MuLOGIC

LLM-336.Eth

Industrial Leased line modem
with internal Ethernet Bridge.

LLM-336D.Eth   LLM-336S.Eth

Introduction

The MuLogic LLM-336.Eth is a voiceband modem combined with an Ethernet bridge for connecting products equipped with an Ethernet port or LANs over voice-grade analog leased lines, PCM channels or copper wire. The modem offers a transparent link for Ethernet protocols regardless of the higher level protocol.
The LLM-336.Eth was designed for industrial applications: it can be powered from any DC or AC power source and operates within a temperature range of -25..+70°C

The modem is available in 3 versions:

- LLM-336D.Eth in compact housing suitable for Dinrail mounting
- LLM-336S.Eth in rugged steel desktop housing.
- LLM-336R.Eth set of rack cards for use in the the 19" UCF-16.3 card frame.

Features

- Operates over PCM channels, microwave links, analog leased lines and dry or conditioned copper wire.
- 2-wire and 4-wire line operating modes.
- No configuration, very easy set-up, "plug and play".
- Automatic learning Ethernet bridge.
- Protocol independent.
- No routing configuration needed.
- Ethernet port supports 10/100baseT, Auto-MDI/MDIX.
- Supports SCADA protocols like Modbus/TCP, DNP3/IP and IEC60870-5-104.
- V.34 modem technology for line rates up to 33.6 kbit/s.
- Isolated supply voltage input (ac and dc) for industrial applications.
- 11..36 Vdc (11..28 Vac) or 18..60Vdc (18..30Vac) supply voltage.
- DIN rail mounting or panel mounting for D-version.
- Extended temperature range -25..+70°C.
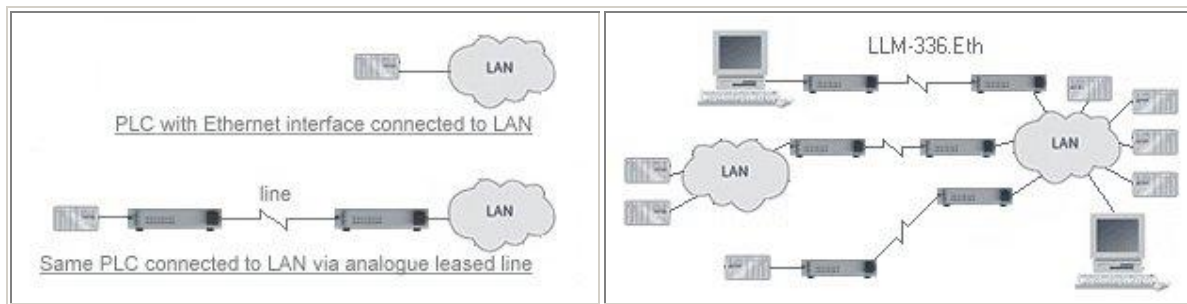
Be it for connecting just two Ethernet devices, for connecting a remote Ethernet device to a LAN or even for connecting two LANs, for environments where there is no demand for high bandwidth, the LLM-336.Eth can be used for any device equipped with an Ethernet port: from Personal Computer to PLC.

The LLM-336.Eth is 100% protocol independent. It will bridge TCP/IP, AppleTalk, DecNet, Netbui, or any protocol that can be transported over Ethernet (with some exceptions for protocols that rely on very short latency times). This makes the modem easy to set up.

LAN to LAN, Device to LAN or Device to Device connections

Because of the automatic MAC address filter, only those Ethernet packets destined for the remote end are send over the modem link. All other packets are blocked by the bridge circuit. In this way, no bandwidth is consumed by data traffic between devices at the same location of the modem.

Configuration

The LLM-336.Eth is configured by means of DIP switches. Basically only the type of line (2 wire or 4 wire) needs to be set. If needed for link reliability, the maximum modem line rate can be reduced, also by means of DIP switches. The modem will work over various types of "voice-band" connections but also over a single pair of copper wire for distances of over 20 km (depending on wire gauge).

Power supply

The LLM-336.Eth is equipped with an internal galvanic isolated power supply that can be
powered from any 11 to 36Vdc or 18 to 60Vdc source. For 100-240 Vac mains operation a
power adapter or power supply unit is used.

Extended temperature range

The modem can be used in many environments. It is suitable for operating at ambient temperatures ranging from -25 to +70C.

LLM-336D.Eth front view

LLM-336S.Eth and LLM-336R.Eth rear view

MODEM

Modulation mode and data rates

- Modulation type: ITU/TSS V.34
- Max. modem data rate: 33.6 kbit/s.

Line connection

- Conditioned or unconditioned voice-grade analogue leased lines, PCM or microwave links.
- Dry copper wire cables (max. cable lenght depends on gauge, e.g. 20 km on AWG24/0,5mm)
- 2 wire and 4 wire operation
- Line impedance: 600 Ohms
- RJ-11 connector

ETHERNET INTERFACE

- Type: Remote Bridge
- 10/100baseT, Auto-MDI/MDIX Ethernet: IEEE 802.3 compatible
- Frame size: max. 1536 bytes
- Frame buffer capacity: 256 frames
- Address filter: automatic learning and ageing
- Ageing time: 300 seconds
- Connection type: 10/100baseT, Auto-MDI/MDIX
- Ethernet polarity: Automatic polarity reversal

DATA THROUGHPUT

- Throughput @ 33,6 kbit/s modem rate: 3,9 kbyte/s
- Latency (throughput delay) @ 33,6 kbit/s modem rate: 45ms

HARDWARE

LED indicators on LLM-336S.Eth and LLM-336R.Eth (front panel)

- PWR: Power applied and modem ready
- TxD: Data transmitted to remote modem
- RxD: Data received from remote modem
- DTR: Local Ethernet port connected
- DSR: Modem ready for operation
- RTS: Bridge circuit ready for communication
- CTS: Modem ready for data transfer
- DCD: Modem connected to remote modem

LED indicators on LLM-336S.Eth and LLM-336R.Eth (rear panel)

- RxTx: Data received or transmitted at Ethernet port.
- LNK: Lnk: Ethernet port connected.
- Coll: Collision detected.
- FDX: Full duplex mode.
- 100M: 100baseT Ethernet link

LED indicators on LLM-336D.Eth

- PWR: Power applied and modem ready
- TxD: Data transmitted to remote modem
- RxD: Data received from remote modem
- DTR: Local Ethernet port link connected
- DCD: Modem connected to remote modem
- RxTx: Data received or transmitted at Ethernet port.
- LNK: Lnk: Ethernet port connected.
- Coll: Collision detected.
- FDX: Full duplex mode.
- 100M: 100baseT Ethernet link

Controls

- DIP switches for selecting max. modem rate, type of line and modem mode.
- Config port for adding new configuration profiles.

Dimensions and weight

- LLM-336D.Eth: 95x145x30 mm LxWxH, Weight: 240 gr.
- LLM-336S.Eth: 250x130x30 mm LxWxH, Weight: 980 gr.
- LLM-336R.Eth: 3U (3HE) high; 5HP (5TE) wide Eurocard, Total depth with interface board: 240mm

Power Supply and environmental characteristics

- Power supply:

  - LLM-336x/Vr1: 11..36 Vdc (11..28Vac), 4.8 W
  - LLM-336x/Vr2: 18..60 Vdc (18..30 Vac), 4.8 W

- Temperature range:

  - extended temp. range: -25..+70°C, Humidity: 5..95%

Compliances

- CE compliance EMC: Directive 2004/108/EC (EN 55022, EN55024).
- CE compliance Immunity: EN 55024 (ref. EN 61000-6-2).
- CE compliance Safety: Directive 2006/95/EC (EN 60950).
- Leased line operation: ES 203 021
- Ethernet: IEEE 802.3