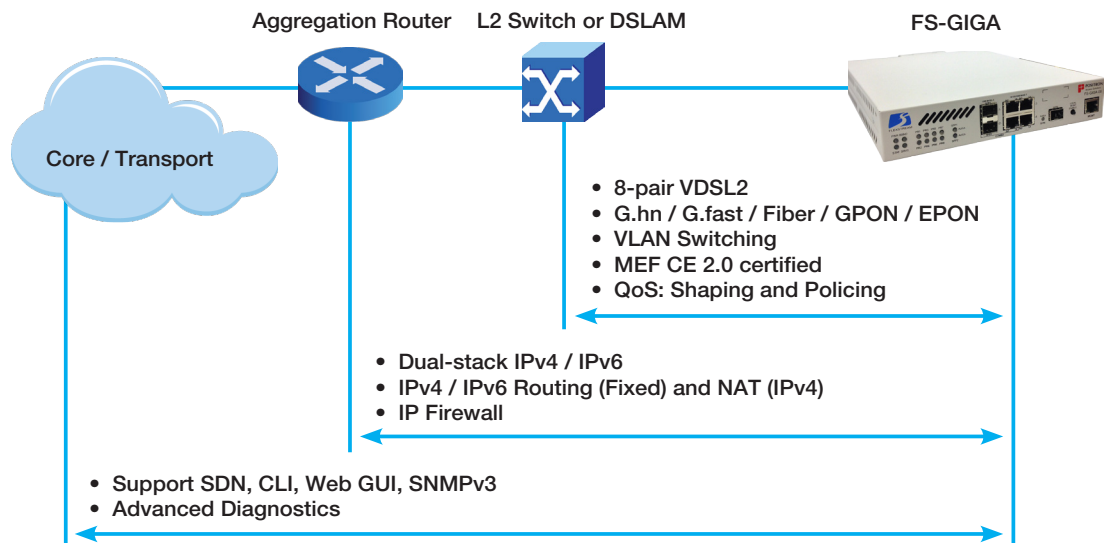
- **5 GigE Ports:**
 - 1 SFP
 - 2 RJ-45 (Electrical)
 - 2 Dual SFP / RJ-45
- **Bonded VDSL2** (8 pairs)
- **SFP Ports can be used with:**
 - Fiber / GPON / EPON
 - G.hn / G.fast
- **Management: RJ-45** (GigE)

Applications

The FS-GIGA is specifically designed as a carrier grade solution to provide Ethernet services for business Internet access, MTU, small cell backhaul, L2 VPN, streamed video and Gigabit connectivity. It is environmentally hardened to provide service providers the flexibility to place the unit inside a building or in an outside plant cabinet.

Feature Overview

The FS-GIGA interfaces naturally to an Ethernet switch or to a 3rd party DSLAM/ MSAN over multi-pair VDSL2 with comprehensive support for VLAN and Metro Ethernet Forum standards. It also provides support for G.hn and G.fast via any of its gigabit SFP ports. The Layer 3 features of the FS-GIGA make it the ideal “light touch” IP Router to complement the role of the aggregation router at the edge of the core/ transport network infrastructure. The FS-GIGA supports the simplicity and scalability of SDN to further facilitate the delivery of Managed Ethernet Services. Turning on wholesale and business Ethernet services has never been easier. Of course, the FS-GIGA also offers comprehensive support for SNMP, CLI and web GUI management interfaces.



Bonded VDSL2 and ADSL2+ Access

The FS-GIGA is a standards-based 8-pair VDSL2 and ADSL2+ EAD which provides network operators the means to deliver advanced Ethernet over bonded copper services to business customers at minimal cost over their existing copper infrastructure. The FS-GIGA is fully standards compliant and interoperates with leading 3rd party DSLAMs from Nokia, Calix, Adtran, Huawei and others. When using Vectoring and Impulse Noise Protection (G.INP), the FS-GIGA delivers the best possible VDSL2 performance under all conditions.



Gigabit Fiber Ethernet Access

The FS-GIGA delivers Gigabit Ethernet over all of its Ethernet ports (SFP and RJ-45 port). As such, it offers a seamless migration to Gigabit Ethernet while preserving the same advanced features and management capabilities. The Ethernet ports of the FS-GIGA EAD are configurable in WAN (NNI) or LAN (UNI) mode.

Flexible SFP Ports for Additional Technologies

The FS-GIGA has three (3) Gigabit SFP ports that support fiber interfaces: active Ethernet, GPON and EPON. It also supports the G.hn and G.fast ITU standards to deliver Gigabit services at distances up to 1500 feet (500 meters) over existing Telephone or Coax wiring inside MTU building or used to connect individual business locations.

Gigabit Switch/Router Core

At the heart of this platform is an advanced high performance CE 2.0 Ethernet switch/router core incorporating Layer 2 and Layer 3 routing, security and quality of service capabilities. All ports connected to the switch/router core support Gigabit Ethernet speeds.

Metro Ethernet Services

The FS-GIGA is CE 2.0 certified and delivers Ethernet services such as Ethernet Private Lines (EPL and EVPL), Ethernet Private LAN services (EP-LAN and EVP-LAN) and Ethernet Access (ACCESS-EPL and ACCESS-EVPL) as per the Metro Ethernet Forum CE 2.0 standard as well as CE 1.0 (MEF 9 and MEF 14) specifications.

Service OAM Monitoring and Service Turn-up

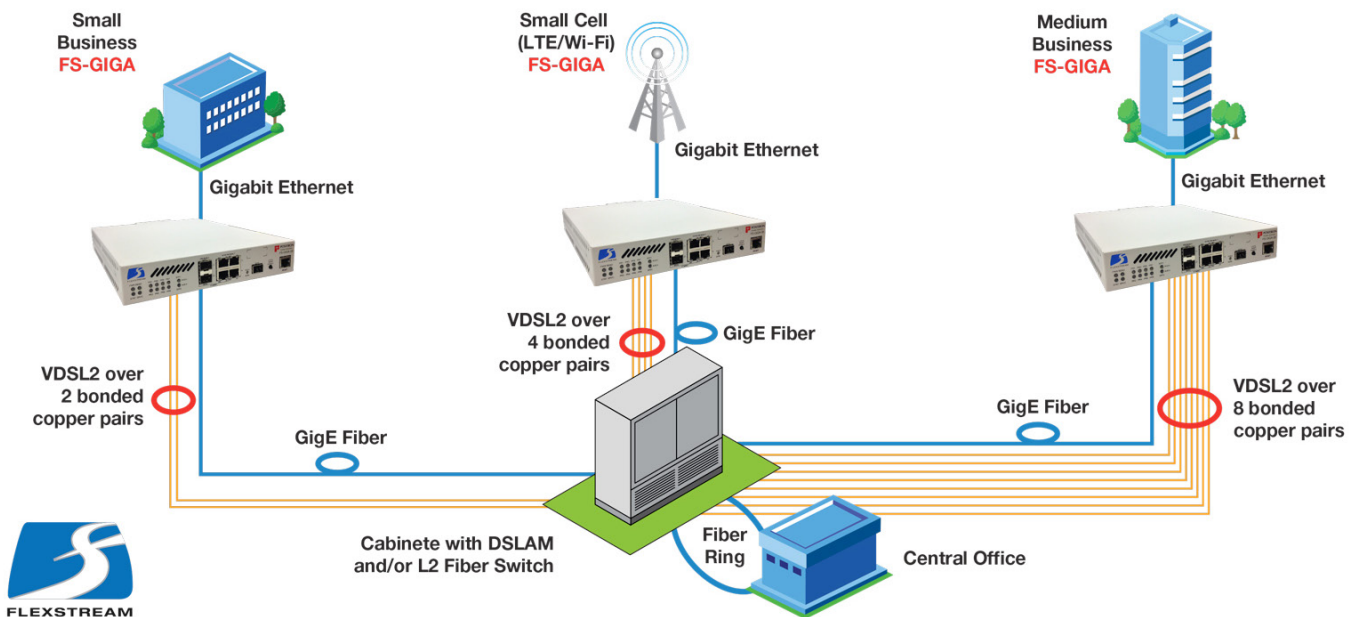
Monitoring the quality and availability of every dataflow as part of the carrier Ethernet service is achieved with IEEE 802.1ag (ITU-T Y.1731) and IEEE 802.3ah. Circuit delivery validation and trouble shooting can be done using RFC2544 traffic test.

Layer-3 Support

The Layer 3 IP features of the FS-GIGA are ideal to handle public and private IP address translation in a flattened L2 network infrastructure to deliver carrier Ethernet, Internet and IP services with one device. The FS-GIGA provides extensive dual-stack IPv4/IPv6 support with static routing.

Accelerated Deployment and Service Provisioning

The FS-GIGA is perfectly suited for any managed environment and supports all the common management interfaces such as SDN, XML/SOAP, SNMP, Telnet, SSH, HTTP and HTTPS.

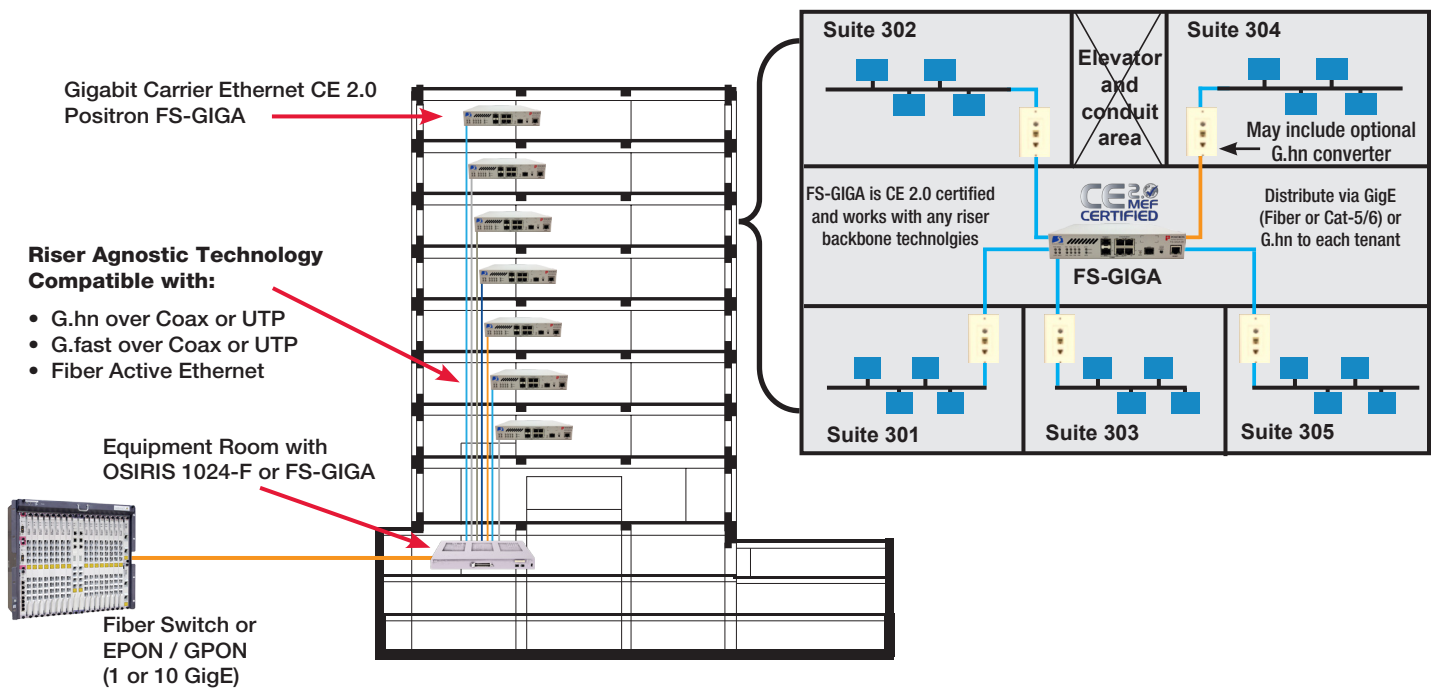


MTU Application: Gigabit Bandwidth to any Floor on Existing Wiring

The FS-GIGA is an ideal platform to distribute a managed Ethernet Business Service to multiple tenants on any floor of a business building (MTU). With support for multi-pair VDSL2, G.hn and G.fast (both over copper or Coax), Ethernet (Cat 5/5E/6) and fiber (active, GPON or EPON), the FS-GIGA is completely agnostic to any wiring that can be found in such an MTU environment.

By leveraging the CE 2.0 capabilities of the FS-GIGA, an Operator can deliver services with guaranteed bandwidth to individual tenants that are backed by Service Level Agreements (SLA).

The Service OAM features of the FS-GIGA provide precise delay and jitter measurements for pro-active monitoring and management of the E-LINE, E-LAN or E-ACCESS service.



Network Termination Equipment FS-GIGA-08-OUT-AC



- Options:**
- Sealed enclosure with protection (NEMA4X – IP65)
 - AC/DC power supply
 - ±190 VDC line power module

Technical Specifications

Basic Hardware

- 8 VDSL2, ADSL2+, ADSL2 and RE-ADSL2 pairs
- 1 x 10/100/1000 BaseX Ethernet uplink (SFP port)
- 2 x Gigabit Ethernet ports (RJ-45)
- 2 Dual-mode RJ-45 and SFP 10/100/1000 BaseX Ethernet
- All Ethernet ports are Gigabit full duplex with auto-sense, automatic cross-over
- 1 x Gigabit Ethernet management port
- Link status and activity LEDs

Support for ITU-T VDSL2 & ADSL2+ Standards

- ITU-T G.992.1, G.992.2, G.992.3 (ADSL2), G.992.5 (ADSL2+)
- ITU-T G.993.2 VDSL2, G.993.5 (G.vector)
- ITU-T G.996.1 (G.test), G.997.1 (G.ploam)
- ITU-T G.999.1
- ITU-T G.998.4 (G.INP)
- IEEE 802.3ah EFM bonding

Outside Plant Pair

- T1.417 spectral compliant
- Resiliency: automatic pair failure protection
- Configurable Impulse Noise Protection and Latency
- BER: 10⁻⁷

Support for G.fast

- ITU-T G.7000 and G.7001

Support for G.hn

- ITU-T G.9960 Amendments 1 and 2

Fault Monitoring

- Alarm Generation
- Automatic re-introduction of fixed pairs
- SELT and DELT support under control of the DSLAM

Layer-2 Functionality

- IEEE 802.1d Transparent Bridging
- IEEE 802.1p QoS on Ethernet Level
- IEEE 802.1q VLAN Tagging
- IEEE 802.1ad Provider Bridges or Q-in-Q
- VLAN Switching
- Port-based VLANs
- Bandwidth Profile

Operations and Maintenance (OAM)

- IEEE 802.1ag (ITU-T Y.1731) and IEEE 802.3ah
- RFC 2544
- CE 2.0 certified
- MEF E-LINE, E-LAN & E-ACCESS

IP Functionality

- Dual Stack IPv4/ IPv6
- IPv4 NAT/PAT
- DHCP client/server

- Basic and Extended IP filtering
- Static routing

Quality of Service (QoS)

- Traffic Classification and Policing (inbound/outbound)
- Priority Queuing Layer 2 (8 levels, programmable)
- Priority Queuing Layer 3 (DiffServ)
- Traffic Shaping and policing
- Queuing mechanisms: SP, RR, WFQ
- Hierarchical QoS

Performance and Scalability

- Number of concurrent EVCs: 256
- Dynamic bridging: 8K MAC addresses

Maintenance and Management Support

- SDN (as per MEF Presto SDK)
- Command Line Interface (CLI)
- HTTP, HTTPS, GUI Web Interface
- SSH and Password protection
- Radius AAA, TACACS+
- Secure and unsecure FTP/ TFTP for configuration and firmware
- SNMPv1, v2, v3, MIB II, proprietary MIB
- Statistics 15 min and 24 hours
- Traffic monitoring: roundtrip delay, jitter, loss

Mechanical Specifications

- Rackmount unit dimensions: 8.5" (216 mm) Wide x 11.2" (284 mm) Deep x 1.75" (44 mm) High
- Weight: max 3 lbs (1.4 Kg)

Power Supply

- Input: -48 VDC
- Optional:
 - 110-230 VAC – 50/60 Hz
 - ±190 VDC
- Power consumption: 26 W
- Operating Temperature: -40 to +65 °C
- Storage Temperature: -40 to +70 °C
- Relative Humidity: up to 95% non-condensing

Regulatory Approval

- UL 60950
- FCC Part 15 Class A
- Tested to GR-487

Ordering Information

Part Number	Description
Remote Units	FS-GIGA-08
FS-GIGA-08	FS-GIGA-08 rack mount unit with fans (8-pair VDSL2)
FS-GIGA-08-OUT	FS-GIGA-08 wall mount unit without fans (8-pair VDSL2)
NTE Kits	Universal CPE (FS-GIGA-08) in FS-CAB-08 Enclosure
FS-GIGA-08-OUT-DC	8-pair FS-GIGA-08 factory installed in an IP65 Enclosure Includes a primary pair protection module (5-pin gas tube protectors not included)
FS-GIGA-08-OUT-AC	8-pair FS-GIGA-08 factory installed in an IP-65 Enclosure Includes a primary pair protection module (5-pin gas tube protectors not included) Includes a FS-ACDC-EXT 110-220 VAC to -48 VDC power supply
FS-GIGA-08-OUT-LPWR	8-pair FS-GIGA-08 factory installed in an IP65 Enclosure Includes a primary pair protection module (5-pin gas tube protectors not included) Includes a FS-LPWR ±190 VDC to -53 VDC power supply (required 2 dedicated copper pairs)
Ancillaries for Cabinets	Spares, Brackets and Options
FS-PROT-08	Protection module FS-GIGA-08
FS-GAS-TUBE	5-pin gas tube protector
FS-ACDC-EXT	110-220 VAC to -48 VDC power supply
FS-LPWR	2-pair line power ±190 VDC to -53 VDC power supply (requires 2 dedicated copper pairs)
FS-POLE-BKT	Pole-mount bracket kit
FS-GIGA-SP	Fiber spool
Ancillaries for Rack mount	Spares, Brackets and Options
FS-GIGA-PWR	AC to -48 VDC power supply for FS-GIGA-08 rack mount
FS-GIGA-FB19	19" brackets for FS-GIGA-08 rack mount
FS-GIGA-FB23	23" brackets for FS-GIGA-08 rack mount
FS-GIGA-FFL6	6-pack of air filters for FS-GIGA-08 rack mount
FS-GIGA-FAN	Fan replacement kit for FS-GIGA-08 rack mount

Optical Modules (SFP)	Speed	Wavelength	Media Type	Reach
SFP-850-500M-1G	1 Gb/s	850nm	Multimode	550 m
SFP-1310-10K-1G	1 Gb/s	1310nm	Single Mode	10 km
SFP-1310-1490-10K-1G	1 Gb/s	1310 - 1490nm	Single Mode	10 km
SFP-1490-1310-10K-1G	1 Gb/s	1490 - 1310nm	Single Mode	10 km
SFP-1310-1490-20K-1G	1 Gb/s	1310 - 1490nm	Single Mode	20 km
SFP-1490-1310-20K-1G	1 Gb/s	1490 - 1310nm	Single Mode	20 km
SFP-1310-1490-40K-1G	1 Gb/s	1310 - 1490nm	Single Mode	40 km
SFP-1490-1310-40K-1G	1 Gb/s	1490 - 1310nm	Single Mode	40 km
SFP-1490-1590-80K-1G	1 Gb/s	1490 - 1590nm	Single Mode	80 km
SFP-1590-1490-80K-1G	1 Gb/s	1590 - 1490nm	Single Mode	80 km