

# ML604D

## Industrial Ethernet Extender and Media Converter

**The ML604D Industrial Ethernet Extender and Media Converter from Actelis® is a small form factor smart device that extend the reach of symmetrical high-speed Ethernet traffic over existing copper supporting up to 60 Mbps.**

Designed for Industrial, utility and traffic applications, the ML604D offers an extremely compact extender with DIN rail mounting for flexible deployment. With its superior performance, extensive functionality, high robustness and reliability, the ML604D offers complete utilization of the existing network infrastructure.

The ML604D Ethernet extender provides media conversion from Ethernet to Ethernet over bonded copper. It can be connected to any standard Ethernet switch, router or hub to enable Ethernet extended delivery further into the network. ML604D can be also combined with any Actelis' ML684Dx devices to support 'Drop and Continue' topology of '4+4' - 4 bonded copper to each side supporting up to 60 Mbps per direction.

The ML604D is a hardened and robust Ethernet Extender with redundant power inputs, designed for deployment in harsh environments. It complies with NEMA 4 extended temperature requirements and K.20/K.21/K.45 for extended protection against overvoltages and over-currents.

Powered by Actelis Networks' award-winning, patented EFMplus™ technology, the ML604D rate, reach and reliability are increased significantly using advanced Dynamic Spectrum Management (DSM) techniques. This technology enables to delivery more Ethernet traffic effectively connecting more remote locations with the most resilient fiber-quality transmission and guaranteed high reliability.

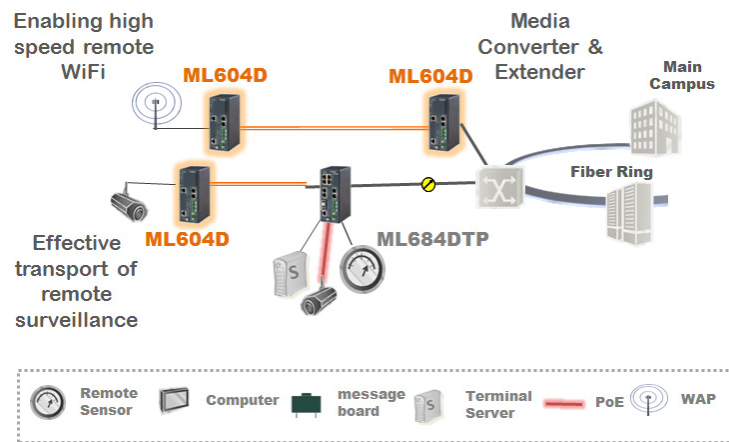
Actelis has comprehensive mechanisms that include high level authentication and advanced encryption capabilities. The segmented and scrambled Ethernet packets are disseminated over multiple transmission conduits and include sophisticated filtering and access control using layer 2 processes. Actelis ML604D offers an all-embracing level of security initiating from the physical layer through switching and up to the management and access layers. This gives you a significantly strong and resilient solution and enables transmissions which have

the highest level of immunity with notably lower vulnerability to hacking attempts.

The ML604D provides 802.1q VLAN-aware wire-speed bridging, double tagging (VLAN stacking), L2 (Ethernet priority), L3 (ToS/Diff-Serv) classification with four traffic classes, RSTP/STP, Link Aggregation, LLCF (Link Loss Carrier Forward), bandwidth monitoring, Multicast/Broadcast limiting, as well as IGMP bandwidth snooping for video distribution applications.

The ML604D 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 MetaASSIST™ View graphical craft application and the MetaASSIST EMS multi-platform Element Management System offer in- and out-of-band management of the ML604D. Management protocols include standard TL1 command line interface and SNMP using standard MIBs for seamless integration with third-party Network Management Systems (NMS).



### Highlights

- High Speed Copper Link - Up to 60Mbps
- Small form factor, no fan, DIN raiing
- Environmentally hardened
- Enhanced Security - Low vulnerability to hacking
- IEEE 802.3ah Ethernet in the First Mile (EFM) 2Base-TL Solution
- Rapid Service Deployment
- Superior Rate, Reach & Reliability
- Low Delay and Jitter for Voice and Video Transmission
- Carrier-Class OAM
- Worldwide Spectral Compliance
- FCC, UL, CE, NEMA 4

### Applications

- Telemetry
- IP-based Traffic Controllers
- Smart Grid Sensors
- Dynamic Message Signs
- HD Video Cameras & Streaming
- Vehicle Detection
- Smart Parking
- Emergency Response
- Supports & Complements City Wi-Fi Access

### Specifications

#### Interfaces

##### Ethernet (Network/User) -

- 10/100Base-T: 1 ports, Connector: RJ45, Auto-MDIX

##### High Speed Link (HSL) - Bonded copper pairs

- Protocol: IEEE 802.3ah 2Base-TL
- Line code: ITU-T G.991.2 rev. 2
- Number of copper pairs: 4  
Connector: RJ45 x 2
- Number of HSLs:  
1 HSL- up to 4 pairs,
- Bandwidth per HSL:  
1 HSL - up to 60 Mbps;
- 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
- Sealing Current: 48 VDC/1.5mA nominal (sink)

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

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

#### 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 Bridge: IEEE 802.1ad
- IGMP snooping: IGMP V1/V2
- OAM: IEEE 802.3ah clause 57 (EFM OAM), IEEE 802.1ag, ITU Y.1731

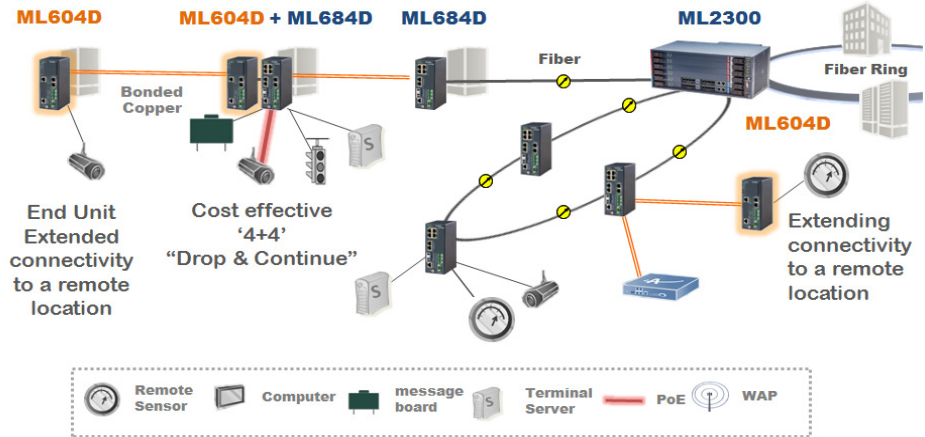
#### Advanced Service Provisioning and Traffic Management

##### Quality of Service

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

#### Management Applications

- EMS: MetaASSIST EMS
- Craft GUI: MetaASSIST View



#### 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
- Web Access: HTTP
- File transfer: FTP, TFTP
- IEEE 802.3ah EFM OAM: Dying Gasp
- User Authentication: RADIUS and/or local passwords

#### Front Panel Indicators (LEDs)

- Power
- Status
- Alarm
- MLP per modem/pair
- ACT (Activity) per Ethernet port
- LNK (Link) per Ethernet/HSL port

#### Physical

- Dimensions: Height: 5.95" / 151 mm, Depth: 5.1" / 130 mm, Width: 2.3" / 58 mm
- Weight: 1.76 lbs / 0.8 kg
- Mounting: Din Rails, Wall Mount  
Design for top hat rail EN 50022 - 35 x 7.5, or 35 x 15 - type O / type Omega (Ω)
- Power

#### Power

- DC: -24/-48 VDC (20 to 57V), 9 Watt (internal)  
Redundant dual inputs
- AC: 90-264 VAC (External)

#### Environmental

- Operating Temp. -40° to +74°C
- Storage Temp. -40° to +75°C
- Relative humidity: Up to 95%, non condensing

#### Regulatory Approval/Certifications

##### Metro Ethernet Forum

- CE 1.0 - MEF 9, 14

##### Safety

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

##### EMI(Emission):

- FCC Part 15 Class A
- ICES-003 Class A
- ETSI EN 300 386 Class A
- ETSI ETS 300 132-2
- EN 55022 Class A
- EN50155\*, IEC60571\*

##### EMS (Immunity):

- EN 300 386 level 3 ESD, Surge, EFT level 2 or 3
- EN 61000 - Level 3: 4-2 (ESD), 4-3 (RS), 4-4 (EFT), 4-5 (Surge), 4-6 (CS)
- EN 61000-4-8
- ITU-T K.20, K.21, K.45

##### CE

- EMC and Safety

##### Environmental

- ETSI ETS 300 019
- NEMA 4 Thermal

\* Design for compliance



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