

# 4G Multi-Service Muxponder

*A TDM multiplexer for multiple services*

## Key benefits:

- Sync- and data-transparent transport of SDH/SONET, Gigabit Ethernet and SAN formats
- High wavelength utilization via Transmode's Intelligent WDM (iWDM™) concept using 4Gb/s or 2.5Gb/s line rate
- Multi-functional plug-in unit. Same hardware can be used as Muxponder, Transponder and Regenerator
- Technology agnostic. Pluggable transceivers enable usage in CWDM as well as DWDM networks
- Dual line ports enabling sub 50ms 1+1 line protection
- Low Power Design ensures low total cost of ownership

The 4G Multi-Service 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 Metro/Access applications

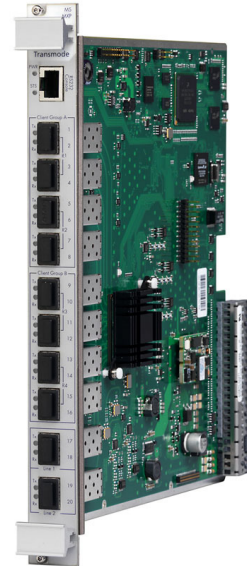
The 4G Multi-Service Muxponder (MS-MXP) is an extremely powerful device for the Metro/access applications where multi-service support, compact design and low power consumption are crucial components. The MS-MXP can be optimized for its purpose by initiating tailored traffic images. Different traffic combinations can be addressed while still maintaining low power consumption and the 4Gb/s line rate provides high utilization of the wavelength capacity. As an example, the MS-MXP can be configured to carry 3x Gigabit Ethernet signals plus 4x STM-1/OC-3 signals, i.e. far better than traditional SDH/SONET solutions that would require multiple plug-in units to support this capacity.

The combination of STM-1/OC-3 and Gigabit Ethernet (Sync-E) is a perfect solution for mobile transmission networks where a combination of circuit switched and packet based connections is required to/from the base station clusters. The MS-MXP can support these networks and also provide a seamless transition to an all-Ethernet solution. This traffic combination is also a powerful option for broadband networks having a mix of ATM/STM-1/OC-3 and Gigabit Ethernet signals.

The MS-MXP can also address large enterprise customers where a combination of Gigabit Ethernet and SAN formats can be seen. The MS-MXP can support 1G as well as 2G Fibre Channel signals in combination with Gigabit Ethernet.

## True transparency multiplexing of SDH/SONET

The 4G Multi-Service Muxponder (MS-MXP) is based on Transmode's Intelligent WDM (iWDM) concept enabling true transparent transport of SDH/SONET signals as compared to SDH/OTN multiplexers where the Section Overhead (SOH) is terminated and thus prevents the usage of the inherent data channels (DCC-channels) of the SDH/SONET frames.



## Three operating modes

The MS-MXP can be configured into a Muxponder, a Transponder or a Regenerator, see figure 1.

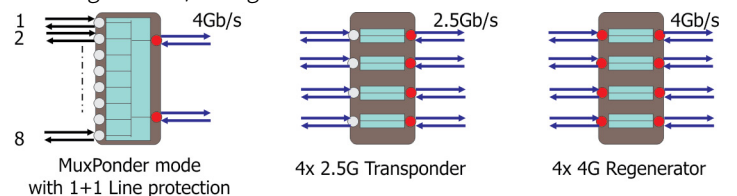


Fig. 1 The three main operating modes of the MS-MXP

This reduces the Operational Expenditures (OPEX ) since the same plug-in unit can be used for both the muxponder and the transponder functions, as well as the regenerator function should the line signal require extension to the bridgeable distance. The regenerator mode can also be used to convert from a CWDM to a DWDM network by using corresponding transceivers (SFPs) on the interfaces, see figure 2. Another application is to use the regenerator mode to convert from one DWDM wavelength to another.

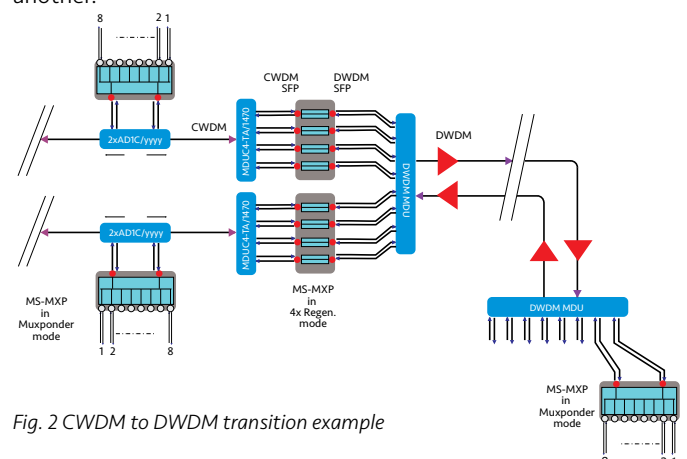


Fig. 2 CWDM to DWDM transition example

### Tailored network element options

The MS-MXP 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 MS-MXP 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 MS-MXP is placed at a customer site.

### Technical specifications:

<b>Supported traffic formats</b>	STM-1/OC-3, STM-4/OC-12, STM-16/OC-48 Gigabit Ethernet (optical/electrical), Fast Ethernet (electrical) 1G/2G Fibre Channel
<b>Layer-1 performance monitoring</b>	SDH/SONET: Based on B1 calculations Gigabit Ethernet: Based on CRC errors SAN formats: Based on CRC errors Line signal: Based on CRC Collected every 15min/24h and presented according to G.826 using ES, SES etc
<b>Layer-2 performance monitoring</b>	Channel utilization (%) on GbE clients
<b>Protection</b>	1+1 line protection on Muxponder images. Non-revertive switching <50ms. Client/Equipment protection on 2.5G Transponder images. Non-reverting switching <50ms
<b>Power consumption</b>	Max 20W worst case (with all client ports active and using DWDM SPFs) 12W w/o SFPs
<b>Misc line interface features</b>	Embedded management channels on line signals Trail Trace insertion to validate connection
<b>Operational modes</b>	Muxponder mode (8 client ports + 2 line ports) with 4Gb/s line interface Transponder mode with 2.5Gb/s line interface 4x Regenerator mode for 4G line signals (with embedded management channels on all 8 line ports) 2x Regenerator mode for 2.5G line signals (with emb mgmt channels on all 4 ports)
<b>Released traffic combinations<sup>1</sup></b>	4G Muxponder images: <ul style="list-style-type: none"> <li>• 3x GbE + 3x STM-1/OC-3 + 1x STM-1/OC-3 or STM-4/OC-12 on 4G line with 1+1 protection</li> <li>• 1x STM-16/OC-48/TPDDGBE + 1x GbE + 3x STM-1/OC-3 on 4G line with 1+1 protection</li> <li>• 2x (4xGbE) on 4G line w/o 1+1 line protection or 4xGbE on 4G line with 1+1 line protection</li> <li>• Dual 2xGbE + 1x 2G FC (or 2x 1G FC) w/o line protection or single 2xGbE + 2x 1G FC (or 2x 1G FC) with 1+1 line protection</li> <li>• 3xGbE (Sync-E) + 1x STM-1/-4 Muxponder with 1+1 protection on 4G line</li> </ul> Transponder images: <ul style="list-style-type: none"> <li>• 4x 2.5G Transponder STM-16/OC-48, GbE</li> <li>• 2x 2.5G Transponder STM-16/OC-48, GbE + 2x 2.5G Transponder STM-1/OC-3 or STM-4/OC-12</li> </ul> Regenerator images: <ul style="list-style-type: none"> <li>• 4x Regenerator function for 4G line signals</li> <li>• 2x Regenerator function for 2.5GG line signals</li> </ul> Note: GbE-ports can be optical/electrical and also support electrical Fast Ethernet Note: Sync-E is always optical GbE
<b>Interfaces</b>	Client interfaces: SFP MM, SM @ 1310nm/1550nm versions covering ranges from 100m up to 15km. MultiRate 100Mb/s – 2,125Gb/s. Dedicated STM-1/OC-3 (S-1.1). Electrical SFP for Gigabit Ethernet and Fast Ethernet. Line interfaces: SFP 4Gb/s 40km/70km CWDM (up to 8 channels) or DWDM (up to 40 channels)

<sup>1</sup> Dependent on release, contact Transmode for details.

The specifications and information within this document are subject to change without further notice. All statements, information and recommendations are believed to be accurate but are presented without warranty of any kind. Contact Transmode for more details.  
www.transmode.com

### Low Power Design

A fully equipped MS-MXP consumes less than 20W. 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. As an example, a MS-MXP mounted with a 2ch Add/drop filter in a 1U TM-101 chassis will consume less than 24W, see figure 3.



Fig. 3 An example of the compact and low power consuming configuration of a TM-101 chassis