ML230 Ethernet Aggregation Switch

The Actelis® ML230 is a compact, next-generation Ethernet aggregation platform that delivers high-speed Ethernet services.

Actelis' best-in-class Ethernet over copper solutions, incorporating EFMplus™ and Symmetrical Vectoring (DRB) technologies, enable the ML230 to delivers unprecedented Rate, Reach and Reliability over existing copper facilities, allowing a wide-scale deployment of Ethernet services and infrastructure. The ML230 is available with front and rear access options and installs within minutes, providing immediate deployment of broadband services. The ML230 offers a density of up to 64 ports per Rack Unit (RU). The ML230 is interoperable with any standard Ethernet switch or router and aligned with Metro Ethernet Forum (MEF) recommendations, enabling Actelis' systems to seamlessly integrate into Carrier Ethernet networks.

Architecturally, the ML230 platform serves as a Central Office (CO) aggregator in a Point-to-Multipoint topology connecting to multiple ML600x (copper) and ML500 (fiber) Ethernet Access Devices (EADs). For copper deployments, each ML600 EAD is connected to the ML230 via a High Speed Link (HSL) comprising 1-16 bonded-copper pairs and offering up to 230 Mbps per HSL. A number of ML230 systems can be stacked in a Star or Ring topology, providing flexible topology layouts and higher port density per uplink. To meet higher bandwidth and/or reach requirements, the Actelis ML230 can be used as an EAD, bonding up to 32 pairs per HSL and offering more than 400 Mbps per HSL. The ML230 HSLs can be used both for aggregation and service distribution.

The ML230 has a single Service Dispatcher Unit (SDU) slot and two Multiport Line Unit (MLU) slots, allowing for incremental service growth, MLP (Modem Line Port) redundancy and flexible modem allocation (any modem to any HSL) using pluggable cards. A variety of SDU and MLU cards exist, supporting different numbers of Ethernet and modem ports per chassis. The MLU-32DF and MLU-32DR line units offer 32 G.SHDSL.bis modems per card and up to 64 modems per shelf. The MLU-64DR and MLU-64DF line units offer superior density of 64 G.SHDSL ports per card and up to 128.

MLU-xxDR or MLU-xxDF, enable ML230 to offers significantly increased performance over bonded copper by utilizing Actelis' Symmetrical Vectoring (DRB) technology.

The SDU-450 linecard series offer advanced Ethernet switching capability as well as multiple uplinks, providing flexible integration into Ethernet and SONET/SDH networks. The ML230's Small Form-factor Pluggable (SFP) ports accept standard 100Base-FX, 1000Base-FX, 2500BaseFX, 1000Base-T and T3/E3 modules. Digital Diagnostics Monitoring (DDM) capabilities are supported for enhanced diagnostic and troubleshooting.

The ML230 can dramatically increase reach by utilizing Actelis' XR239 G.SHDSL EFM repeaters and Actelis' PFU-8x units for repeaters remote powering. The ML230 can support up to 8 hops (9 segments), with each XR239 supporting 2 copper pairs.

The ML230 supports current and evolving MEF service requirements, supporting 2000 EVC flows meters, policing and shapers. Additionally, the ML230 provides 802.1q VLAN-aware wire-speed bridging, optimizes multicast switching by IGMP v1/v2 snooping, performs double tagging (VLAN stacking) for end-user VLAN transparency, applies 802.1p COS classification and marking, as well as supports per port egress rate limiting. Service resiliency can be assured using Ethernet Ring Protection Switching (ERPS) (G.8032), offering sub-50ms protection switching. In addition, RSTP/STP, Automatic Protection Switch (APS) and Link Aggregation (LAG) protocols are supported on all Ethernet ports.

Highlights

- IEEE 802.3ah Ethernet in the First Mile (EFM) 2Base-TL Solution
- CE 2.0, CE 1.0 - MEF 9, 10, 14
- Rapid Service Deployment
- Carrier-Class Redundancy
- Carrier-Class OAM
- Superior Rate, Reach & Reliability through EFMplus and DRB
- Low Delay and Jitter for Voice and Video Transmission
- Worldwide Spectral Compliancy
- NEBS III, FCC, UL, CE
- Environmentally Hardened

Applications

- DSLAM Backhaul
- Fast Internet Access
- MDU/MTU Backhaul
- Metro Ethernet Extension
- Private Campus Network Intra-Connection
- Transparent LAN Service
- WiFi and Cellular Backhaul

Markets Served

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

High Performance Broadband Over Copper

The ML230 provides enhanced troubleshooting and OAM capabilities. The ML230 offers proactive and reactive tools for dynamic troubleshooting and monitoring capabilities. Advanced Carrier-class EFM OAM, including 802.3ah, CFM (802.1ag) and Y.1731 (ITU), are incorporated, offering physical link, service level end-to-end advanced troubleshooting, as well as performance and Service Level Agreement (SLA) monitoring mechanisms. In addition, the ML230 supports bandwidth utilization monitoring per port and EVC, as well as Ethernet frames triggering. Time-Domain Reflectometer (TDR) capability, integrated as part of the ML230 along with external Metallic Loop Test (MLT) connectivity, enables

an effective troubleshooting tool to locate most DSL-affecting copper problems. The information gathered includes accurate end-to-end loop length measurement, as well as identification of various fault types impacting signal continuity between loop spans.

The ML230 can be managed In-Band and Out-of-Band by Actelis' MetaASSIST™ View graphical craft application and via Actelis' multiplatform Element Management System, MetaASSIST EMS. The management protocols include SNMP using standard MIBs, de facto standard CLI, and standard TL1 command line interface for seamless integration with third-party Network Management Systems (NMS).

Specifications

System

- **Service Dispatching Units:** 1 SDU-450 series
- **Modem Line Units**: 2 MLU cards: MLU-32ER/EF, MLU-32DR/DF, MLU-64DR/DF
- **Max Copper pairs**: 128
- **Redundancy:** Ethernet Facility redundancy, Modem port/pair redundancy, Power input redundancy
- **End-to-End Delay:** 2-4 ms (typical)

Product Interfaces

Ethernet (Network/User) No. of interfaces SDU model dependant

- **10/100Base-T Ports**: RJ45, Auto-MDIX
- **100/1000Base-T (option)**: RJ45, Auto-MDIX
- **1000/2500Base-FX (option):** SFP based, MSA compliant

High Speed Link (Bonded Copper Pair Link)

- **HSLs (max)**: 128
- **Protocol**: IEEE 802.3ah 2Base-TL
- **Linecode:** ITU-T G.991.2 rev. 2
- **Copper Pairs per HSL**: 1-16 with ML600, 1-32 with ML230
- **Bandwidth per HSL**: 1-230 Mbps w/ML600, Exceeding 400 Mbps w/ML230 / SDU-450 **Connector:** 1x DIN 128-pin, rear access, per slot, 64-pairs FCI Connector for front access MLU-32/64DF cards
- **Cross-talk Cancellation** - **Symmetrical Vectoring** Dynamic Rate Boost (DRB) (Note: DRB friendly for HSL bonding more than 8 pairs)
- **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)
- **Sealing (Wetting) Current*:** 48V/1.5mA nominal (Note: *Sealing current will not be supported on Add-Drop confi.)

Copper Pair Testing Tools

- **Time Domain Reflectometer:** Loop length measurement, fault types identifications (presence and location)
- **External Metallic Loop Testingt**: 2 RJ45 connectors, any copper pair

Management (Out-of-Band).

- **10/100Base-T Connector:** RJ45, Auto-MDIX
- **Craft EIA RS-232 (DCE) Connector:** DB9
- Dial-up Modem EIA RS-232 (DTE); **Connector:** DB9
- **Alarm Contacts 4 Input; 4 Output Connector:** DB15 and Wire-wrap

Ethernet Capabilities & Protocols

- **Dynamic Bridging:** IEEE 802.1
- **VLAN Tagging:** IEEE 802.1Q
- **Double Tagging:** Q-in-Q, VMAN
- **IGMP Snooping:** IGMP v1/v2 (SDU-450 series)
- **RSTP, STP:** IEEE 802.1d
- **Link Aggregation:** IEEE 802.3ad
- **ERPS:** ITU-T G.8032, Multiple Rings
- **Provider Bridges:** IEEE 802.1ad
- **LLDP:** IEEE 802.1ab

Quality of Service

- **Classes of Service:** 2K queues per system
- **Scheduler:** 4SP, WFQ in each SP
- **Queue Management:** Tail Drop
- **Classification:** Port/L2 802.1p/Q priorities

Management

Protocols

- **SNMP:** SNMP V3, V2C, V1
- **IP addresses:** IPV4 and IPV6
- **Command Line Interface:** TL1, CLI
- **Remote Access:** Telnet
- **Secure Access (option):** SSH v2
- **Time Synchronization:** SNTP v3
- **Radius Authentication :** RFC 2856
- **Web Access:** HTTP
- **File Transfer:** FTP, TFTP
- **EFM OAM:** IEEE 802.3ah clause 57
- **CFM:** IEEE 802.3ag
- **Service OAM:** ITU Y.1731

Applications

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

Front Panel Indicators

System

- Power A/B
- Critical / Major / Minor
- ACO (Alarm Cut-Off) / LMT (Lamp Test) Button

Card

- Active Status
- ACT (Activity) /LNK (Link): Per Ethernet port

Physical

- **Chassis:** 19"
- **Mounting Rack:** 19", 23" or ETSI rack Wall mount
- **Dimensions Height:** 3.5" / 88mm (2U) **Depth:** 11"/278mm with cable management **Width:** 17.2"/438.55 mm
- **Weight:** 7.7 lbs/3.5 Kg (chassis only)
- **Plug-in Cards:** 3 horizontal, front loading
- **Power DC:** -48/-72 VDC nominal, dual A+B, 90 Watt min configuration (1x SDU, 1xMLU-32); 130 Watt for fully loaded system (1xSDU, 2x MLU-32); 210 Watt for fully loaded, high-density system (1x SDU, 2x MLU-64)

Environmental

- **Operating Temp.:** -40° to +65°C (-40° to +149° F)**
- **Storage Temp.:** -40° to +75°C (-40° to +167° F)
- **Relative humidity:** Up to 95%, non-cond. (Note: **Tested in accordance with NEMA temperature requirements with MLU-32XX cards)

Regulatory Compliance/Certifications

Metro Ethernet Forum

- CE 2.0, CE 1.0 - MEF 9, 10, 14

Safety

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

EMC

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

NEBS

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

CE

- EMC and Safety

Environmental

- GR-63-CORE; ETSI ETS 300 019