transmode

Data sheet

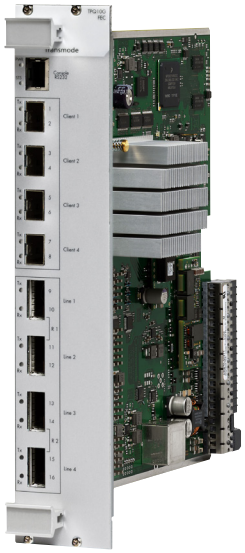
TM-Series

Quad 10G Multi-Service Transponder

Flexible and versatile 10G Transport

Key benefits:

- Compact and cost-effective transport of 10G SDH/SONET and Ethernet signals
- Multiple resilience options
- Technology agnostic. Pluggable transceivers enable usage in CWDM as well as DWDM networks
- Inbuilt Forward Error Correction (FEC) enables usage in long-haul networks
- High flexibility and Layer-2 awareness via Transmode's Intelligent WDM (iWDM™) concept
- Low Power Design ensures low total cost of ownership



The Quad 10G FEC Transponder (TPQ10GFEC) is part of Transmode's TM-Series platform optimized for cost efficient transport in CWDM/DWDM networks.

It contains four individual Transponder functions supporting transport of STM-64/OC-192, 10GbE-WAN and 10GbE-LAN signals. The client signal is mapped into a digital wrapper with Forward Error Correction (FEC) which makes the Transponders suitable for amplified long-haul networks.

Pluggable tranceivers providing great flexibility

The usage of pluggable transceivers (XFP) for network facing interfaces provides a high level of flexibility since the Transponders can be used in both CWDM and DWDM networks by selecting the appropriate type of XFP. The support for DWDM XFPs with tunable lasers further enhances the flexibility and cost efficiency of the unit.

The client interfaces use pluggable transceivers (SFP+) enabling the client connection to be adapted to type of interface (SM, MM etc) and the distance to the client equipment. The usage of SFP+ transceivers provides a lower cost compared to XFP transceivers.

These flexible capabilities in combination with pluggable optics give the lowest Total Cost of Ownership (TCO), in particular when using XFPs with tunable lasers.

Optimized for backhaul applications

The Quad 10G Transponder is a generic traffic unit in metro/regional networks for backhaul of Ethernet and SDH/SONET traffic. For wholesale operators it is important to be able to transport both SDH/SONET and Ethernet signals data as well as synchronization transparently. The latter is of imperative importance for mobile backhauling of multiple Synchronous Ethernet signals to support wholesale services to multiple operators over the same infrastructure.

Simplified management via iWDM

The Quad 10G Transponder is based on Transmode's iWDM concept where the client signal is wrapped into a digital frame that adds 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.

Resilience options

The TPQ10GFEC supports two basic resilience options; 1+1 Line protection and client/equipment protection. The 1+1 Line protection is provided by collapsing two Transponder functions into a single Transponder with sub 50ms 1+1 Line protection.

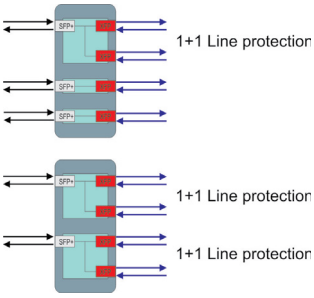


Fig. 1 Flexible 1+1 Line protection configuration

Equipment/Client protection is provided via an optical coupler. The two Transponder functions, typically located on two separate boards can be placed in the same chassis or in separate chassis. The latter is done by adding a Protection Control Unit (PCU/2) that provides the required fast signaling between the Transponder

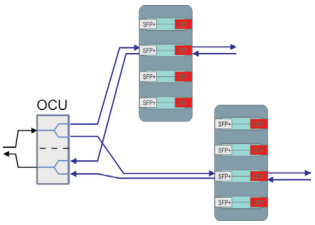


Fig. 2 Equipment protection

For meshed networks where multiple protection paths are required, a combined client/line protection configuration can be used to provide up to four paths through the network. In this configuration up to three stand-by paths can be established, i.e. 1+3 line protection.

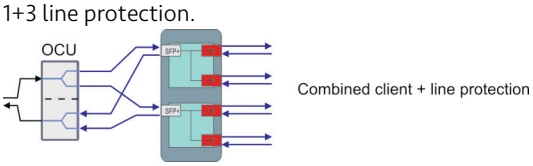


Fig. 3 Multi-path protection

iWDM Layer-2 awareness

Even though the Quad 10G FEC Transponder unit is a Layer-1 device it has inbuilt Layer-2 functions, such as the ability to inject and extract VLAN management channels on the client ports for 10GbE-LAN signals. This enables easy remote management of Transmode Layer-2 units via the native Ethernet signal.

Remote access to an Ethernet Muxponder (EMXP) is easily provided via the management VLANs and therefore provides an integrated solution for management of both Layer-1 and Layer-2 devices in the network.

Furthermore, the Quad 10G FEC Transponder unit has the ability to enable network managers to view the Layer 2 utilization level of the 10G Ethernet streams on a per port basis shown as a percentage of maximum throughput.

Cascaded networks

The Quad 10G FEC Transponder unit can be reconfigured into a dual regenerator function. In this configuration only the XFP ports are used. This regenerator function can also be used to regenerate the line signal from the Multi-Service Muxponder 10G (MS-MXP/10G) or the 9xGbE/10G FEC Muxponder (GBE9/MXP10GFEC).

Tailored Network Element options

The Quad 10G FEC Transponder unit can be mounted in either the TM-3000 (10U) or TM-301 (3U) chassis.

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

Low Power Design

A fully equipped Quad 10G Transponder consumes less than 50W. 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.

Technical specifications:

Supported traffic formats	STM-64/OC-192, 10GbE-WAN, 10GbE-LAN
Basic configurations	4x Transponder unit or 2x Regenerator unit
Layer-1 Performance Monitoring	SDH/SONET: based on B1 calculations Ethernet: CRC bytes and PCS statistics Line signal: Based on CRC Collected every 15min/24h and presented according to G.826 using ES, SES etc
Protection	1+1 Line protection. Non-revertive switching typically <20ms Equipment protection. Non-revertive switching typically <20ms Combined equipment/line protection (1+3 Line protection)
Power consumption	Max 50W 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
Interfaces	Client interfaces: SFP+-based. Supporting MM, SM, 1310nm/1550nm, CWDM and DWDM Line interfaces: XFP-based, SM, MM, CWDM, DWDM tunable 40ch DWDM via XFP with fixed wavelength 80ch via XFP with tunable laser 8ch CWDM
Layer-2 features	Ethernet utilization PM (in %) per 10GbE-LAN port Inject and extract of mgmt-VLAN on 10GbE-LAN clients
Synchronization	Through-timing Supports Sync-E transport (G.8262/Y.1362 option 1)

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