10G Ethernet Universal Service Module

EM316EUSM-10G

Overview

The Fiber Driver 10G Ethernet Universal Service Module (EUSM™) is a converter-based optical 10G Ethernet demarcation device for "bookend pair" applications only. Flexible and cost-effective architecture reduces both operating and capital expenses (OpEx and CapEx) while providing premium services. Native support for jumbo packet sizes up to 9600 bytes supports demanding Ethernet services such as distributed video and network storage arrays.

Located at the edge of the customer premises, the EUSM-10G CO/CPE pair provides carrier-to-customer network interface that separates the upstream WAN from the downstream network which can be either a customer LAN or a peer carrier network. Each EUSM-10G in the bookend pair uses extended OAM 802.3ah protocols to allow full management of both ends of the point-to-point fiber optic link from a single manager at one end of the link. CO and CPE link ports on the respective EUSM-10G modules are each controlled similarly from the managed side of the link.

Highlights

- 10 Gbps Ethernet
- Centralized link (CO and CPE) full management through IEEE802.3ah with MRV extensions
- Interfaces:
  - Two SFP+ access ports
  - Two redundant XFP optical trunk ports with LAN and WAN PHY support
- Performance monitoring with extensive hierarchical OAM, Ethernet switching, and RMON MIB statistics
- Jumbo packets (9600)
- Sub-microsecond latency (0.6 us = 600 ns)
- Per port bandwidth limiting
- Unfiltered traffic flow for Transparent Line Services (TLS)
- Fiber Driver management compatibility
- Hot-swap support
- Two-slot module fits into 2-slot, 3-slot (3V), and 16-slot Fiber Driver chassis

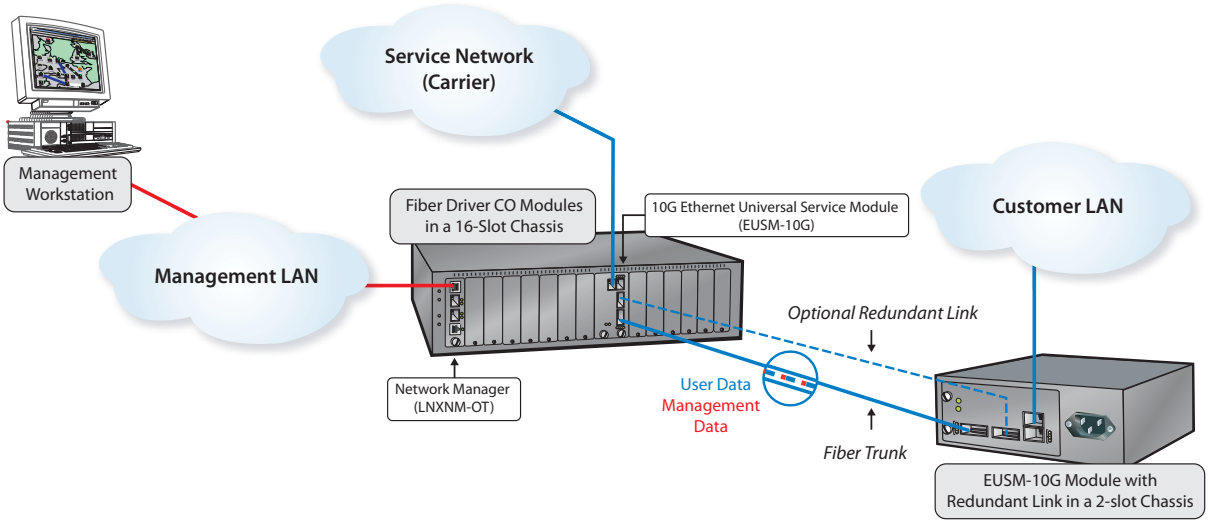
Applications

- Converter-based services demarcation
- Signal repeating
- Transparent LAN services

Benefits

- Carrier-grade reliability at converter-level prices (low CapEx)
- Minimized truck rolls for reduced OpEx
- Extreme low latency with full performance monitoring
- Field feature enhancement

Peer Application #1: *Customer Demarcation*



Flexibility

Flexible interface options reduce inventory needs and OpEx. 10G small form-factor pluggable (SFP+ and XFP) optical transceivers provide further flexibility by interoperating with any 10G Ethernet access interfaces. Pluggable transceivers are available for a range of 10G Ethernet access optical fiber types, distances, and wavelengths, including short and long reach multi-mode as well as short to medium reach single-mode and DWDM from 2 km to 100 km.

The module offers two modular SFP+ access ports, interoperable with 10G Ethernet standard interfaces.

The module also offers two redundant modular XFP ports that support 10G Ethernet traffic over a variety of optical links up to 100 km including gray wavelengths, and DWDM. The extended form-factor pluggable XFP transceivers offer the ultimate flexibility for a wide variety of trunk link solutions, including media conversion to DWDM transport.

Ethernet Provider Services

Beyond the flexibility of physical interfaces, the EUSM-10G offers Transparent Line Services (TLS) for monitoring and control over the demarcation device.

Optical Performance Monitoring

The EUSM-10G implements a powerful set of optical performance monitoring tools compliant with the Digital Diagnostics (DD) standards (SFF-8472 and SFF-INF-8077i). Through DD, the EUSM-10G provides real-time monitoring and reporting of SFP+ or XFP operating parameters such as optical TX/RX power, voltage, and temperature. It also provides static component information such as vendor code, serial number, wavelength, maximum bandwidth supported, and other device specifications. The intelligent SFP+ or XFP agent provides alarm and warning indications to the EUSM-10G to identify potential problems in optical transmission when pre-defined thresholds are crossed. Network administrators may avoid service outages with preemptive action prompted by threshold alarms.

Ethernet OAM

Operations, administration, and management (OAM) metrics available through a demarcation device significantly determine the SLA options supported by a service provider. The EUSM-10G incorporates industry OAM standards extended with unique MRV enhancements that support network monitoring, service provisioning, and speedy fault isolation remotely from the network operation center (NOC) through the network.

At the point-to-point link level, the EUSM-10G fully implements the 802.3ah standards with MRV enhancements for full pair (CO and CPE) provisioning and monitoring from the service provider NOC or point of presence (POP).

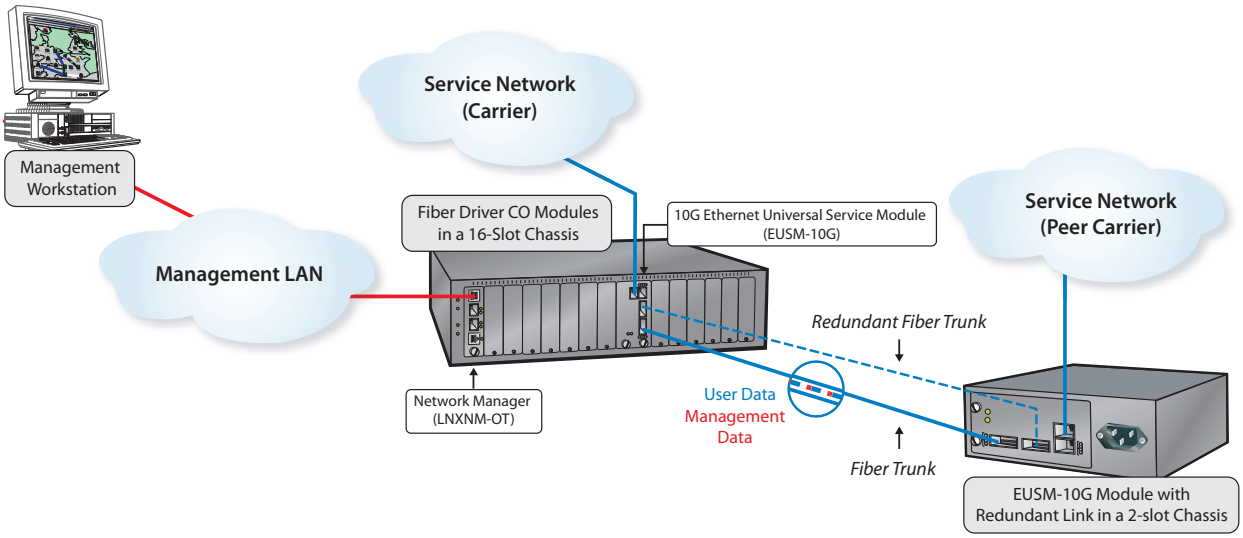
High Availability Optical Links

The EUSM-10G offers service protection. The module's two self-healing (redundant) XFP link interfaces ensure high network availability. It activates redundancy upon loss of optical signal (SD). Ethernet link detection provides a fast switching time to minimize data loss.

The two network line redundancy schemes listed below ensure safe service delivery even during some network failures such as:

- Physical layer 1:1 redundancy based on loss of optical signal (SD) and Ethernet link detection
- 802.3ah OAM 1:1 redundancy

Peer Application #2: *Carrier Demarcation*



DEVICE MANAGEMENT

Link management through 802.3ah with MRV extensions
- Single LNXNM-OT IP/SNMP agent management of multiple links
- Full CO/CPE monitoring and provisioning using

Graphical web management through an embedded MegaVision-J application on the LNXNM-OT

MegaVision Pro® support

LNXNM-OT Fiber Driver network management
- Out-of-band RS-232 management console
- TCP/IP v4
- Secure Access
  - SSH and optional Telnet access
  - SNMP v1 and v3
  - Radius authentication
- ASCII format for simple system configuration
- System software and microcode download
- Automatic system provisioning (default operation)
- System monitoring and provisioning
- Syslog and trap notification

METRO ETHERNET

- Jumbo frames (9600 bytes) at any speed and port
- High availability optical links
- Physical interfaces performance monitoring
  - SFP/XFP Digital Diagnostics (SFF-8472/ INF-8077i)
- Advanced QoS with low granularity rate policing by port

CARRIER ETHERNET MEF Certified Compliant

- Pure (unfiltered) traffic flow for Transparent Line Services (TLS)
  - No MAC address learning
  - Transparent flow control (TLS)
  - End-to-end errored packets (except runts)
- Fault propagation
  - Link Integrity (LIN)
  - Hierarchical OAM connectivity fault propagation
- OAM
  - IEEE 802.3ah with MRV extensions

Datasheet

Physical Specifications	
Operating Temperature Range	0°C to 50°C (32°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Relative Humidity	85% maximum, non-condensing
Approximate Dimensions (H x W x D)	75 mm x 50 mm x 175 mm (3" x 2" x 7")
Approximate Weight	218 g (7.7 oz)
Regulatory Compliances	FCC Part 15 (Class A); IC (Class A); EMC Directive: Emission (Class A) and Immunity; RoHS Directive; China RoHS; WEEE Directive; The Quality Management System is certified to ISO 9001 by QMI-SAI Global The Environmental Management System is in compliance with ISO 14001

Ordering Information

Model	Function	Protocol	Connectors[1] Port/Link	Wavelength (nm) Port / Link	Budget (dB) Port / Link	Range[2] Port / Link
EM316EUSM-10G	10G Optical Ethernet Universal Service Module - fiber (SFP+) access ports and redundant XFP optical trunks; advanced remote management 802.3AH with MRV extensions	10 Gigabit Ethernet	SFP+ (x2) XFP (x2)	SFP+ Dependent XFP Dependent	SFP+ Dependent XFP Dependent	SFP+ Dependent XFP Dependent

[1] Default connectors listed, others optional.
[2] All specifications, distance claims and operational parameters are based on industry average fiber cable performance; 9µ Single-mode performance of 0.25 dB/km for 1550 nm and 0.5 dB/km for 1310 nm, and 62.5µ Multi-mode performance of 3 dB/km for 850 nm and 1.5 dB/km for 1300 nm. For non-standard fiber applications or additional information contact MRV Communications

For additional information including pricing, availability and configuration options, contact your MRV Communication sales representative.

MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at www.mrv.com.
Please e-mail us at **info@mrv.com** or call us for assistance.

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