Driven by mobile, residential, and business traffic increase, network operators worldwide are investing in their transport networks and mobile network infrastructure. Transmode’s high performance optical network solutions supports MPLS-TP to deliver highly scalable, reliable and cost effective metro and regional optical networks, providing the OAM features needed by operators.

Limitations on capital expenditures and operating expenses cause operators to demand more cost effective technologies to meet the scalability challenges brought by scaling their service deployment and delivery. One way to accommodate this is the transition of the transport network from circuit-based to packet-based technologies using Carrier Ethernet.

The Metro Ethernet Forum’s Carrier Ethernet has standardized the services and the service management to make Ethernet a viable choice for delivery of cost efficient residential, business and backhaul services. The network used to deliver these services has included different technologies in different parts of the network. For smaller networks or for metro-aggregation networks, Ethernet over Service VLANs have been the choice. In the core, where a more scalable solution is needed, IP/MPLS has been widely deployed for more than a decade due to the scalability advantages that MPLS brings to routed IP networks.

MPLS-TP leverages the advantages of MPLS technology to provide connection-oriented service transport. It uses a subset of IP/MPLS features needed for transport networks, and has been extended with Operations, Administration and Maintenance (OAM) and resiliency features. These extensions provide capabilities needed for carrier-grade transport networks, including scalable operations, high availability and performance monitoring. By providing the same OAM, QoS(Quality of Service), protection and restoration features as circuit-based networks, MPLS-TP has a familiar look and feel for network operators, who already have management processes and work procedures based on these principles.
In addition to increased scalability, MPLS-TP has other benefits for service providers. It enables a more flexible way to build and provision capacity in the network and can take advantage of the statistical multiplex gains associated with packet networks. It also ensures services SLAs through the combination of QOS handling and service OAM.

Another benefit is that it can be carried over existing and evolving transport networks such as switched Ethernet networks, Packet over SONET and OTN.

Transmode provides MPLS-TP support on its Native Packet Optical offering, delivering these essential capabilities for network operators.

The Transmode Solution – Native Packet Optical Networks

Transmode is a global provider of packet-optical networking solutions which enable network operators to cost effectively address the capacity needs created by the rapid growth in video and data traffic. The company has installed systems for over 300 fixed and mobile network operators, service providers, large enterprises and public institutions in over 40 countries across the globe.

Transmode’s Native Packet Optical offering is designed to provide scalability, efficiency, flexibility and manageability, while optimizing costs. It does so by integrating key Ethernet Layer 2 and MPLS functionality with the optical transport network. Native Packet Optical offerings are ideal for the metro network as they support extremely high performance characteristics, as well as multiple service types, such as Ethernet, SONET/SDH and Fibre Channel (FC) in one cost efficient solution, over a single wavelength. In this way both new Ethernet based services as well as legacy SONET/SDH services can be supported, creating a smoother transition from legacy services to an Ethernet/IP based network.

Transmode’s optical solutions brings flexibility by supporting CWDM and DWDM, single fiber and fiber pair, Ethernet only and multi-service wavelengths, and finally a selection of line rates to choose from. Pluggable optics enables us to offer an affordable optical transport solution for service providers – large or small. Easy to install, turn up and commission, Transmode offers several products to meet a variety of network needs.

Transmode’s approach also provides greatly simplified operation and management, as one management system can be used for all services. Compliant with well known MEF standard services, the GUI or CLI based management service uses familiar concepts and terms.

Figure 1 - Typical network using MPLS-TP with Transmode EMXP Ethernet Muxponders
**TM-Series integrates Ethernet and MPLS switching**

The TM-Series combines integrated Ethernet and MPLS switching and transport functionality to create a converged packet-optical platform for metro and regional networks. This allows the design of simplified transport networks to provide more flexibility and reduce the number of physical elements in the network. It provides capacity increases based on Ethernet, MPLS and WDM technologies, known for their scalability and flexibility characteristics. This gives transport solution that offers a cost efficient way to support MEF-standardized Carrier Ethernet services delivered over a single converged platform for Ethernet, MPLS and optical transport.

Expensive switching and routing network components can be used more efficiently by having router-bypass in the TM-Series. Together with the ability to directly provide Carrier Ethernet services in the TM platform, this gives a lower total cost of ownership for the complete network.

**Performance**

Transmode’s Packet Optical network solutions offer industry leading latency and jitter performance. Further, by integrating MPLS-TP into the transport platform, MPLS-TP benefits from industry leading Sync-E performance.

- The TM-Series Ethernet Muxponders have near zero jitter, and less than 2 microseconds latency, which is far better than comparable Ethernet switches.
- The TM-Series Ethernet Muxponders deliver network synchronization (SyncE) with better than 1 ppb (15 minutes) holdover and 70 times better wander performance than specified by MEF 22.1 for LTE networks
- The TM-Series 10G Transponders provide only 4 to 10 nanoseconds latency per Transponder pair.

**Transmode’s MPLS-TP Implementation**

Supporting MPLS-TP is consistent with Transmode’s strategy to offer a cost efficient MPLS solution, implementing only what is needed. The Transmode Native Packet Optical platform, delivered on the TM-Series Ethernet Muxponder, supports all network topologies; mesh, ring, hierarchical, and hub-spoke. Ethernet Muxponder hardware acceleration of OAM for MPLS-TP enables even higher scalability in larger networks.

Transmode’s IETF compliant MPLS-TP implementation used with the company’s Flexible Optical Networking portfolio brings a common look and feel to optical and Ethernet service provisioning. Both layers of the network are built around a flexible optical and MPLS-TP tunnel architecture which allows the operator to plan and deploy the best network architecture for their specific deployment challenges. Services are then applied at the edge of this optical or Ethernet cloud independently of how the traffic is routed through the network. By providing a simple and well understood common work flow to either layer, network operations are simplified and easy to deploy.

![Figure 2– The Transmode Network Manager provides a simplified view of multi-layer networks](image-url)
Summary

MPLS-TP leverages the well known IP/MPLS standard to meet the critical needs of network operators. MPLS-TP enables a broad range of capabilities, particularly OAM and resiliency features, and will continue to evolve to meet emerging requirements. Transmode has gained recognition from customer and independent analysts for its optical network knowledge, product reliability and technical innovations. The MPLS-TP features of the Transmode Native Packet Optical platform is a high performance solution to meet the evolving needs of Transmode customers.

TM-Series Highlights

- Industry leading Low Latency and zero jitter for video distribution
- Intelligent WDM (iWDM™) concept for innovative optical networking
- Seamless mix of CWDM and DWDM on fiber pair or single-fiber configurations
- Flexible pluggable optics and configurable hardware including ROADMs for low total cost of ownership
- Efficient wavelength utilization via Layer 1 and Layer 2 aggregators
- Low Power Design architecture – 80% energy savings compared to similar solutions, compact with small footprint
- Multi dimensional scalability including distance (1-1500 km), number of wavelengths, services per wavelength, traffic formats, capacity and chassis options
- Ethernet aggregation with MEF compliant Carrier Ethernet capabilities, prioritization, classification, and bandwidth profiling
- Centralized, carrier-grade Network Management system with provisioning, fault management and performance monitoring

For further reading:

For more information regarding Transmode’s Ethernet Mobile Backhaul solution and Native Packet Optical architecture please take a look at:
- Solving the Mobile Backhaul Challenges Whitepaper
- Native Packet Optical Whitepaper

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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