

4xSTM-16/OC-48 Muxponder

An SDH/SONET multiplexer

Key benefits:

- Single-board SDH/SONET Multiplexer
- 4xSTM-16/OC-48 to STM-64/OC-192
- Optional FEC mode enabling long-haul applications
- OH-Transparency mode enabling semi-transparent transport of tributary signals
- Sub 50ms Client protection
- Ability to handle multiple synchronization sources
- Technology agnostic. Pluggable transceivers enable usage in CWDM as well as DWDM networks
- Tunable optics for full flexibility and cost efficient spare management

The 4xSTM-16/OC-48 Muxponder is a powerful part of Transmode's TM-Series platform enabling optimized and cost efficient capacity networks based on C/DWDM technology.

A single board SDH/SONET multiplexer

The 4xSTM-16/OC-48 Muxponder is in essence a standard SDH/SONET multiplexer on a single board. It performs OH-termination, pointer processing, VC-4 switching, parity calculations etc according to standards.

The 4xSTM-16/OC-48 Muxponder also has some extra features that are not covered in the standards. As an option, it is possible to relay OH-information of the tributaries to provide a semi-transparent transport end-to-end. This is a feature that can be of high importance for e.g. a city carrier that needs to preserve the integrity of each tributary signal, but still utilize the transmission network in a cost-efficient way by using multiplexed solutions.

Interfaces based on pluggable optics for low TCO

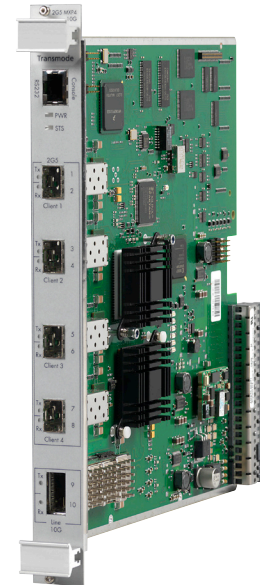
All interfaces are based on pluggable optics, including the line interface. The XFP-based line interface solution enables uncolored, DWDM or even CWDM interface options. The introduction of XFP's with tunable lasers will further enhance the flexibility and lower the total cost of ownership (TCO).

All client interfaces also use SFPs and can therefore support uncolored, CWDM or DWDM options to suit any interfacing requirement.

Usage in multiple applications brings flexibility

The flexibility of the unit enables usage in multiple applications:

- SDH/SONET interconnect: where native STM-64/OC-192 format is of primary importance. This could be the case when the line signal is to be carried through a SDH/SONET network



- DWDM networking: where Forward Error Correction (FEC) is necessary to provide transmission performance over an amplified network, see figure 1
- Transparent transport of STM-16/OC-48 in Carriers-carrier networks

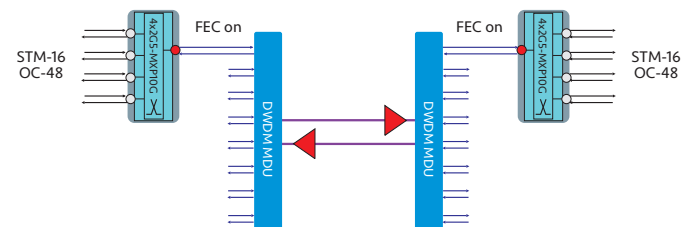


Fig.1 Example DWDM network with FEC enabling transmission performance

The typical application is to use the 4xSTM-16/OC-48 Muxponder as an aggregator of STM-16/OC-48 signals to reduce the number of transported wavelengths. In this mode the FEC-option is activated to provide the extra transmission performance to bridge the distances in amplified networks.

The 4xSTM-16/OC-48 Muxponder can also be used to upgrade a node in a CWDM network to 10Gb/s capacity by using a CWDM XFP on the line port.

Protection of both client and line signals

Client protection can be applied between two client ports on the same 4xSTM-16/OC-48 Muxponder unit or between client ports of two different units, see figure 2. The protection switch is based on loss of optical signal or loss of frame and will be performed within 50ms.

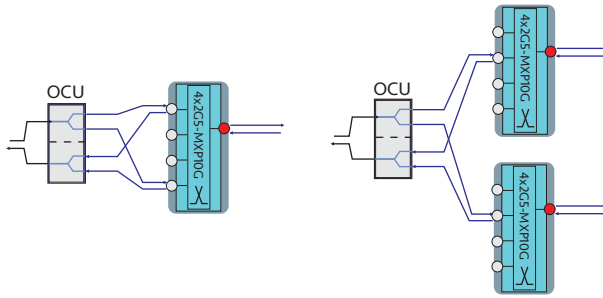


Fig. 2 Client protection

1+1 Line protection can also be provided by combining the 4xSTM-16/OC-48 Muxponder with the TPD10G-Lite Transponder, see figure 3.

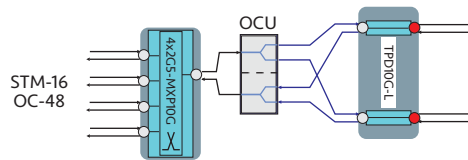


Fig. 3 Line protection

Synchronization sources

Since the incoming tributary signals normally will have different synchronization sources, they need to be frequency aligned prior to being multiplexed.

The frequency alignment is performed via pointer justifications on each incoming tributary signal according to the SDH/SONET standards.

The following synchronization sources can be used:

- Any of the four incoming tributary signals
- The line signal e.g. received STM-64/OC-192 signal
- Internal, on-board oscillator

The selected synchronization source is used to synchronize both outgoing tributaries as well as outgoing line signal. Pointer justifications are thus performed on both incoming as well as outgoing tributary signals.

Change of synchronization source can be manual or automatic and is hitless.

The S1 byte of the used synchronization source is inserted in all outgoing signals that are synched on this source. This is done to indicate quality of the used synchronization.

Tailored Network Element options

The 4xSTM-16/OC-48 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
- As one of many traffic units in a TM-3000 (10¹/₃U) or TM-301 (3U) chassis

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

In the TM-101/102 option, the 4xSTM-16/OC-48 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 thus no need to provide access to the customer DCN network if the 4xSTM-16/OC-48 Muxponder is placed at a customer site.

Technical specifications

Software release 13.0 or later

Client formats	STM-16/OC-48
PM	Based on B1 calculations Collected every 15min/24h and presented according to G.826 using ES, SES etc
OH-transparency	In OH-Transparency more the following OH-bytes are transported transparently between two 4xSTM-16/OC-48 Muxponder units: D1- D3, D4-D12, B1, B2, J0, E1, E2, F1, K1, K2 The S1-byte is set to reflect quality of selected sync source. The VC-4 POH is always transparently transported.
Protection	On-board Client protection. 1+1 line protection via TPD10G-Lite. Non-revertive switching <50ms
Power consumption	Max 35W worst case (with all client ports active and using DWDM SPFs/XFPs)
Misc interface features	Embedded management channels on line signal in FEC mode Embedded management channel support on client interfaces towards Transmode units MXP8 and GXP10/2500-SFP Trail Trace insertion to validate connection
Interfaces	Client interfaces: SFP-based. Supporting SM @ 1310nm/1550nm, SFPs, CWDM & DWDM Line interfaces: XFP 10Gb/s 40km/70km CWDM (up to 8 channels) or DWDM (up to 40 channels via standard XFPs, 80 channels via tunable XFP)

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