XR239 EFM Repeaters

Now in their sixth generation, Actelis' XR239 EFM Repeaters are the world's first standards-based and most widely deployed 2-pair repeaters for 2Base-TL Ethernet in the First Mile (EFM) systems.

Used with Actelis' Ethernet over copper equipment, XR239 EFM Repeaters extend the reach of high-capacity Ethernet to cover over 98% of loop lengths. Actelis' repeaters can be linked together and used to extend the reach of carrier Ethernet over copper services beyond 100Kft (19 miles, or more than 30km) using 0.5mm (AWG 24) cable.

Actelis' Ethernet over copper equipment already delivers the best performance over bonded EFM copper links. Our patented, award-winning EFMplus™ technology uses advanced signal processing to obtain the greatest rate, reach and reliability performance over voice-grade copper cabling. Actelis' EFMplus delivers symmetrical service up to 100Mbps using 8-pair bonded links in excess of one mile, or 1.6km. Actelis' XR239 EFM Repeaters extend the reach of EFM services by regenerating the signal between the carrier's central office and customer premises. Supporting higher rates, the XR239 EFM Repeaters extend the distance to over 9.5 miles, or 15km, enabling more than 10Mbps per pair.

Actelis' XR239 EFM Repeaters are compliant with IEEE 802.3ah EFM standards as well as global and regional spectral requirements, including the ANSI T1.417-2003 standard for Spectrum Management for Loop Transmission Systems by Telcordia. Actelis' XR239SE Repeater supports Dynamic Spectral Shaping (DSS) to ensure that it can be used in carrier EFM networks safely and reliably to significantly extend the reach of carrier Ethernet services and minimize any spectral interference well below regional spectral requirements.

Environmentally Hardened for Outside Plant or Indoor Use

Actelis' XR239 EFM Repeaters are designed for deployment in outside plant or indoors. They occupy a single slot in any industry-standard 239 mechanics enclosure or common European carrier-grade enclosures, so the repeater can be deployed in existing electrical facilities. For outside plant deployments, Actelis' XR239 EFM Repeaters come in an environmentally hardened case and support a variety of field installations, including cabinet, pole and building mounts. In these installation scenarios, the repeaters are line-powered from a remote PFU (Power Feeding Unit) directly connected to either an Actelis ML2300, ML230, ML130, ML1300 aggregation platform or ML600 EAD, and have no additional electrical or environmental requirements.

The new XR239 Repeaters lower OpEx by simplifying and reducing installation time, especially in dual-side feeding configurations where it eliminates the need to rewire the enclosures being fed from the CPE side of the link, using a single type of XR239 product.

Power Feeding Units

Actelis' new XR239 EFM Repeaters are remotely powered from a PFU-8D Power Feeding Unit. While feeding a span from a single side, Actelis' PFU-8D supplies power up to 4 repeaters in a span across 8 pairs for a total of 16 repeaters. The PFU-8D can also feed spans from both sides (dual-side feeding), doubling the amount of repeaters per span, and as a result, the entire reach of the span.

The PFU-8D offers improved performance as well as it is designed to support future single side Dynamic Rate Boost (DRB) functionality for further enhancing the XR239 links rate and reach performance.

The PFU-8D is UL and NEBS Level 3 approved, meeting the most stringent carrier environmental and safety requirements. The PFU units can be attached to any Actelis ML600 system feeding up to 8 loops, and to any MLU-32 or MLU-64 front or rear access based system (ML2300, ML230 ML130, ML1300) with the ability to concatenate up to 16 PFU-8 units (feeding up to 128 loops) per system.
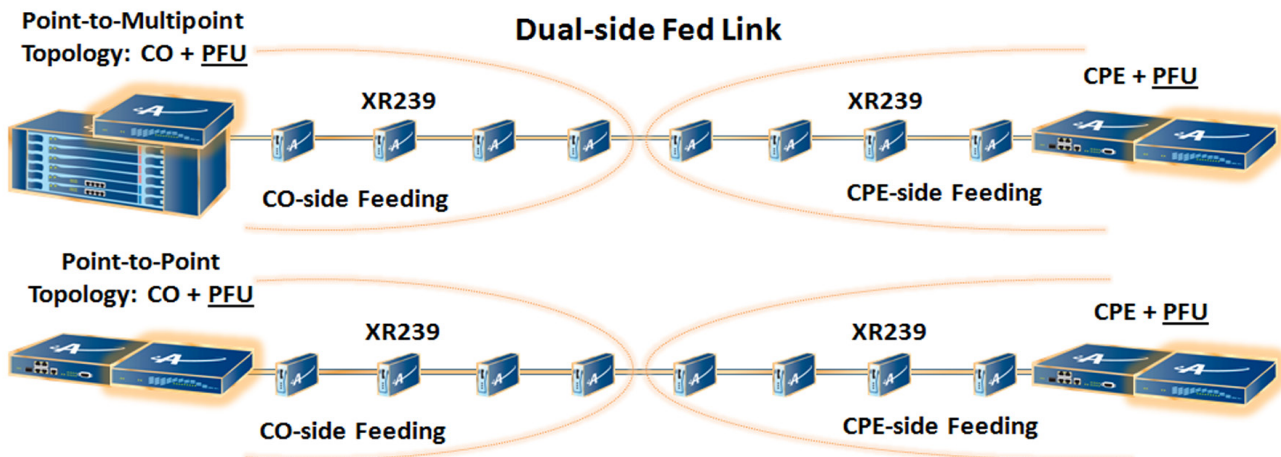
Operations, Administration and Maintenance (OAM) Features

Extensive troubleshooting capabilities in Actelis' MetaASSIST™ View topology provides simple troubleshooting and fault isolation in repeater links, including the option to perform loopbacks on a remote XR239 copper pair. Actelis' XR239 EFM Repeaters fully support ITU-T G.991.2 Performance Monitoring and are transparent to the 802.3ah OAM and 991.2 EOC messages, including support for the OAM loopback, Remote Fault Indication (RFI) and Dying Gasp.

Highlights

- Designed for IEEE 802.3ah Ethernet in the First Mile (EFM) 2 Base-TL systems
- Covers over 98% of loop lengths
- Extend service reach beyond 19 miles (>30 km) using 0.5 mm (AWG 24) cable
- Delivers best performance over bonded EFM copper pairs
- Simplified installation and lower OpEx utilizing single type repeater; no need for rewiring in dual-side feeding scenarios
- Fully standard & spectrally compliant
- ANSI T1.417-2003 compliant
- Fully supports ITU-T G.991.2 Performance Monitoring
- Transparent to the IEEE 802.3ah OAM and ITU-T G.991.2 EOC messages
- Environmentally hardened

High Performance Broadband Over Copper

Point-to-Multipoint Topology: CO + PFU

Dual-side Fed Link

XR239 — CO-side Feeding — CPE-side Feeding — CPE + PFU

Point-to-Point Topology: CO + PFU

XR239 — CO-side Feeding — CPE-side Feeding — CPE + PFU

Specifications

XR239 EFM Repeaters

High Speed Link (HSL) Interfaces

- **Protocol:** IEEE 802.3ah 2Base-TL
- **Linecode:** ITU-T G.991.2 rev. 2
- **Bandwidth:** Above 10Mbps/pair (20Mbps/ XR239SE unit); and Up to 5.7Mbps/pair (11Mbps/XR239 unit)
- **Dynamic Spectral Shaping (DSS):** XR239SE only
- **Connectors:** 12-pin edge connector (239 mechanics)
- **Number of Pairs:** 2 copper pairs in, 2 copper pairs out
- **Dual-side feeding supported:** Up to 8 hops using dip switch for reverse wiring

LED Indicators

- Network and subscriber-side status for each pair

Physical Dimensions

- Single 239 Mechanics Slot
- **Form Factor:** 0.75" H X 2.55" D X 6.5" L 19.1mm H X 65.5mm D X 165mm L
- **Weight:** .53 lbs/240 grams

Power Requirements

- **Power:** 80-250 VDC
- **Consumption:** <4.2W, 60-260VDC
- **Input:** Line powered via PFU-8D/PFU-8E -130 VDC or ± 60 VDC

Operating Temperature

- -40°F to 167°F (-40°C to 75°C) ambient temperature inside repeater case

Regulatory Approvals/Certifications

- ANSI T1.417-2003 compliant
- GR-1089 A3 voltage safety class
- UL 60950-1, UL 60950-21
- EN 60950-1, UL 60950-21,
- CSA C22.2 60950-1, CSA C22.2 60950-21
- FCC Part 15 Class A
- CE - EMC and Safety
- RUS listed

Ordering PN's

- **XR239-SE PN:** 501RG2097; **CLEI code:** CMUIAEFDAA
- **XR239 PN:** 501RG2096; **CLEI code:** CMUIAEEDAA

PFU-8D/PFU-8E Power Feeding Unit

High Speed Link (HSL) Interfaces

- **Links:** Up to 8 pair copper links
- **Capacity:** Up to 8 repeater segments in dual-side feeding mode (4 in case of PFU-8E) across 8 pairs; up to 32 repeaters in PFU-8D and a total of 16 repeaters in PFU-8E. Single-side feeding from CO only is supported as well.
- **Connectors:** Terminal block for copper links and DB-25 for link to ML devices

Management

- Dip-switch configuration
- Fault reporting - via AUX port, daisy-chaining PFUs or via Alarm contacts
- LED Indicators – front panel

Physical Dimensions

- 1.6" H x 11" D x 8.4" W
- 4 cm H x 28 cm W x 21.3 cm W

Power Requirements

- **Power:** -40 to -72 VDC
- **Consumption:** <135W (-48V Nominal)

Power Output

- **PFU-8D Output:** ± 130 VDC, Non-simplex powering; 13.5W per PFU port
- **PFU-8E Output:** ± 60 VDC, Non-simplex powering; 12.5W per PFU port

Operating Temperature

- -40°F to 149°F (-40°C to 65°C) ambient

Regulatory Approvals/Certifications

- GR-1089 A3 voltage safety class
- UL 60950-1/-21, CSA C22.2 60950-1/-2
- EN 60950-1/-21, (PFU-8E '-1' only)
- FCC Part 15 Class A
- CE - EMC and Safety
- NEBS Level III (GR-1089-CORE, GR-63-CORE)

Ordering PN's

- **PFU-8D PN:** 501RG2099; **CLEI code:** CMM1A00ARA
- **PFU-8E PN:** 501R20196; **CLEI code:** COM8110FRA

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