**Ethernet Muxponder II**

*Delivering Ethernet services in transport networks*

**Key benefits:**
- Compact and cost efficient demarcation and aggregation of FE/GE and 10GbE LAN services
- Provides E-LINE, E-LAN or E-TREE services
- Ultra low latency and zero jitter
- Flexible network resilience options through ring protection and point-to-point protection
- Efficient tools for implementation of flexible and robust services
- 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 units included in the EMXP II family are the EMXP II 10, the EMXP II 22 and the EMXP II 80.

**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 functions. Expensive switching and routing network components can therefore be used more efficiently, providing a lower total cost of ownership for the complete network.

The following example shows how the EMXP II units can be deployed to provide transport of Ethernet traffic in a Mobile Backhaul network.

**Ethernet Access**

The EMXP II units provide powerful UNI and E-NNI interfaces enabling port based or fully service multiplexed E-LINE, E-LAN or E-TREE services, certified by the Metro Ethernet Forum. The Ethernet services could be setup as fully transparent services for all kinds of customer traffic, enabling even the most advanced datacenter virtualization or cloud computing services. There are point-to-point or ring protection schemes to provide carrier-class sub 50ms protection in service provider topologies.

**Service OAM**

The Ethernet services provided by the EMXP II units are constantly monitored for interruption and performance. There are in-service surveillance for connectivity and measurement of availability and utilization throughout the entire service provider network. The Fault Management and Performance Monitoring capabilities are all standards based and fully interoperable.

**In-band management**

The EMXP II units offer 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.

**Powerful UNI**

Bandwidth profiles allow a service provider to offer services using less than full port speed. Furthermore, it allows the network to be engineered to provide service assurance of all in-profile service frames. These services could for example be the standard E-LINE, E-LAN or E-TREE services.
Quality of Service
The EMXPII units provide a flexible toolkit of traffic management features. The toolkit includes features such as strict and weighted scheduling, bandwidth profiles and shaping of min and max bandwidth. Traffic can be classified either per port (for EPL, EP-LAN and EP-Tree services) or it can be classified per VLAN for service multiplexed services (EVPL and EVP-LAN). For traffic that is already classified there is flexible mapping between Class of Service (CoS) and scheduling so that the Service Provider can offer the optimum transport for all services.

Resiliency
The EMXPII units offer various methods to provide resiliency. The simplest method is to utilize IEEE 802.3ad Link aggregation, where the dual GbE line ports are configured as protected aggregated links, providing protection switching if a fault occurs while utilizing the resources in an optimum way in normal operation. If any of the units in the EMXP II family are deployed in a ring topology, then

ITU-T G.8032 Ethernet Ring Protection Switching also becomes an option. Protection switching is performed with carrier class sub 50 ms protection using either of these 2 protection schemes.

Ultra Low Latency
Each of the EMXPII units have less than 2 microseconds latency and zero jitter for all packet sizes and regardless of traffic load. This makes it ideally suited to Ethernet applications where latency and jitter are important, such as services for financial institutions, video distribution and LTE backhaul.

Low Power Design
A fully equipped 10 port EMXPII consumes a maximum of 30W, and a fully equipped 22 port EMXPII consumes a maximum of 45W. See the table below for more power consumption figures. 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  (Valid for EMXPII 10, EMXPII 22 and EMXPII 80):

| Interfaces | 10G interfaces (XFP):  
|           | • 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):  
|           | • Uncolored Multimode and Singlemode  
|           | • CWDM up to 16 channels or DWDM up to 40 channels  
|           | • Single-strand fiber solution  
|           | • Electrical 10/100/1000BASE-T  
| Resilience | ITU-T G.8032 Ethernet Ring Protection  
|            | IEEE 802.3ad Link Aggregation  
| Ethernet Services | E-LINE (EPL and EVPL)  
|                    | E-LAN (EP-LAN and EVP-LAN)  
|                    | E-TREE (EP-Tree)  
|                    | MEF 9+14 Certification  
| Quality of Service | Policing using bandwidth profiles  
|                   | Flexible Traffic Classification, e.g. based on CoS, port and VLAN  
|                   | 8 Strict priority queues / WRR queues  
|                   | Min and Max Shaping, WRED  
| Latency | 1.8 µs delay for all packet sizes using RFC1242 store and forward metric.  
|             | Immeasurable frame delay variation.  
| Performance Monitoring & OAM | IEEE 802.1ag Continuity Check and Loopback  
|                              | Port Mirroring  
|                              | Management VLAN for in-band management  
|                              | Port isolation using Private VLAN technique  
| Synchronous Ethernet | ITU-T G.8262 Ethernet Equipment Slave Clock (EEC)  
| Switching | Selectable learning enabled per VLAN  
|           | 32K MAC-addresses  
|           | 4,094 VLAN IDs  
|           | Storm Control  
|           | IEEE 802.1ad Q-in-Q SVLAN  
|           | Flexible tag handling  
|           | Super Jumbo Frames up to 10248 Bytes  
| Power consumption | Max 30W (including optics) for EMXPII 10  
|                   | Max 45W (including optics) for EMXPII 22  
|                   | Max 65W (including optics) for EMXPII 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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