CE 1.0 MEF CERTIFIED

GLOBAL SUPPLIER OF EFM OVER COPPER

I N F O N E T I C S
R E S E A R C H

No. **1** 2009 2010 2011 2012

ML698 Ethernet Aggregation Switch

The Actelis® ML698 expands our central office solutions, offering a compact and cost-effective Ethernet in the First Mile (EFM) mini-aggregation solution for low-pair count locations. The ML698 operates in a Point-to-Multipoint topology, connecting to up four ML600 Ethernet Access Devices (EADs) delivering symmetrical Ethernet access services to remote subscribers over multiple voice-grade copper pairs.

Each of the ML600 EADs can be connected to the ML698 via a High Speed Link (HSL) comprised of 1-8 bonded copper pairs. Any combination of copper pairs per HSL can be supported to a total of 8 pairs per ML698 unit.

The ML698 bonds up to 8 copper pairs together to create a 2Base-TL aggregated link, implementing the standard IEEE 802.3ah-2004 (EFM) long-reach Ethernet-over-Copper specification.

Powered by Actelis Networks' award-winning EFMplus™ technology, the rate, reach and reliability are increased significantly using advanced Dynamic Spectrum Management (DSM) and Dynamic Rate Boost (DRB) techniques. This technology doubles the rate/reach in real-world field deployments. Combined with Actelis industry-leading XR239 EFM repeaters, the reach can be extended even further.

Interoperable with any standard Ethernet switch or router and aligned with Metro Ethernet Forum (MEF) recommendations, the ML698 allows service providers and enterprises to use existing copper infrastructure to deliver up to 100 Mbps Ethernet service per customer in G.SHDSL.bis technologies. The ML698 is equipped with 4 10/100Base-T Ethernet interfaces and an optional 100/1000Base-FX Small Form Factor (SFP). The SFP ports can accept any standard 100Base-FX, 1000Base-FX, 1000Base-T and T3/E3 modules, providing redundant aggregation uplinks to Ethernet and SONET/SDH networks.

The ML698 mini-aggregator provides 802.1q VLAN-aware wire-speed bridging, double tagging (VLAN stacking) for end-user VLAN transparency, L2 (Ethernet priority), L3 (ToS/Diff-Serv) classification with four traffic classes, RSTP/STP, link aggregation, bandwidth monitoring, multicast/broadcast limiting, and IGMP snooping for video distribution applications. The ML698 supports full Intra-switching between the HSLs connected to it.

Advanced loop diagnostics capabilities are integrated as part of the ML698, including a Time-Domain Reflectometer (TDR), enabling 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 ML698 provides proactive and dynamic tools for enhanced trouble shooting and monitoring capabilities. Advanced Carrier-class EFM OAM, including 802.3ah, CFM (802.1ag) and Y.1731 (ITU), are incorporated, offering both physical link as well as service level end-to-end advanced troubleshooting mechanisms.

The ML698 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 TL1 Command Line Interface (CLI), Cisco like CLI and SNMP using standard MIBs for seamless integration with third-party Network Management Systems (NMS).

Highlights

- IEEE 802.3ah Ethernet in the First Mile (EFM) 2Base-TL Solution
- CE 1.0 - MEF 9, 14
- Rapid Service Deployment
- Superior Rate, Reach & Reliability
- Low Delay and Jitter for Voice and Video Transmission
- Worldwide Spectral Compliancy
- OSMINE, 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

Actelis Networks

ML698

Specifications

Interfaces

Ethernet (Network/User)

- **10/100Base-T:** 4 ports, **Connector:** RJ45, Auto-MDIX
- **100/1000Base-FX Connector:** 1 port (option) SFP Based MSA compliant

High Speed Link (Bonded Copper Pairs)

- **Max HSLs:** 4
- **Protocol:** IEEE 802.3ah 2Base-TL
- **Line code:** ITU-T G.991.2 rev. 2
- **Bandwidth per HSL:** 1-100 Mbps (symmetrical)
- **Copper Pairs per HSL:** 1-8, Connector: RJ45 (per modem/pair)
- **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:** 48VDC/4mA nominal

TDR

- **Loop length measurement:** Fault types identifications (presence & location)

Management (Out-of-Band)

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

LAN Protocols

- **Dynamic Bridging:** IEEE 802.1, 8K MAC addresses
- **Discovery Mechanisms:** LLDP
- **VLAN Tagging:** IEEE 802.1Q
- **Double Tagging:** Q-in-Q
- **RSTP, STP:** IEEE 802.1d
- **Link Aggregation:** IEEE 802.3ad

- **Provider Bridges:** IEEE 802.1ad
- **IGMP snooping:** IGMP V1/V2
- **OAM:** IEEE 802.3ah clause 57 IEEE 802.1ag ITU Y.1731

Management

Protocols

- **SNMP:** SNMP v1 and v2c
- **Command Line Interface:** TL1, CLI
- **Remote Access:** Telnet
- **Secure Access (option):** SSH v2
- **Time Synchronization:** SNTP v3
- **Web Access:** HTTP
- **File transfer:** FTP, TFTP
- **IEEE 802.3ah EFM OAM:** Dying Gasp
- **User Authentication:** RADIUS and/or local passwords

Metro Ethernet Forum – Advanced Service Provisioning and Traffic Management

Quality of Service

- **Classes of Service:** 4
- **Scheduler:** WFQ, SP
- **Classification:** L2 802.1p/Q priorities L3 ToS/DiffServ

Applications

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

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
- **Dimensions:** Height: 1.6" / 40mm (1U)

- **Depth:** 11.0" / 280mm, **Width:** 8.4" / 213mm
- **Weight :** 3.75 lbs / 1.7 Kg
- **Mounting Rack:** 2 units in 19", 23" or ETSI racks Desktop, Wall Mount
- **Power DC:** -48/-60 VDC nominal 17 Watt
- **Power AC:** 90-264 VAC, 47-63 Hz 21 Watt

Environmental

- **Operating Temp:** -40° to +65°C*
- **Storage Temp:** -40° to +75°C
- **Relative humidity:** Up to 95%, non-cond.

*Tested in accordance with NEMA temperature requirements

Regulatory Approval/Certifications

Metro Ethernet Forum

- CE 1.0 - MEF 9, 14

Safety

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

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

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