



GLOBAL SUPPLIER OF  
EFM OVER COPPER

INFONETICS  
RESEARCH

No. **1**  
2009  
2010  
2011  
2012  
2013

# ML2300 Ethernet Aggregation Switch

## The Actelis® ML2300 is a compact, next-generation Ethernet aggregation platform that delivers high-speed Ethernet services.

With Actelis' best-in-class Ethernet over copper solutions, incorporating EFMplus™ and DRB technologies, the ML2300 delivers unprecedented Rate, Reach and Reliability over existing copper facilities, enabling wide-scale deployment of Ethernet services and infrastructure. The ML2300 is available with front and rear access options and installs within minutes, enabling immediate deployment of broadband services. The ML2300 offers a density of up to 64 ports per Rack unit (RU). The ML2300 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 ML2300 platform serves as a Central Office (CO) aggregator in a Point-to-Multipoint topology connecting to multiple ML600 (copper) and ML500 (fiber) Ethernet Access Devices (EADs). For copper deployments, each ML600 EAD is connected to the ML2300 via a High-Speed Link (HSL) comprising 1-16 bonded-copper pairs and offering up to 230 Mbps per HSL. A number of ML2300 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 ML2300 can be used as an EAD bonding up to 32 pairs per HSL, offering more than 400Mbps per HSL. The ML2300 HSLs can be used both for aggregation and service distribution.

The ML2300 has two Service Dispatcher Unit (SDU) slots and four Multipoint Line Unit (MLU) slots, allowing for incremental service growth, equipment redundancy, 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-32EF, MLU-32ER, MLU-32DF and MLU-32DR line units offer 32 G.SHDSL.bis modems per card and up to 128 modems per shelf. The MLU-64DR and MLU-64DF line units offer superior density of 64 G.SHDSL ports per card and up to 256 ports per ML2300. When equipped with MLU-64DR/DF or MLU-32DR/DF, the ML2300 offers significantly increased performance over bonded copper by utilizing Actelis' DRB technology.

The SDU-440/450 linecard series offer advanced Ethernet switching capability as well as multiple uplinks, providing flexible integration into

Ethernet and SONET/SDH networks. The ML2300'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 ML2300 can dramatically increase reach by utilizing Actelis' XR239 G.SHDSL Repeaters and Actelis' PFU-8x units for repeaters remote powering. The ML2300 can support up to 8 hops (9 segments), with each XR239 supporting 2 copper pairs.

The ML2300 supports current and evolving MEF service requirements, supporting 2000 EVC flows meters, policing and shapers. Additionally, the ML2300 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.

The ML2300 provides enhanced troubleshooting and OAM capabilities. The ML2300 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 ML2300 supports bandwidth utilization monitoring per port and EVC as well as Ethernet frames triggering. Time-Domain Reflectometer (TDR) capability, integrated as part of the ML2300 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 ML2300 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).

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

## Markets Served

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



## Specifications

### System

	SDU's Service Dispatching Units	MLUs Modern Line Units	Max Copper Pairs (chassis connectors)
ML2300 CHS-2000B 19"	SDU-450 Series SDU-440 Series	MLU-32ER rev B MLU-32EF MLU-32DR/DF MLU-64DR/DF*	256
ML2300 CHS-2000 19" CHS-2000 ETSI	SDU-450 Series SDU-440 Series	MLU-32ER rev B MLU-32ER MLU-32EF MLU-32DR/DF	128
	SDU-450 Series	MLU-64DF	256

- **Slots 6:** 1-2 x SDU, 1-4 x MLU
- **Redundancy:** Ethernet Facility redundancy  
SDU Equipment protection, Modem port/pair redundancy, Power input redundancy, Dual star backplane
- **End-to-End Delay:** 2-4 ms (typical) Construction

### 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):** 64/128 (SDU-440/SDU-450 series)
- **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 ML2300/ML2300
- **Bandwidth per HSL:** 1-230 Mbps w/ML600  
Exceeding 400 Mbps w/ML2300 SDU-450
- **Connector:** 1x DIN 128-pin, rear access, per slot  
2x50-pin Telco for front access MLUs-32EF  
64-pairs FCI Connector for front access MLU-32/64DF cards
- **Cross-talk Cancellation**  
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 configurations)

### Copper Pair Testing Tools

- **Time Domain Reflectometer:** Loop length measurement, fault types identifications (presence & location)
- **External Metallic Loop Testing:** 2 x RJ45 connectors, any copper pair Physical Characteristics

### 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
- **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 & Service OAM:** IEEE 802.3ag; ITU Y.1731

#### Applications

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

### Front Panel Indicators

#### System

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

#### CARD

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

#### Physical

- **Chassis:** 19" (CHS-2000/B), ETSI (CHS-2000)
- **Mounting Rack:** 19", 23" or ETSI rack
- **Dimensions:** Height: 7" / 178mm (4U) or 225 mm (for ETSI chassis) Depth: 12" / 305mm or 11" / 280 mm (for ETSI chassis) Width: 17.32" / 440 mm
- **Weight:** 15.0 lbs/ 6.8 Kg (chassis only)
- **Plug-in Cards:** 6 horizontal, front loading
- **Power DC:** -48/-60 VDC nominal, dual A+B  
140 Watt min configuration (1x SDU, 1xMLU-64);  
380 Watt, full chassis w/o SDU redundancy (1x SDU, 4x MLU-64);  
405 Watt for fully loaded system WITH (2x SDU, 4x 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



Corporate Headquarters  
Actelis Networks, Inc.  
47800 Westinghouse Drive  
Fremont, CA 94539  
t. +1 510-545-1045 or toll-free in U.S. 1-866-ACTELIS

Company and General Information: [info@actelis.com](mailto:info@actelis.com)

Asia Pacific Sales: [apacsales@actelis.com](mailto:apacsales@actelis.com)

Central and Latin America Sales: [calasales@actelis.com](mailto:calasales@actelis.com)

Europe, Middle East and Africa Sales: [emeasales@actelis.com](mailto:emeasales@actelis.com)

North America Sales: [nasales@actelis.com](mailto:nasales@actelis.com)