DATA SHEET

XTM SERIES

QUAD MULTI-SERVICE TRANSPONDER

Four Transponders for Compact SAN Extension

The Quad Multi-Service Transponder (TPQMS) is a powerful part of the Infinera XTM Series, which enables optimized and cost-efficient capacity networks based on CWDM and DWDM technology.

Optimized for Metro/Access SAN Applications

The Quad Multi-Service Transponder is an extremely compact solution for SAN extension applications in the metro/access area where multi-service support, compact design and low power consumption are critical. The TPQMS has four transponder functions, each of them capable of transporting 1 Gb/s, 2 Gb/s or 4 Gb/s Fibre Channel (or Fibre Connection) traffic formats over a CWDM or DWDM network.

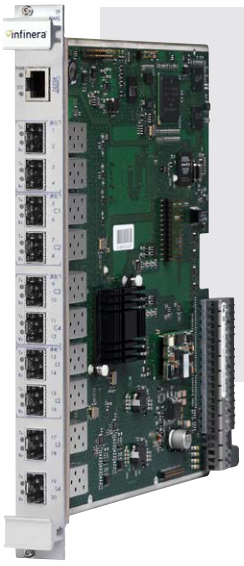
The TPQMS can be set in automatic mode in which the transponders will automatically detect the traffic format and configure the client interface accordingly. Thus there is no need to reconfigure the TPQMS when upgrading the SAN switch from 2 Gb/s to 4 Gb/s Fibre Channel, for example. Alternatively, the client interface can be set in forced mode and only accept the signal type it is configured for.

Simplified Management Via iWDM

The Quad Multi-service Transponder is based on the Intelligent WDM (iWDM®) concept wherein the client signal is wrapped into a digital frame with overhead bytes that are used to carry the management channels as well as quality control of the transmission via performance data. The embedded management channel simplifies the management of an Infinera network since management access is provided wherever there is a traffic connection.

Two Operating Modes

The TPQMS has two operating modes that can be activated when the unit is initialized. The unit can be set into either a quad transponder



Key benefits:

- Transparent transport of 1 Gb/s, 2 Gb/s and 4 Gb/s Fibre Channel formats
- Multi-functional plug-in unit. Same hardware can be used as transponder and regenerator
- Technology-agnostic. Pluggable transceivers enable use in CWDM as well as DWDM networks
- Automatic configuration via protocol recognition
- Forced mode option for enhanced traffic control
- Low power design ensures low total cost of ownership

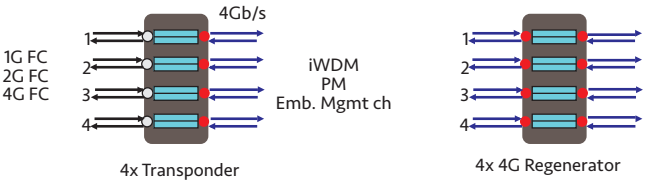


Fig 1. The Two Main Operating Modes of the TPQMS: Transponder Mode and Regenerator Mode.

mode or a quad regenerator mode, shown in Figure 1. The quad regenerator mode converts all interfaces into a line interface, enabling the unit to regenerate the signal from the TPQMS transponders.

This hardware flexibility reduces operational expenditure (OpEx) since the same plug-in unit can be used to collect and transport client signals as well as regenerate the line signal to extend the bridgeable distance. The regenerator mode can also be used to convert from a CWDM to a DWDM network by using corresponding SFP transceivers on the interfaces, Figure 2. Another application is to use the regenerator mode to convert from one DWDM wavelength to another.

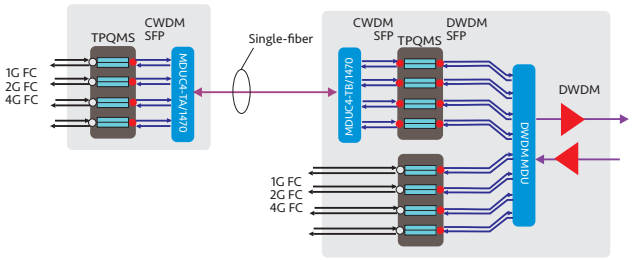


Fig 2. Regenerator Mode Can Be Used for CWDM to DWDM Transition.

Figure 2 shows an example network. In the left node a TPQMS is combined with a 4-channel CWDM mux/demux unit (MDU) for single-fiber configuration. This configuration can be mounted in a 1U TM-102 chassis. The CWDM wavelengths are carried to a hub node where the wavelengths are converted to DWDM using a TPQMS in regenerator mode. In the same hub node, another TPQMS collects four additional Fibre Channel signals, and all eight are then transported on the amplified DWDM network.

Protected Configurations

To provide high-availability configurations, 1+1 protection can be applied between two transponder functions within the same TPQMS, or between two transponder functions on separate TPQMS units, as shown in Figure 3. Protection is provided via a passive optical coupler placed between the client equipment (i.e. SAN switch) and the TPQMS. The two transponder functions are configured into a protection group via the Embedded Node Manager (ENM). Protection switching is performed within 20 ms to provide rapid recovery in fault conditions.

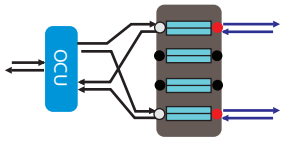


Fig 3. 1+1 Equipment Protection for Increased Network Availability.

Tailored Network Element Options

The TPQMS can be mounted in the following XTM Series chassis options:

- As a self-managed network element in a 1U TM-102 chassis
- As one of many traffic units in a TM-3000 (10U)/TM-3000II (11U) or TM-301 (3U) chassis

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

In the TM-102 option, the TPQMS initiates the complete ENM on the onboard microprocessor. This enables local management simply by connecting any PC or workstation 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 data communications network (DCN) if the TPQMS is placed at a customer site.

Certified and with Low Latency

The TPQMS provides transparent transport of the SAN format, i.e. without any bit manipulation and with low latency. From a SAN switch perspective, the TPQMS is seen as a part of the fiber path. The TPQMS has been certified to provide secure interoperability by major SAN vendors.

Low Power Design

A fully equipped TPQMS consumes less than 20 W. 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.

Specifications

Supported Traffic Formats	1 Gb/s, 2 Gb/s and 4 Gb/s Fibre Channel (and FICON)
Layer 1 Performance Monitoring	SAN formats: Based on CRC and 8B10B coding errors Line signal: Based on CRC Collected every 15min/24h and presented according to G.826 using ES, SES, etc.
Protection	1+1 Client/equipment protection. Non-revertive switching <20 ms
Power Consumption	Max 20 W, worst case (with all client ports active and using DWDM SFPs) 12 W w/o SFPs
Misc Line Interface Features	Embedded management channels on line signals Trail trace insertion to validate connection
Operational Modes	4x Transponder mode 4x Regenerator mode (with embedded management channels on all 8 line ports)
Released Traffic Combinations	1 Gb/s, 2 Gb/s or 4 Gb/s FC per transponder function via automatic protocol recognition or via forced settings. Other traffic combinations can be provided in future releases
Interfaces	Client interfaces: SFP MM, SM @ 1310 nm/1550 nm versions covering 1 Gb/s to 4 Gb/s FC Line interfaces: SFP 4 Gb/s 40 km/70 km CWDM (up to 8 channels) or 80 km DWDM (up to 40 channels)
Latency	1G=17.9 µs, 2G=9.5 µs, 4G= 5.4 µs
Certifications	Brocade Fabric Aware (also applies on HP B-Series SAN switches)

Specifications and Features Are Subject to Change

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