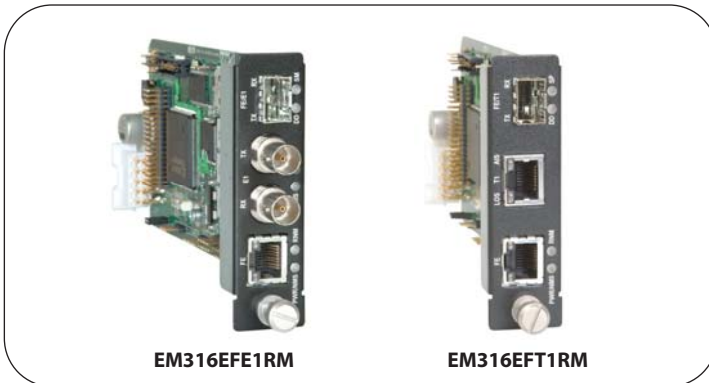




## E1/T1 & Ethernet/Fast Ethernet With Remote Management



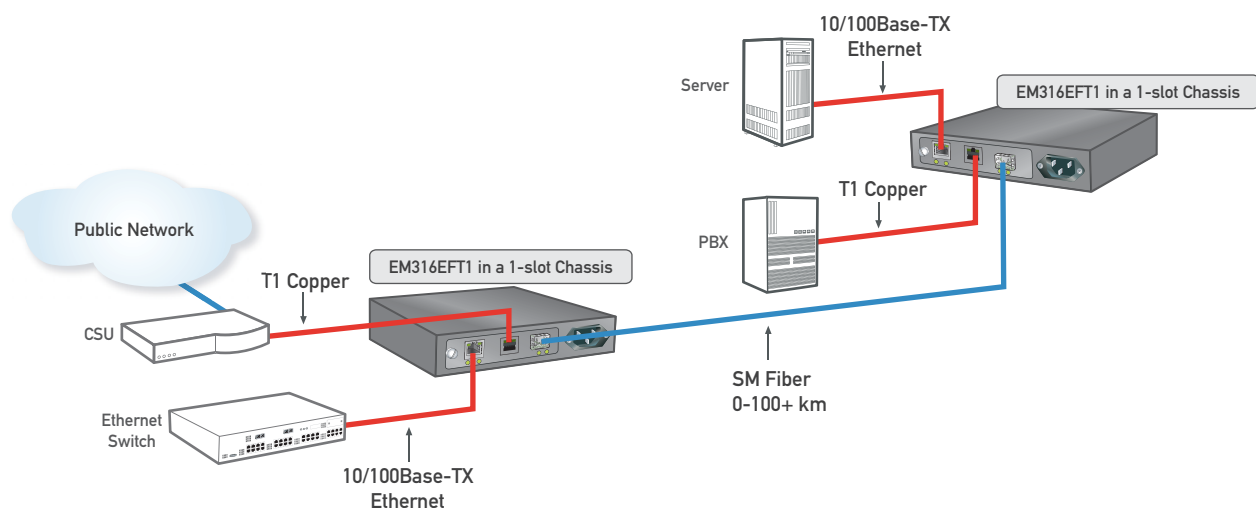
### Overview

The Fiber Driver® EM316EFx1RM modules from MRV Communications extend the distance and functionality of your Optical Ethernet network while optimizing the use of existing fiber optic plant. Using advanced Time Division Multiplexing (TDM) technology, they combine and simultaneously transmit a 10/100 Mbps Ethernet data channel with either an E1 (EM316EFE1RM) or T1 (EM316EFT1RM) channel across a Full Duplex fiber optic trunk to distances only limited by the SFP trunk interfaced used.

The EM316EFx1RM modules are transparent to the framing format, and support HDB3 and AMI line codes. They include an internal elastic buffer to remove jitter from transmit data.

### Features and Benefits

- **Combines E1/T1 with Ethernet/Fast Ethernet over one Full Duplex fiber optic link** - optimizes use of existing fiber plant while extending reach of E1/T1 services
- **802.3ah remote provisioning and management** - eliminates expensive truck rolls
- **SFP trunk port interface** - change optics as needed quickly and easily
- **10/100Base-TX (RJ-45) port with Auto-Negotiation of speed and MDI / MDI-X** - plug-n-play connectivity with any standards compliant Ethernet device
- **Standard T1 (RJ-48) or E1 (BNC) interface** - interoperable with standard E1/T1 devices
- **Link distance of up to 120+ km over Single Mode fiber** - cost effective service deployment over extended distances
- **Built-in Elastic Buffer** - jitter-free E1/T1 signaling
- **SFP Digital Diagnostics (SFF-8472), RMON counters per data port, and Remote Loopback capabilities** - rapid fault isolation that saves Op-Ex by allowing for system service before an outage may occur
- **Link Integrity Notification (LIN)** - end-to-end link state continuity
- **Last Gasp support** - management notification in the event of power failure at remote site
- **Hot swappable** - modules can be Inserted/removed without powering off the chassis
- **Compact form factor** - 1-slot module fits in all powered Fiber Driver chassis





The EM316EFx1RM modules utilize Small Form-factor Pluggable (SFP) trunk interfaces for the ultimate in deployment flexibility and ease of maintenance. The hot-swappable interfaces can be quickly and easily changed as needed, and can be used again at a different site. Accordingly, SFP-enabled network equipment reduces the need for on-hand parts inventory as a small number of spare SFP interfaces can handle the needs of a large installation

Greatly simplifying end-to-end network management and reducing Op-Ex, the Fiber Driver EM316EFx1RM modules fully support the IEEE 802.3ah remote management standard. By overlaying a management channel along the data path, remote link management is achieved without the complexity and cost incurred by standard IP/SNMP management. Offering the most comprehensive management features available, the modules support SFP Digital Diagnostics, per port RMON counters, Last Gasp notification, and local and remote loopback.

### About 802.3ah Remote Management

Following the IEEE 802.3 remote management standard the modules separate the management channel from the data channel, ensuring that the full bandwidth of the data channel is available to the user. There is an inherent level of data security in this method as compared to a typical in-band IP solution where the management hardware could theoretically be used to tap into the user data stream. In addition, the 802.3ah management channel remains unaffected by instabilities in the data channel such as high traffic loads, or topology changes caused by Spanning Tree, OSPF, etc.

The main benefits of the 802.3ah remote management technology are:

- **Cap-Ex/equipment cost savings** - no expensive management agent required at the remote site
- **Simplified deployment** - fewer devices on the network and fewer IP addresses used
- **Improved performance** - no user bandwidth is wasted on in-band management data
- **Reduced Op-Ex** - fewer truck rolls are needed to service remote sites

At the CO or local site, the Fiber Driver® EM316EFx1RM modules are managed via the EM316NM Network Management Module and its RS-232 serial CLI or its in-band 10Base-T Ethernet port.

### About SFP Technology

SFPs (Small Form-factor Pluggables) are extremely small, hot-swappable transceivers, which can be inserted into an access port of any supporting network device to create a data link interface. SFP modules conform to a Multi-Source Agreement (MSA), an industry standard that specifies physical and electrical characteristics, ensuring wide support for the technology.

Most SFP modules are optical transceivers, Multimode (850 nm) or Single Mode (1310 nm). In addition to these types of interfaces, MRV offers SFP that operate at CWDM specific (ITU-T G.694.2 grid) wavelengths, and also a selection of copper SFP interfaces. Should an access port need to reach the next town over, our long haul SFPs can reach distances of up to 120 km or more unamplified.

### About Digital Diagnostics

Many SFPs provide a powerful Digital Diagnostics tool for managing the interface. Fully supported by the EM316EFx1RM modules, Digital Diagnostics is a Multi-Source Agreement (SFF-8472) that includes a large number of manageable parameters, including:

- Optical Transmit Power
- Optical Receive Power
- Voltage & Temperature Measurement
- Vendor Code, Wavelength, Serial Number and other factory parameters

Digital Diagnostics also allows thresholds to be set for alarms when the transmitter power is too low or too high.

### MRV Sales, Service and Support

Delivering value added service and support for nearly 20 years, MRV Communications provides worldwide technical assistance through a highly trained team of dedicated corporate and field based engineers as well as through certified channel partners. Whether your needs are for 24x7 dedicated support, same day replacement parts shipment, on-site support or network design and installation related professional services, you'll gain the opportunity to build a responsive and accountable partnership with the MRV service and support experts.

For more information contact your nearest authorized MRV representative.



**Physical Specifications: E1/T1 & Ethernet/Fast Ethernet**

<b>Operating Temperature Range:</b>	0°C to 50°C (32°F to 122°F)
<b>Storage Temperature:</b>	-40°C to 95°C (-40°F to 203°F)
<b>Relative Humidity:</b>	85% maximum, non-condensing
<b>Physical Dimensions:</b>	25 mm x 75 mm x 175 mm deep (1" x 3" x 7" deep)
<b>Weight:</b>	120 - 240 g (4.2 - 8.5 oz) depending on configuration
<b>Emission Compliance:</b>	FCC - PART 15, SUBPART B, 1999, CLASS A; CE MARK - EN 50081-1:1992; EN 50082:1997; EN 55024:1998; EN 55022:1998; AS/NZS 3548:1995

Ordering Info	Part Number	Function	Protocol	Port Connectors	Trunk Connector	Wavelength (nm)	Range (km)
	<b>EM316EFE1RM</b>	E1 & Ethernet/Fast Ethernet with Remote Management	E1 & Ethernet/Fast Ethernet	BNC (E1) & RJ-45 (Ethernet)	SFP	(SFP Dependent)	(SFP Dependent)
<b>EM316EFT1RM</b>	T1 & Ethernet/Fast Ethernet with Remote Management	T1 & Ethernet/Fast Ethernet	RJ-48 (T1) & RJ-45 (Ethernet)	SFP	(SFP Dependent)	(SFP Dependent)	

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