High Performance

High Quality

Specifications

Interfaces
- Ethernet (Network/Class)
  - 10/100/1000Base-T
- Copper Pair
  - Protocol IEEE 802.3ab/DL/Ether.
- Link Code
  - Auto-MDIX
- Number of Copper Pairs
  - 4 pairs
- Enabling and Delay
- Spectrum Compliance
  - ITU-T G.984.2
- Ageing Current
  - 10/100 Base-T
  - AUTO-MDIX
- Copper Pair Bonded Line
  - Protocol IEEE 802.3ah 2Base-TL
  - Line Code ITU-T G.991.2
  - Bandwidth Up to 100 Mbps
  - Number of Copper Pairs 2-8
  - End-to-end Delay
  - Spectral Compliance
  - ITU-T G.991.2
  - ETSI TS 101 524
  - ANSI T1.417, T1.426
- Management (Out-of-Band)
  - EVCs
  - Mapping Rules
  - VLAN Tagging
  - L2/L3/L4 Switching

Front Panel Indicators (LEDs)
- Power
- Status
- Alarm
- MLP per modem/pair
- ACT (Activity) per Ethernet/HSL/T1/E1 port
- ER (Error) Alarm per T1/E1 port (ML640-ML650 models)

Management Protocols
- SNMP
- TFTP
- SSH
- Telnet
- User Authentication

Applications
- MetaASSIST EMS
- MetaASSIST View

Alarm Contacts
- Terminal Block

Physical
- Dimensions
  - Height: 1.67 ft (40mm)
  - Depth: 11.0 ft (280mm)
  - Width: 8.4 ft (213mm)
- Weight
  - Rack: 2 units in 19", 23" or ETSI racks
- Mounting: Desktop, Wall Mount, Rack Mount

Environmental
- Operating Temp.
  - -40° to +74°C
- Storage Temp.
  - -40° to +74°C
- Relative Humidity
  - Up to 85%, non-cond.

Regulatory Approvals/Certifications
- Metro Ethernet Forum
  - Med 5, 14, 18
- Safety
  - UL 60950, CSA-C22.2
- CE
  - EMC and Safety
The ML650 introduces a novel resilient clocking solution with timing accuracy better than that provided by traditional T1/E1 circuits. This solution complies with wander and jitter requirements of ITU-T G.823/G.824 for synchronization interfaces. Actelis has developed this advanced clock transmission mechanism to eliminate all carrier concerns related to clock recovery over pseudo wire. This unique architecture ensures that the ML650 provides Actelis’ customers with the best clock accuracy and reliability of any copper-based backhaul solution.

All ML600 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 ML650 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 third-party Network Management Systems (NMS).

**Optional Features**

**Optical Interfaces**

A choice of optical interfaces accommodates short and long distances as needed with speeds of 100 Mbps or 1000 Mbps 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 ML650 EAD and can drop and add Ethernet traffic at each location while passing the rest of the traffic through. With up to 22.8 Mbps aggregated traffic, the copper Add-Drop EAD is a powerful tool for distribution of Ethernet traffic across linear/ring copper networks.

### Carrier Ethernet Network

- **Extended Reach for Distinctive Customers**
- **Port per Service Type (one user)**
- **MTU Service Distribution for Multiple Customers**

### Ethernet Access Devices

<table>
<thead>
<tr>
<th>Model</th>
<th>Number of Pairs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML620</td>
<td>4</td>
<td>4x10/100M copper Ethernet ports</td>
</tr>
<tr>
<td>ML624</td>
<td>4</td>
<td>4x10/100M copper Ethernet ports and a 100Base-FX optical SFP* port</td>
</tr>
<tr>
<td>ML628</td>
<td>8</td>
<td>4x10/100M copper Ethernet ports and a 100Base-FX optical SFP* port</td>
</tr>
<tr>
<td>ML630</td>
<td>8</td>
<td>4x10/100M copper Ethernet ports and a 100Base-FX optical SFP* port</td>
</tr>
<tr>
<td>ML640</td>
<td>4</td>
<td>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</td>
</tr>
<tr>
<td>ML644</td>
<td>8</td>
<td>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</td>
</tr>
<tr>
<td>ML650</td>
<td>8</td>
<td>4x10/100M copper Ethernet Ports and a 100Base-FX optical SFP* port</td>
</tr>
<tr>
<td>ML658</td>
<td>8</td>
<td>4x10/100M copper Ethernet Ports and a 100Base-FX optical SFP* port</td>
</tr>
<tr>
<td>ML680</td>
<td>8</td>
<td>4x10/100M copper Ethernet Ports and a 100Base-FX optical SFP* port</td>
</tr>
<tr>
<td>ML688</td>
<td>8</td>
<td>4x10/100M copper Ethernet Ports and a 100Base-FX optical SFP* port</td>
</tr>
</tbody>
</table>

### Copper Add-Drop EAD

- **4x10/100M copper Ethernet Ports**
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### Applications

- **Fast Internet Access**
- **Private Campus Network**
- **RBOC’s, PTT’s, Independent Operators, Competitive Operators**
- **Federal, State and Local Government Agencies**
- **Education, Health Care, Utilities, Private Campuses**

### Markets Served

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

### Highlights

- **IEEE 802.3ah Ethernet in the First Mile (EFM) 2Gbit-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 Compliance**
- **OSMINE, NEBS III, FCC, UL, CE**
- **Environmentally Hardened**

### Ethernet Solutions

- **High Bandwidth**
- **Extended Rate, Reach & Reliability**

### Carrier Ethernet over Copper Ethernet Solutions

- **Ethernet Access Devices (EAD) from Actelis Networks® enable delivery of high-speed carrier Ethernet services over the existing copper and fiber infrastructure. The ML600s are compact, cost-effective Ethernet in the First Mile (EFM) EADs that deliver up to 100 Mbps symmetrical Ethernet traffic at fiber quality over existing copper pairs. Available in 2 to 8 copper pairs and fiber configurations, the ML600 EADs 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.**

- **The ML600 EAD platforms are interoperable with any standard Ethernet switch, router or hub. Compliant with Metro Ethernet Forum (MEF) specifications, ML600 EAD systems seamlessly integrate into carrier Ethernet networks. Equipped with four 10/100Base-T Ethernet interfaces and an optional 100Base-FX or 100Base-FX Small Form Factor (SFP) port, the ML600 EAD platform allows assignment of a service or a customer per port. A DS3/ES3 uplink can be used to connect to legacy networks in the 100Base-FX SFP version.**

- **The ML640 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 ML640 enables flexible service provisioning using Ethernet Virtual Connections (EVCs) with flexible mapping and Quality of Service (QoS) 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.**

- **ML650 EAD for Mobile and PBX Backhaul Applications**

With up to 4 T1/E1s and with high-speed fiber symmetrical Ethernet traffic over existing copper pairs, the ML650 EADs, introduced in 2008, provide a cost-effective solution for mobile and PBX backhauling applications. Available in 8 copper pairs and fiber configurations, the ML650 EADs, which are MEF 8 CEoE/SHE and MEF 9, 14 and 18 certified, can be deployed in a Point-to-Point configuration or as the CPE in a Point-to-MultiPoint configuration with Actelis’ EFM aggregation platforms. With its superior performance and extensive functionality, the ML650 EADs offer rapid service delivery over a converged Ethernet facility, allowing for complete future-proof utilization of the existing network infrastructure.