ML640E Ethernet Access Device

The ML640E Ethernet Access Device (EAD) from Actelis® is an advanced intelligent Ethernet service delivery access unit. Using the existing copper network, the ML640E can deliver up to 230 Mbps of symmetrical Ethernet traffic at fiber quality over existing voice-grade copper. The ML640E comes in three models capable of supporting 4, 8 or 16 copper pairs, and has 2 optional SFP interfaces supporting 100/1000Base-FX optical connections. It offers CE 2.0 services on all its ports copper and fiber.

The ML640E EAD can be deployed back-to-back in a Point-to-Point topology or in Multi-Point topologies with Actelis' Ethernet aggregation switches ML2300/ML230. With its superior performance, extensive functionality and low cost, the ML640E EAD offers rapid CE2.0 service delivery and allows for complete utilization of the existing network infrastructure.

The ML640E EAD is interoperable with any standard Ethernet switch, router or hub. Compliant with Metro Ethernet Forum (MEF) specifications, ML640E EADs seamlessly integrate into carrier Ethernet networks. Equipped with four 10/100Base-T Ethernet interfaces and 2 optional 100/1000Base-FX Small Form Factor (SFP) ports, the ML640E EAD allows assignment of a service or a customer per port. DS3/E3 uplinks can be used to connect to legacy networks instead of the 100/1000Base-FX SFPs.

The ML640E EAD models enable service providers to create an intelligent, CE2.0 Ethernet access edge with comprehensive bandwidth control and traffic management features. The ML640E enables flexible service provisioning using Ethernet Virtual Connections (EVCs) with flexible mapping and Quality of Service (QoS) capabilities that maximize the efficiency of the access bandwidth on all ports and configurations. The ML640E enforces Service Level Agreements (SLAs) for each subscriber and Class of Service based on the MEF CE2.0 specifications, allowing service providers to safely aggregate multiple services or multiple subscribers on the same Ethernet access uplink.

All ML640E EAD models provide 802.1q VLAN-aware wire-speed bridging, double tagging (VLAN stacking) for end-user VLAN transparency, VLAN translation, L2, L3 and L4 classification with eight traffic classes, RSTP/STP, bandwidth monitoring, Multicast/Broadcast limiting, as well as IGMP snooping for video distribution applications.

Powered by Actelis' award-winning, patented EFM*plus*™ technology, the rate, reach and reliability are increased significantly using advanced Dynamic Spectrum Management (DSM) and Dynamic Rate Boost (DRB) techniques. EFM*plus* technology provides the best rate/reach performance and most resilient fiber-quality transmission, ensuring carrier-class reliability. When combined with Actelis' industry-leading XR239 EFM Repeaters, the reach can be extended even further.

The ML640E EADs provide proactive and dynamic tools for enhanced trouble shooting and monitoring capabilities. Advanced Carrier-class EFM OAM, including 802.3ah, CFM (802.1ag), Y.1731 (ITU), Y.1564 embedded traffic generator and Ethernet Loopback with MAC/IP swapping, TWAMP lite reflector as well as IP probe capabilities are supported by the product offering both physical link as well as service level end to-end advanced troubleshooting mechanisms.

The ML640E EADs can be managed In- and Out-of-Band by the MetaASSIST™ View graphical craft application and via the multi-platform Element Management System, MetaASSIST EMS. The management protocols include standard command line interface and SNMP using standard MIBs for seamless integration with third-party Network Management Systems (NMS).

Highlights

- Standards-based IEEE 802.3ah Ethernet in the First Mile (EFM) 2Base-TL transport
- MEF CE 2.0
- Rapid Service Deployment
- Superior Rate, Reach & Reliability
- Low Delay and Jitter for Voice and Video Transmission
- Carrier Class OAM, including Y.1731, CFM, Y.1564, EFM OAM, and TWAMP lite-reflector
- Worldwide Spectral Compliancy
- NEBS III, FCC, UL, CE
- Environmentally Hardened

Applications

- Transparent LAN Service
- Fast Internet Access
- Metro Ethernet Extension
- Private Campus Network Intra-Connection
- MDU/MTU Backhaul
- DSLAM Backhaul
- WiFi and Cellular Backhaul (Radio Access Network)
- Leased Lines Replacement

Markets Served

- ILECs, CLECs, IOCs, PTTs, and Alternative Carriers
- Federal, State and Local Government Agencies
- Education, Health Care, Utilities, and Private Campuses

ML640E

Specifications

Interfaces

Ethernet (Network/User)

- **10/100/1000 Base-T:** 4 ports
  Connector: RJ45, Auto-MDIX
- **100/1000Base-FX:** 2 ports (option)
  Connector: SFP based, MSA compliant

High Speed Link (Bonded Copper Pairs)

- **Protocol:** IEEE 802.3ah 2Base-TL
- **Line code:** ITU-T G.991.2 rev. 2
- **Bandwidth:** 1-230 Mbps (symmetrical)
  up to **15 Mbps per pair**, bonding up to 16 pairs*
- **Number of Copper Pairs:** 4, 8, 16*
  Connector: RJ45 (per modem/pair ML644E/8E,
  2 modems/pairs per connector with ML6416E)
- **End-to-end Delay:** 2-4 ms (typical)
- **Spectral Compliance:** ITU-T G.991.2 annex A, B, F,
  G, ETSI TS 101 524 annex E, ANSI T1.417, T1.426
  Per-country regulatory compliant spectral modes
- **Spectral Friendliness:**
  Dynamic Spectral Shaping (DSS)
- **Cross-talk Cancellation:**
  Dynamic Rate Boost (DRB);
- **Sealing Current** 48 VDC/1.5 mA nominal

Management (Out-of-Band)

- **10/100Base-T Connector:** RJ45, Auto-MDIX
- **Craft EIA RS-232 (DCE) Connector:** DB9

Ethernet Bridge Features

- **Bridging:** IEEE 802.1q
- **Forwarding Database size:** 16K MAC addresses
- **MTU:** Configurable
- **TPID:** up to 4 settable per inner/outer tag
- **Aging:** Configurable
- **MAC Limiting and Filtering**
- **Multicast/Broadcast Control**
- **Port based VLAN Stacking (**Q-in-Q
  Conditional VLAN Stacking
- **VLANs: 4K,** supports **VLAN translations**
- **RSTP, STP:** IEEE 802.1d
- **Link Aggregation:** IEEE 802.3, L2/L3 balancing
- **Provider Bridges:** IEEE 802.1ad
- **LLDP:** IEEE 802.1ab
- **IGMP Snooping:** RFC 4541, V1/V2 RFC 1112/2236

- **ERPS:** ITU-T G.8032
- **EFM OAM:** IEEE 802.3ah clause 57 inc. Dying Gasp
- **CFM/MEF OAM:** IEEE 802.1ag , ITU Y.1731
- **ITU SAM:** Y.1564 traffic generator/analyzer
- **Loopback:** L2/L3 - MAC/IP swap;
  wire-speed CFM loopback by LBM-LBR
- **TWAMP lite-reflector:** RFC 5357; **IP Probe**

Quality of Service Features

- **Classes of Service:** 8
- **Scheduler**: WFQ, SP, Hybrid
- **Bandwidth Control:** 32 profiles, 2 rate, 3 color
  metering (CIR, CBS, EIR, EBS)
- **EVCs:** 32 Services
- **Classification:** 128 rules (Port/VLAN/L2 L3/L4)
- **Shaping:** per queue/port
- **CoS Marking:** Per EVC

Management

Applications

- **EMS:** MetaASSIST EMS
- **Craft GUI:** MetaASSIST View

Protocols

- IPV4 and IPV6
- **DHCP Client:** RFC 2132
- **ACS Client, CWMP:** TR-069
- **Command Line Interface:** TL1, CLI
- **Remote Access:** Telnet
- **SNMP:** V3, V2C, V1
- **Radius Authentication:** RFC 2865
- **Secure Access (option):** SSH v2
- **Time Synchronization:** SNTP v3
- **Web Access**: HTTP
- **File transfer:** FTP, TFTP
- **Syslog:** RFC 3164

Front Panel Indicators (LEDs)

- **Power**
- **Status**
- **Alarm**
- **MLP per modem/pair**
- **ACT** (Activity)
- **LNK** (Link) per Ethernet/HSL port

Alarm Contacts

- **Terminal Block:** 2 Input, 1 Output Physical

Physical

- **Dimensions Height:** 1.6" / 40 mm (1U)
  Depth: 11.0" / 280mm, **Width:** 8.4" / 213 mm
- **Weight:** 3.75 lbs / 1.7 Kg
- **Mounting Rack:** 2 units in 19", 23" or ETSI racks
  Desktop, Wall Mount
- **Power**
  DC: 24/48 Vdc nominal (20-60 Vdc range),
  15-24 Watt (per model)
  AC: 90-264 VAC, 47-63 Hz, up to 30 Watt

Environmental

- **Operating Temp:** -40° to +65°C
- **Storage Temp:** -40° to +70°C
- **Relative humidity:** Up to 95%, non-cond.

Regulatory Certifications/Compliance

Metro Ethernet Forum

- CE 2.0 **

Safety

- UL 60950, CSA C22.2 60950
- EN 60950-1, IEC 60950-1

EMC

- FCC Part 15 Class B
- ICES-003 Class B
- ETSI EN 300 386 Class B
- ETSI ETS 300 132-2
- ITU-T K.20, K.21

NEBS

- Level III (GR-1089-CORE, GR-63-CORE) **

CE

- EMC and Safety

Environmental

- GR-63-CORE
- ETSI ETS 300 019

CE 2.0 MEF CERTIFIED

* 16 pair product - future release   ** Certification in progress

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11.06.14