

# Ethernet Demarcation Unit

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

### Key benefits:

- Ultra-low delay and jitter with Ethernet wire-speed performance for unprecedented QoS and SLA fulfillment
- Provides MEF certified E-LINE, E-LAN or E-TREE services
- 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) for both Gigabit and 10G Ethernet 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 industry leading service demarcation of Layer 2 Ethernet services.

### High performance 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 network processor and traditional 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.

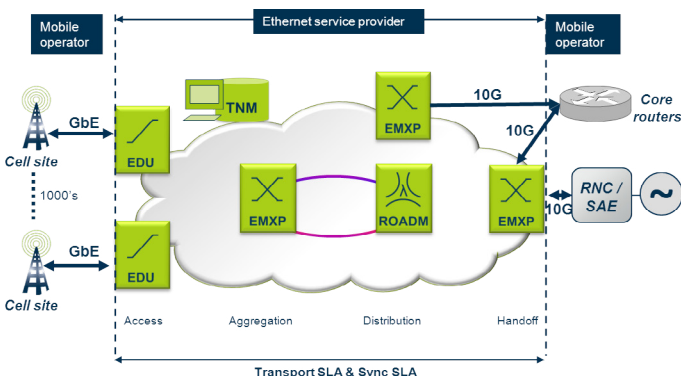


Fig. 1 EDUs in an Ethernet Mobile Backhaul Network

### Service mapping

Transmode's transport ethernet solution with high performance EDUs implement QoS functionality in line with MEF Carrier Ethernet 2.0 initiative. Multi-CoS Ethernet Services as described in CE 2.0 results in substantial cost savings and increased service offerings for network operators.

Flexible service mapping allows service 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 transport Ethernet network.

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

### End-to-end OAM overlay

The EDU delivers high performance service assurance monitoring to mission-critical, high-density, GbE applications. As a hardware-based device, the EDU can maintain up to one hundred Y.1731 & 802.1ag OAM sessions per unit, enabling highly accurate and precise OAM Performance Monitoring for large-scale wireless backhaul and business service applications.

The EDU also you to define Service Availability instances with various metrics (CE 2.0 per CoS – various Loss Measurements and Delay Measurements metrics in any combination) that will be used to determine unavailable seconds. Each criteria has its own definable thresholds to enable SLA verification if the service sold to a client meets a specific SLA. All reported according to standardized MEF 10.2 Service Availability and unavailability.

### Service throughput testing

Advanced throughput and RFC-2544 test capabilities allow service providers to perform fully automated and documented tests on EDU and Ethernet Muxponders (EMXP/II) The services are tested in real-world traffic conditions and therefore the results provide a true picture of the customer's QoS experience.

## Advanced network troubleshooting

The EDU has fault propagation to enable a service outage to be propagated to a client using Link Loss Forwarding (LLF) or Automatic Laser Shutdown (ALS). This includes both a detected bidirectional or unidirectional EVC fault (detected by ETH-CC) or a Client port fault (propagated through the service with ETH-CSF). The units also support full wire-speed Y.1731 loopbacks from any compliant network element, monitoring probe or test set. 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.

## 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 µs, with Traffic Jitter : < 0.1 µs for all packet sizes Intrinsic Latency for Intelligent Loopback: < 0.8 µs, with Jitter: < 0.1 µs		
<b>Synchronous Ethernet</b>	ITU-T G.8262 Synchronous Ethernet Equipment Clocks (EEC)		
<b>Resilience</b>	IEEE 802.3ad Link Aggregation (LAG / LACP) using Active/Standby <50ms Ethernet Client Signal Fail (ETH-CSF) signaling		
<b>Ethernet services</b>	E-LINE (EPL and EVPL), E-LAN (EP-LAN and EVP-LAN) E-TREE (EP-Tree) MEF9+14 Certified, UNI Type II Compliant (MEF 20) Jumbo Frames support for all features (up to 10,240 bytes) Upstream and downstream CIR/EIR and (CBS, EBS) per EVC, CoS or for all traffic Zero-Latency Traffic Shaping no delay added to highest-priority traffic		
<b>Management</b>	SNMP v1 and v2c, FTP, TFTP and SCP RADIUS Authentication and Authorization Secure Web GUI via SSL, Secure CLI via SSH (HTTP and Telnet also available) Configuration import/export Remote and Local Syslog		
<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 including Dying Gasp (via 802.3ah or SNMP traps) IEEE 802.1ag Service Layer OAM (Connectivity Fault Management) ITU-T Y.1731 Performance Monitoring (High Precision measurements: 1 µs resolution) Service Availability as defined by MEF 10.2.1 RFC2544 Throughput testing Continuous in-service monitoring of Layer of Packet loss, Delay and Jitter (Delay Variation) Packet and byte statistics per VLAN, per Ethertype, per ToS, per CoS, per MAC, etc.		
<b>Product variants</b>	<b>EDU/SPGBE-TEY</b>	<b>EDU/SPGBE-TESY</b>	<b>EDU/SPGBE-TERY</b>
<ul style="list-style-type: none"> <li>Interface options (excl Mgmt port)</li> <li>Copper Failover Bypass Circuit</li> <li>Traffic Shaping</li> <li>3x1, 2x1 Aggregation Modes</li> <li>No of Bandwidth Policers</li> <li>Per-Flow Traffic Monitors</li> </ul>	2x SFP + 2x RJ45 No Yes Yes 16 16	4x SFP No Yes Yes 16 16	2x SFP + 2x RJ45 Yes No No 60 60
<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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## Management 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 the entire network. The Transmode Network Manager (TNM) provides service creation and assurance over the full range Transmode EDUs and EMXPs which enables an operator to conveniently deploy new Ethernet services and also to quickly identify, isolate and resolve network problems.