

9xGbE/10G FEC Muxponder

Effective aggregation of GbE-signals

Key benefits:

- Compact and cost-effective aggregation of 9 GbE-signals to a 10Gb/s line signal
- Dual line ports enabling protected configurations
- Technology agnostic. Pluggable transceivers enable usage in CWDM as well as DWDM networks.
- Tunable optics for full flexibility and cost efficient spare management
- Inbuilt Forward Error Correction (FEC) enables usage in long-haul networks
- High flexibility and simplified management due to Layer-2-aware iWDM™ concept
- Low Power Design ensures low total cost of ownership

The 9x GbE/10G FEC Muxponder is a powerful part of Transmode's TM-Series platform enabling optimized and cost efficient capacity networks based on CWDM / DWDM technology.

Optimized for Ethernet backhaul applications

The typical application of this 9xGbE/10G FEC Muxponder is for IPDSLAM Backhauling, IPTV distribution or Business Ethernet Backhaul networks.

The 9xGbE/10G FEC Muxponder is a single-slot device for aggregation of up to 9 GbE signals onto a 10G line signal.

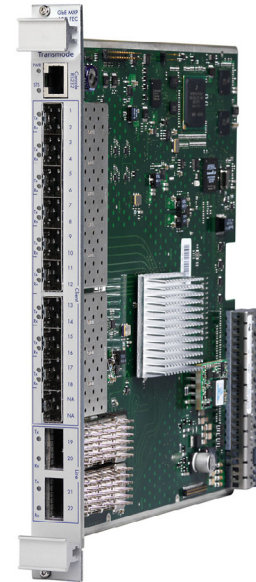
All client interfaces use pluggable transceivers (SFPs). This enables each client connection to be adapted to the interface type (SM, MM etc), as well as the distance to the client equipment. The two line interface are also equipped with pluggable transceivers (XFPs) giving the ability to provide sub 50ms 1+1 line protection simply by inserting a second XFP and configuring the unit via the graphical user interface.

The usage of pluggable transceivers provides a high level of flexibility since the Muxponder can be used in both CWDM and DWDM networks by selecting appropriate type of XFPs.

Both line ports provide Forward Error Correction (FEC) which makes the 9xGbE/10G FEC Muxponder also suitable for amplified long-haul networks.

Simplified management via iWDM

The 9xGbE/10G FEC Muxponder is based on Transmode's "intelligent WDM" (iWDM) concept where the client signals are wrapped into a digital frame having overhead bytes that are used to carry the management channels as well as providing quality control of the transmission via performance data. The embedded management channel simplifies the management of a Transmode network since management access is provided wherever there is a traffic connection.



iWDM Layer 2 awareness

Even though the 9xGbE/10G Muxponder is a Layer-1 device it has inbuilt Layer-2 functions, such as the ability to measure to what extent each GbE-pipe is utilized. This information gives the operator the ability to insert Layer-2 concentration to better utilize each GbE-pipe and thus avoid adding unnecessary wavelengths in the transport network.

Another powerful Layer-2 feature is the ability to inject and extract VLAN management channels on the GbE-ports, see figure 1. This enables easy remote management of Transmode Layer-2 units via the native GbE signal.

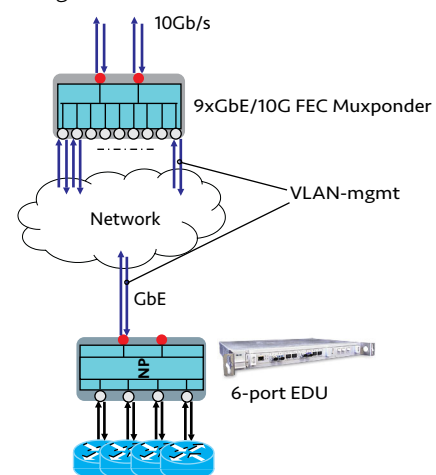


Fig. 1 Remote management of EDU via VLAN management

Figure 1 shows an example configuration where remote access to the EDU unit is easily provided via the management VLAN. This provides an integrated solution for management of both Layer-1 and Layer-2 devices in the network.

Cascaded networks

The line format of the 9xGbE/10G FEC Muxponder is compatible with the TPD10GBE Transponder. As an example, this enables usage of this unit in Regenerator mode to cascade the line signal from the 9xGbE/10G FEC Muxponder over multiple optical subnetworks as shown in the figure below.

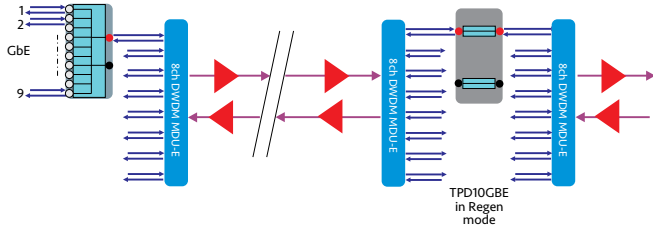


Fig. 2 Cascaded networks using TPD10GBE

Tailored Network Element options

The 9xGbE/10G FEC Muxponder can be mounted in any of the TM-Series chassis options;

- As a self-managed Network Element in a 1U TM-101/102 chassis, see figure 3.
- As one of many traffic units in a TM-3000 (10 1/3U) or TM-301 (3U) chassis

This enables a tailored setup depending on current and future capacity needs of the site.

Technical specifications:

Software release 12.0 or later

Supported traffic formats	GbE optical or electrical
Layer-1 performance monitoring	Client signal: Based on CRC and 8B10B coding errors Line signal: Based on FEC Collected every 15min/24h and presented according to G.826 using ES, SES etc
Protection	1+1 Line protection. Non-revertive switching typically <20ms
Power consumption	Max 32.5W worst case (with all client ports active and using DWDM SPFs)
Misc line interface features	Embedded management channels on line signals Trail Trace insertion to validate connection Forward Error Correction (FEC) using RS(255,239)
Interfaces	Client interfaces: SFP MM, SM @ 1310nm/1550nm, electrical SFPs, CWDM & DWDM Line interfaces: XFP 10Gb/s 40km/70km CWDM (up to 8 channels) or DWDM (up to 40 channels via standard XFP, 80 channels via tunable XFP)
Layer-2 features	GbE utilization PM (in %) per GbE port Inject and extract of management-VLAN on all GbE ports

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In the TM-101/102 option, the 9xGbE/10G FEC Muxponder initiates the complete Embedded Node Management (ENM) on the on-board micro processor. This enables local management simply by connecting any PC or work station and launching a standard internet browser. The embedded management channels enable easy remote management via the line signal. There is therefore no need to provide access to the customer DCN network if the 9xGbE/10G FEC Muxponder is placed at a customer site.

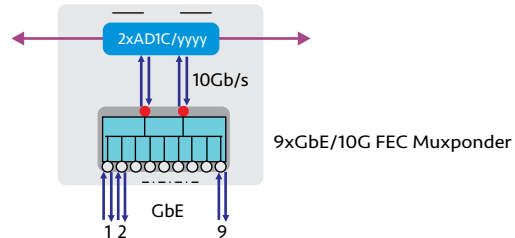


Fig. 3 1U collector node with 1+1 line protection providing low cost redundancy

Low Power Design

A fully equipped 9xGbE/10G FEC Muxponder consumes less than 32W. Low power consumption in combination with a small footprint reduces site costs and enables more capacity to be handled at sites with restrictions on power consumption, cooling and space.