

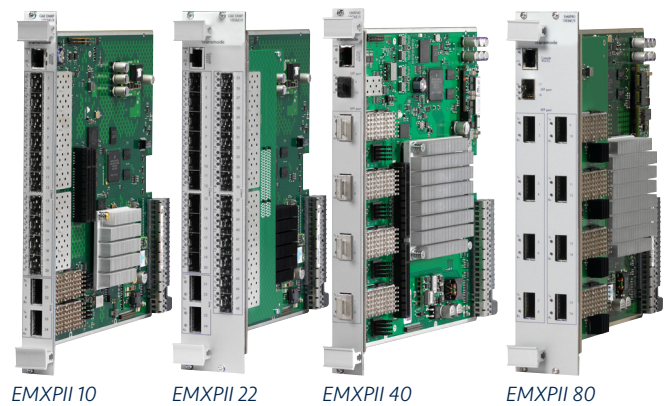
Ethernet Muxponder II

Delivering Ethernet services in transport networks

Key benefits:

- Compact and cost efficient switching, demarcation and aggregation of FE/GbE and 10GbE LAN services
- MEF CE2.0 certified on all MEF services E-Line, E-LAN, E-Tree and E-Access
- Ultra low latency and zero jitter
- Connection-oriented services through MPLS-TP
- Flexible network resilience options through G.8032 Ethernet Ring protection, Link Aggregation and MPLS-TP Linear Protection
- Efficient video distribution enabled by Source Specific IP Multicast
- Synchronous Ethernet for efficient network synchronization
- Tunable optics on line side for maximum flexibility
- Provides seamless Layer 1 and Layer 2 integration with Ethernet services into flexible CWDM and DWDM networks
- Low Power Design ensures low total cost of ownership

The Ethernet Muxponder II (EMXP II) family is a powerful part of Transmode's TM-Series platform. Its seamless integration of Layer 1 transport and Layer 2 Metro Ethernet functionality enables cost efficient transport of Ethernet services over flexible CWDM and DWDM networks.



The above example shows how the EMXP II units can be deployed to provide Ethernet transport for a variety of services in a scalable way in an MPLS-TP backhaul network.

Carrier Ethernet 2.0 (CE2.0) certified

The EMXP II provides powerful UNI and E-NNI interfaces enabling port based or fully service multiplexed E-Line, E-LAN, E-Tree or E-Access services, compliant to Metro Ethernet Forum's CE2.0 specifications and certification.

The multiple Class of Service (CoS) aspect of CE2.0 simplifies the handling of differentiated traffic. The E-Access provides well defined interconnection between networks and allows service providers to build scalable and cost optimized Ethernet services. The EMXP II offers a strong classification and policy engine to better manage extended and flexible service and QoS classifications.

OAM

The Ethernet services provided by the EMXP II are constantly monitored for interruption and performance with Ethernet Service OAM, and the MPLS paths are monitored with BFD. There are in-service surveillance for connectivity and measurement that are standards based and fully interoperable.

In-band management

The EMXP II offers standard methods for in-band management. Transmode's Intelligent WDM (iWDM™) technology combined with the standard in-band access methods can be used for easy and flexible in-band management across the entire network.

Quality of Service

The EMXP II provides a flexible toolkit of traffic management features. The toolkit includes features such as strict priority and Weighted Fair Queuing, MEF CE2.0 certified bandwidth profiles and shaping to min and max bandwidth. Traffic can be classified

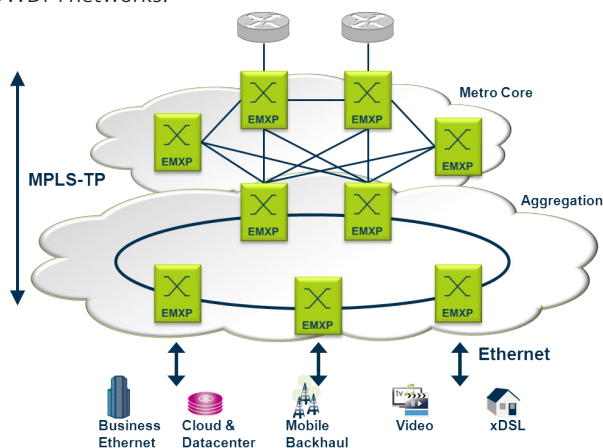


Fig. 1 EMXP units in an Ethernet Backhaul Network using MPLS-TP

Ethernet Transport

The EMXP II units are especially designed to deliver an optimized Ethernet transport solution. They create a Layer 2 optimized transport architecture using selective integration of Layer 2 and MPLS functions.

Scaling Ethernet services over larger networks can be done by taking advantage of the MPLS-TP capabilities of the EMXP. Transporting Ethernet over MPLS-TP single or multi-segment pseudowires encapsulates the user traffic allowing services to scale in large metro and aggregation networks.

either per port, per VLAN or per flexible service definition using the classification engine.

Resiliency

The EMXP11 offers various methods to provide resiliency. For UNI or E-NNI interfaces standard and interoperable IEEE 802.3ad Link aggregation is used. Standard ITU-T G.8032 Ethernet Ring Protection Switching can be used where the EMXP11 is deployed in a ring topology.

For Ethernet transported over MPLS-TP, the Linear protection function provides protected MPLS-TP tunnels to ensure service continuity over any type of topology including ring, full mesh or partial mesh without involving a control plane. Protection switching is performed with carrier class sub 50ms protection using any of these protection schemes.

Technical specifications

(Valid for EMXP11 10, EMXP11 22, EMXP11 40 and EMXP11 80):

Interfaces	10G interfaces (XFP): <ul style="list-style-type: none"> • Uncolored Multimode and Singlemode • CWDM up to 8 channels, DWDM up to 40 channels or Tunable XFP up to 80 channels GE/FE interfaces (SFP): <ul style="list-style-type: none"> • Uncolored Multimode and Singlemode, Single-strand fiber solution • CWDM up to 16 channels or DWDM up to 40 channels • Electrical 10/100/1000BASE-T 	
Resilience	ITU-T G.8032 Ethernet Ring Protection IEEE 802.3ad Link Aggregation MPLS-TP Linear Protection with Protection State Coordination (PSC) RFC6378	
Ethernet Services	CE2.0 certified services E-Line (EPL and EVPL), E-LAN (EP-LAN and EVP-LAN), E-Tree (EP-Tree and EVP-Tree) and E-Access (Access EPL and Access EVPL) MEF CE1.0 9+14 Certification	
Quality of Service	Policing using bandwidth profiles Flexible Traffic Classification, e.g. based on DSCP, CoS, port and inner/outer VLAN 8 Strict priority queues / WRR queues, WFQ, Min and Max Shaping, WRED	
Latency	1.9 μ s delay for all packet sizes using RFC1242 store and forward metric Frame Delay variation below 0.05 μ s	
Performance Monitoring & OAM	IEEE 802.1ag Continuity Check and Loopback, Port Mirroring MPLS G-ACh channel for OAM RFC5586 BFD for MPLS Label Switched Paths (LSPs) RFC5884 Management VLAN for in-band management Port isolation using Private VLAN technique	
Synchronous Ethernet	ITU-T G.8262 Synchronous Ethernet Equipment Clocks (EEC) ITU-T G.8264 Ethernet Synchronization Messaging Channel (ESMC) ITU-T G.781 Synchronization Status Messages (SSM)	
Source Specific Multicast	RFC4607 Source-Specific Multicast for IP RFC4541 IGMP Snooping RFC1112 IGMPv1, RFC2236 IGMPv2 and RFC3376 IGMPv3	
L2 Switching	Selectable learning enabled per VLAN, 4,094 VLAN IDs, 32K MAC-addresses Multicast and broadcast Storm Control IEEE 802.1ad Provider Bridging Q-in-Q SVLAN Flexible VLAN tag handling: push, pop, swap, pop-swap - ingress and egress Super Jumbo Frames up to 10248 Bytes	
MPLS	LER and LSR operation 512 LSPs, 512 Pseudowires MPLS Transport Profile RFC5960 RFC5659 Multi-Segment Pseudowires	
Power consumption (including optics)	Max 30W for EMXP11 10, max 45W for EMXP11 22, max 50W for EMXP11 40, max 65W for EMXP11 80	

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.

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