



# ML 600

## Ethernet Access Devices

Carrier Ethernet  
over Copper™



# High Bandwidth

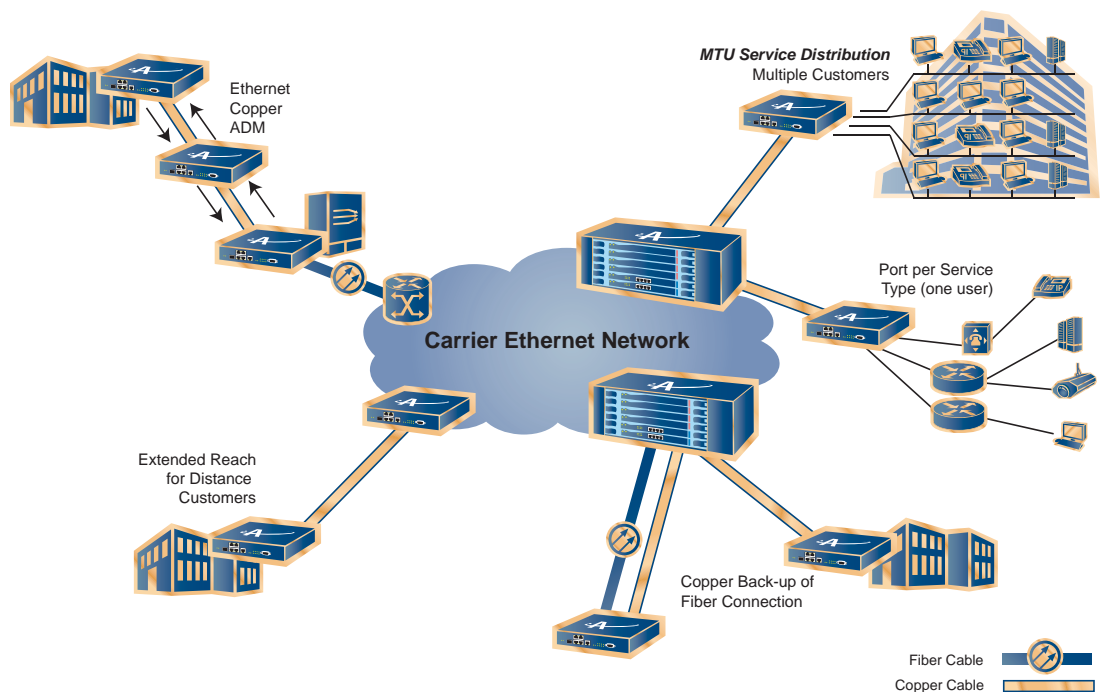
Ethernet Access Devices (EAD) from Actelis Networks enable delivery of high-speed Carrier Ethernet services over the existing copper and fiber infrastructure. The ML 600s are compact, cost-effective Ethernet in the First Mile (EFM) EADs that deliver up to 45 Mbps symmetrical Ethernet traffic at fiber quality over existing copper pairs.

Available in 1 to 8 copper pairs and fiber configurations, the ML 600 EAD can be deployed in a Point-to-Point configuration, optional copper add-drop chain, or as the CPE in a Point-to-Multi-Point configuration with Actelis' EFM switches. With its superior performance, extensive functionality and low cost, the ML 600 EAD platforms offer rapid service delivery and allow for complete utilization of the existing network infrastructure.

The ML 600 EAD platform is interoperable with any standard Ethernet switch, router or hub. Compliant with Metro Ethernet Forum (MEF) specifications, ML 600 EAD systems seamlessly integrate into Carrier Ethernet Networks. Equipped with four 10/100Base-T Ethernet interfaces and an optional 100Base-FX or 1000Base-FX Small Form Factor (SFP) port, the ML 600 EAD platform allows assignment of a service or a customer per port. A DS3/E3 uplink can be used to connect to legacy networks in the 100Base-FX SFP version.

The ML 640 EAD models let service providers create an intelligent Ethernet access edge with advanced bandwidth control and traffic management features, fully compliant with the MEF 9 and 14 specifications. The ML 640 enables flexible service provisioning using Ethernet Virtual Connections (EVCs) with flexible mapping and Quality of Service capabilities that maximize the efficiency of access bandwidth. QoS strictly enforces Service Level Agreements for each subscriber and Class of Service using VLAN or CoS based rate limiting, allowing service providers to safely aggregate multiple services or multiple subscribers on the same access port.

Powered by Actelis Networks' field-proven EFMplus™ technology, the rate and reach are increased significantly, using advanced Dynamic Spectrum Management (DSM) techniques. This technology ensures the best rate/reach performance and most resilient fiber-quality transmission ensuring carrier class service availability.



# Extended Rate and Reach

All ML 600 EAD models provide 802.1q VLAN-aware wire-speed bridging, double tagging (VLAN stacking) for end-user VLAN transparency, L2 (Ethernet priority) and L3 (ToS/Diff-Serv) classification with four traffic classes, RSTP/STP, bandwidth monitoring and Multicast/Broadcast limiting.

The ML 600 EAD platforms 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 and SNMP, using standard MIBs for seamless integration with 3rd party Network Management Systems (NMS).

## Optional Features

### Optical Interfaces

A choice of optical interfaces accommodates short and long distances as needed with speeds of 100Mbps or 1000Mbps with connections over the existing copper and fiber infrastructure. These optical interfaces provide an evergreen investment by allowing a smooth migration to higher service speeds over fiber without changing the EADs at the customer premises.

### Copper Add-Drop EADs

The Copper Add-Drop EADs allow multiple nodes to be connected to each other over copper, in a linear chain or ring configuration. Each node has the full switching capabilities of the ML600 EAD and can drop and add Ethernet traffic at each location, while passing the rest of the traffic through. With up to 22.8Mbps aggregated traffic, the copper Add-Drop EAD is a powerful tool for distribution of Ethernet traffic across linear/ring copper networks.

| Product                            | Product Group | Model  | Number of Pairs | Description   |
|------------------------------------|---------------|--------|-----------------|---|
| Ethernet Access Device (EAD)       | ML 620        | ML 621 | 1               | 4x10/100M copper Ethernet ports   |
|                                    |               | ML 622 | 2               |   |
|                                    |               | ML 624 | 4               | 4x10/100M copper Ethernet ports and 100Base-FX optical SFP* port  |
|                                    |               | ML 628 | 8               |   |
|                                    | ML 630        | ML 638 | 8               | 4x10/100M copper Ethernet ports and a 1000Base-FX optical SFP* port   |
|                                    | ML 640        | ML 644 | 4               | 4x10/100M copper Ethernet ports and 100Base-FX optical SFP* port with Advanced QoS features supporting 3-tiered hierarchical QoS, two-rate three-color traffic management per EVC |
| ML 648                             |               | 8      |                 |   |
| Copper Add-Drop Multiplexer (CADM) | ML 680        | ML 688 | 8               | 4x10/100M copper Ethernet ports and a 100Base-FX optical (or DS3/E3) SFP* port  |
|                                    |               |        |                 | *SFP modules - optional   |

## Highlights

- IEEE 802.3ah Ethernet in the First Mile (EFM) 2Base-TL Solution
- Fiber Quality Transmission
- MEF certified Ethernet capabilities
- Rapid Service Deployment
- Superior Rate and Reach
- Low Delay and Jitter for Voice and Video Transmission
- Worldwide Spectral Compliancy
- OSMINE, NEBS III, FCC, UL, CE
- Environmentally Hardened

## Applications

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

## Markets Served

- RBOC's, PTT's, Independent Operators, Competitive Operators
- Federal, State and Local Government Agencies
- Education, Health Care, Utilities, Private Campuses

Carrier Ethernet over Copper™  
**Ethernet Solutions**

# High Performance

## High Quality

### Specifications

#### Interfaces

##### Ethernet (Network/User)

- 10/100Base-T 4 ports  
Connector: RJ45, Auto-MDIX
- 100Base-FX/1000Base-FX 1 port (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 1-45 Mbps (symmetrical)
- Number of Copper Pairs 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)  
ETSI TS 101 524 (Annex E)  
ANSI T1.417, T1.426  
NICC ND1602 (ANFP)  
BIPT BRUO 2005
- Sealing Current 48VDC/4mA nominal

##### Management (Out-of-Band)

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

#### LAN Protocols

- Dynamic Bridging IEEE 802.1, 8K MAC addresses
- 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
- OAM IEEE 802.3ah clause 57  
(EFM OA&M)

#### Management

##### Protocols

- SNMP SNMP v1 and v2c
- Command Line Interface TL1
- 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

#### Metro Ethernet Forum – Advanced Service Provisioning and Traffic Management

##### (ML 640 Models)

- EVCs 8
- Mapping Rules 16 ingress rules (Port/VLAN/  
L2/L3/L4 Flexible)
- BW profiling CIR, CBS, EIR, EBS per EVC
- Frame Marking 2 rate, 3 color traffic management  
(green, yellow, red) ingress policing
- CoS Marking Per EVC L2/L3 marking,

#### Quality of Service

- Classes of Service 4, 8 (in ML 640 models)
- 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,  
13.5-17 Watt (per model)  
AC: 90-264 VAC, 47-63 Hz,  
17-21 Watt (per model)

#### Environmental

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

#### Regulatory Approval/Certifications

##### Metro Ethernet Forum

- 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

##### 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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