

# Ethernet Demarcation Unit

*Seamless aggregation of Ethernet services into CWDM / DWDM networks*

## Key benefits:

- Zero delay and jitter wire-speed performance for unprecedented QoS and SLA fulfillment
- Provides MEF certified E-LINE, E-LAN or E-TREE services
- High performance Synchronous Ethernet for best-in-class mobile backhaul applications
- Highly accurate and precise OAM and Performance Monitoring through microsecond resolution
- Per service visibility for all key OAM and SLA parameters enabling individual SLA monitoring and service differentiation
- Provides a seamless integration of Ethernet services into flexible CWDM and DWDM networks

Transmode provides a range of Ethernet Demarcation Units (EDUs) which are a powerful part of the TM-Series platform. Their seamless integration of Ethernet services into Transmode’s widely deployed CWDM and DWDM networks provides operators with the most cost effective transport of Layer 2 Ethernet services.

## High performance silicon design eliminating delay and jitter issues

Transmode’s EDUs are built on a unique hardware-based design that provides advanced performance testing and service creation capabilities in a compact, cost efficient and carrier-grade in-line network element.

Unlike store-and-forward architectures, the silicon design provides wire-speed pass-through performance without adding jitter or delay, while at the same time providing microsecond measurement resolution and real-time processing for every packet flowing through the unit.

## Service mapping

Service mapping allows providers to quickly create Ethernet Virtual Circuits (EVCs) for E-Line, E-LAN, and E-Tree services. Services can be mapped with advanced bandwidth policies that establish committed and excess throughput and burst rates (CIR, EIR, EBS, CBS), as well as defined Ethernet & IP service priorities.

Mapping is performed by classifying traffic based on a rich frame-characteristic filter set, and then selectively pushing VLAN tags, ensuring complete Layer 1, 2, 2.5 and 3 transparency over the entire service provider network.

The Transmode EDU offers zero-latency traffic shaping, a fully hardware-based packet processing that passes high-priority, real-time traffic through the Fast-Thru passing lane without adding jitter or latency. Lower priority traffic is buffered, then forwarded in priority sequence when bandwidth is available.

With high performance Synchronous Ethernet the EDU is a perfect demarcation device to deliver mobile backhaul services. Those require both low latency/low jitter transport and highly accurate frequency synchronization delivery all the way to the base station.

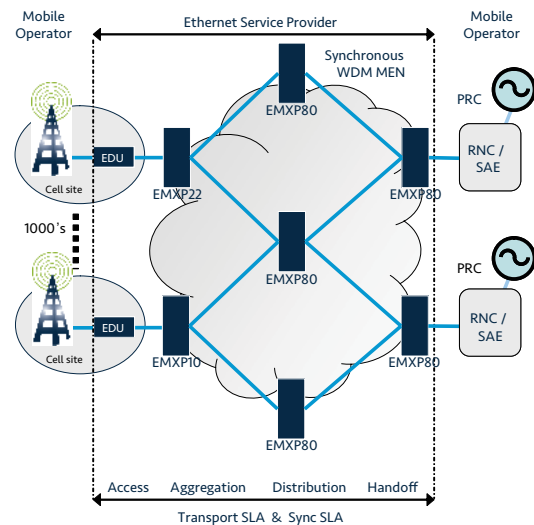


Fig. 1 EDUs in an Ethernet Mobile Backhaul Network

## Flexible setup of client ports and traffic classification

Transmode provides a range of EDU models. The base model, TEY, has 2 optical ports and 3 electrical ports and the TESY model has 4 optical ports and 1 electrical port. Both models can be flexibly configured to address a number of configurations. For example 4 client ports can be configured to aggregate into a single line port, traffic from 2 GbE client ports can be aggregated into a 1:1 protected line port or in the simplest case 1 client port is directly mapped to 1 line port. The TERY model does not support aggregation mode, but instead handles an increased amount of simultaneous sessions.

Each model is also available in a temperature hardened version.

Classification of traffic could be made on VLAN, MAC / IP addresses, or sophisticated Layer 2-4 packet selection criteria.

## End-to-end Performance Monitoring and SLA verification

As hardware-based devices, the EDUs can maintain up to 100 Y.1731 & 802.1ag OAM sessions per unit, enabling highly accurate and precise OAM Performance Monitoring with loss, delay and delay variation measurements for large-scale wireless backhaul and business service applications. This is a valuable parameter in SLA monitoring and helps operators differentiate between individual SLAs.

Advanced throughput and RFC-2544 test capabilities allow service providers to perform fully automated and documented tests. This technique tests services under real-world traffic conditions and therefore provides a true picture of the customer's QoS experience.

## Advanced network troubleshooting

The units support full wire-speed Y.1731 loopbacks from any compliant network element, monitoring probe or test set.

## Technical specifications:

<b>Service mappings</b>	Identifies traffic flows based on frame characteristics <ul style="list-style-type: none"> <li>• Source or destination MAC or IP addresses, masks, Ethertype, Port(s), DSCP, IP Precedence or PCP</li> <li>• Customer and providers VLAN ID (C-VLAN, S-VLAN)</li> </ul> Applies one or more actions <ul style="list-style-type: none"> <li>• C / S-VLAN tagging (selective push) and VLAN overwrite</li> <li>• CoS mapping (set C/S-VLAN tag priority based on DSCP, IP Precedence or PCP, Drop Eligibility)</li> </ul>
<b>Pure hardware data-path (Fast-Thru architecture)</b>	Throughput: wire-speed (1000 Mbps at 100% utilization) Intrinsic Pass-through Traffic Latency: < 3.3 $\mu$ s, with Traffic Jitter : < 0.1 $\mu$ s for all packet sizes Intrinsic Latency for Intelligent Loopback: < 0.8 $\mu$ s, with Jitter: < 0.1 $\mu$ s
<b>Synchronous Ethernet</b>	ITU-T G.8262 Synchronous Ethernet Equipment Clocks (EEC)
<b>Resilience</b>	IEEE 802.1w Rapid STP (RSTP) IEEE 802.3ad Link Aggregation (LAG / LACP)
<b>Ethernet services</b>	E-LINE (EPL and EVPL), E-LAN (EP-LAN and EVP-LAN) E-TREE (EP-Tree) MEF9+14 Certified Jumbo Frames support for all features (up to 10,240 bytes)
<b>Policing and shaping</b>	CIR/EIR by filtering criteria or for all traffic. Zero-Latency Traffic Shaping no delay added to highest-priority traffic
<b>Performance Monitoring &amp; OAM</b>	IEEE 802.3ah Ethernet OAM IEEE 802.1ag Service Layer OAM (Connectivity Fault Management) ITU-T Recommendation Y.1731 Dying Gasp (via 802.3ah or SNMP traps) Continuous in-service monitoring of Layer 2 & 3 SLA parameters, unicast or multicast <ul style="list-style-type: none"> <li>• Packet loss, One-way and Round-Trip Latency (Delay) and Jitter (Delay Variation)</li> <li>• Continuous End-to-End path continuity check, Availability (SES)</li> </ul> IGMP Group join / leave delays High Precision measurements: 1 $\mu$ s resolution Stats per VLAN, per Ethertype, per ToS, per CoS, per MAC, per IP, etc.
<b>Interface options</b>	EDU/SPGBE-TEY: 2x SFP Optical + 3x RJ45 Electrical EDU/SPGBE-TESY: 4x SFP Optical + 1x RJ45 Electrical EDU/SPGBE-TERY: 2x SFP Optical + 3x RJ45 Electrical <span style="float: right;">* Electrical SFPs supported</span>
<b>Power consumption</b>	External AC/DC adapter (100-120VAC/200-240VAC, Auto-sensing, 50-60Hz), 5VDC input to unit Dual (A/B) -20 to -57VDC/+20 to +57VDC inputs Power consumption: 7,5W typical, 10W max Cooling: convection cooled (no fans)
<b>Physical and Environmental</b>	Dimensions: 35mm (H) x 145mm (W) x 153mm (D) / 1.3in (H) x 5.7in (W) x 6.0in (D) Weight: 660g / 1.4lb Standard operating temperature: 0 to + 50 °C / 32 to 122 °F. Hardened version: -40 to + 50 °C / -40 to 122 °F. Operating conditions: ETSI EN 300 019-1-3 class T3.1
<b>Regulatory and Certifications</b>	IEC 60950, FCC Part 15 Class A and NEBS Level 3 MTBF >53 yrs at 25°C per Telcordia SR-332 method MEF9+14 Certified

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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Advanced Layer 1-4 Loopbacks can be established by VLAN, source or destination address, TCP/UDP port, service level, or any combination thereof. Furthermore, it can be controlled by industry-standard Y.1731 in-band commands and most 3rd-party test sets.

## Certified and true Carrier Class

With MEF 9+14 & NEBS Level 3 certification, 3-way redundant power, 1+1 protection, no moving parts and failover-bypass circuitry the EDUs are truly carrier-grade. In addition to rubber-feet tabletop placement there are a variety of mounting options such as wallmount, 1U horizontal rackmount (1 or 2 EDUs) or a 4U vertical rackmount shelf (up to 12 EDUs).

## Service provider integration

The EDUs offer standard methods for inband management. Transmode's Intelligent WDM (iWDM™) technology can therefore be used combined with your standard inband access methods for easy and flexible inband management across your entire network.