ML690E Aggregation Unit

The ML690E Ethernet Aggregation Unit from Actelis® is an advanced intelligent Ethernet service delivery unit. Using the existing copper network, the ML690E can support up to 16 pairs / 4 HSLs and up to 230 Mbps of symmetrical Ethernet traffic at fiber quality over existing voice-grade copper. ML690E has two optional SFP interfaces supporting 100/1000Base-FX ports. It offers CE 2.0 services on all its ports - both copper and fiber.

The ML690E Aggregation unit can be deployed in a Multi-Point topologies with Actelis' ML600/E Ethernet Access Devices. ML690E uplink can be fiber or bonded copper - copper when connected to Actelis Ethernet aggregation switches ML230/ML2300 or fiber when connected to any standard Ethernet switch including ML230/2300 units. With its superior performance, extensive functionality and low cost, the ML690E offers immediate CE 2.0 service delivery, and allows for further utilization of the existing network infrastructure.

The ML690E is interoperable with any standard Ethernet switch, router or hub. Compliant with Metro Ethernet Forum (MEF) CE 2.0 specifications, ML690E seamlessly integrates into carrier Ethernet networks. Equipped with four 10/100/1000Base-T Ethernet interfaces and two optional 100/1000Base-FX Small Form Factor (SFP) ports, the ML690E 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.

Service providers utilizing the ML690E intelligent can offer up to four CE 2.0 based services with comprehensive bandwidth control and traffic management features. The ML690E's flexible service provisioning using Ethernet Virtual Connections (EVCs), along with its advanced mapping and Hierarchical Quality of Service (H-QoS) capabilities, allows carriers to maximize the efficiency of the access bandwidth on all their ports and configurations. Service Level Agreements (SLAs) can be easily enforced per each subscriber enabling service providers to safely aggregate multiple services or multiple subscribers, on the same Ethernet access uplink. For higher density two ML690E can be stacked in one RU 19" sleeve.

ML690E provides 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, ERPS, 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, these technologies can extend reach even further.

The ML690E provides proactive and dynamic tools for enhanced trouble shooting and monitoring capabilities. Advanced Carrier-class OAM, including EFM OAM per 802.3ah , CFM (802.1ag) and , Y.1731 are supported by the product, offering both physical link as well as service level end to-end advanced troubleshooting mechanisms.

The ML690E 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, Telnet and SNMP using standard MIBs for seamless integration with third-party Network Management Systems .

Highlights

- Standards-based IEEE 802.3ah Ethernet in the First Mile (EFM) 2Base-TL transport
- MEF CE 2.0 compliant,
- H-QoS
- Rapid Service Deployment
- Superior Rate, Reach & Reliability
- Low Delay and Jitter for Voice and Video Transmission
- Carrier Class OAM, including Y.1731, CFM, EFM OAM
- Hardened, Extended Temp to +74ºC
- Worldwide Spectral Compliancy
- NEBS, 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

Actelis Networks™

ML690E

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)

- **Number of HSLs:**
  CO unit: 1xHSL or up to 4xHSL
  CPE unit : 1xHSL
  Mixed (Drop&Cont): 1x-R HSL +3x-O HSL
- **Protocol:** IEEE 802.3ah 2Base-TL
- **Line code:** ITU-T G.991.2 rev. 2
- **Bandwidth per HSL:** 1-230 Mbps (symmetrical) up to **15 Mbps per pair** , bonding up to 16 pairs
- **Number of Copper Pairs per unit:** 8 or 16
- **Copper Pairs per HSL:** 1-16 / 1-8 (per model type)
  Connector: RJ45 (per modem/pair) ML698ES, 2 modems/pairs per connector with ML6916ES
- **Line code:** ITU-T G.991.2 rev. 2
- **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:** 1518 – 2048 Bytes (configurable per system)
- **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

Quality of Service Features

- **Classes of Service** (queues per port): 8
- **Two Levels Hierarchical Scheduler (H-QOS),** up to 64 queues per port, 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
- **Color Mode Awareness** by COS or DEI
- **CoS Marking**: by COS or DEI, per Service

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) - per Ethernet port
- **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" / 280 mm, **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), 24 Watt
  AC: 90-264 VAC, 47-63 Hz, up to 30 Watt

Environmental

- **Operating Temp:** -40° to +74°C
- **Storage Temp:** -40° to +74°C
- **Relative humidity:** Up to 95%, non-cond.

Regulatory and 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
- ICES-003 Class B
- ETSI EN 300 386 Class B
- ETSI ETS 300 132-2
- ITU-T K.20, K.21

NEBS

- Designed for GR-1089-CORE, GR-63-CORE

CE

- EMC and Safety

Environmental

- GR-63-CORE
- ETSI ETS 300 019