

# XtendLan<sup>®</sup>

## Fiber Optical Multiplexer



**8x E1, 1x Fast Ethernet, Hotline, 1x Fiber optic**

**XL-FMUX4E1**

User's Manual

Thank you for using XtendLan's products. This manual will show you how to install and use this product. Please read it carefully before installation and operation. You can refer to it if any difficulty on operation.

## **1 Product Description**

### **1.1 Function Description**

XtendLan fiber optical multiplexers product family provides ideal solutions for building fiber base E1 or T1 networks. They have a range from 4x E1 up 16x E1.

XL-FMUX4E1 can multiplex to 4 E1 signals for transmission over an optical fiber, resulting in reaching a longer distance without a repeaters and superior performance compared to copper media.

XL-FMUX4E1 is the 4E1 point-to-point optical transport equipment that uses the FPGA chips and it is easy to upgrade. It is single board structure and the largest transmission capacity is 4E1. The outer design use the standard 19 inches rack, so the volume is little, weight is light and operation is convenient and credit.

4 E1 fiber optical mulitplexer uses the PDH fiber transmission technologies. The 2M (E1) interfaces can connect with the exchanger, light loop device and multi-diplexer directly to form the micro, midi or the special network. Complete alarm function for FMUX4E1, it is stable and easy to maintenance, install and small in size. It has one digital service telephone.

### **1.2 Features**

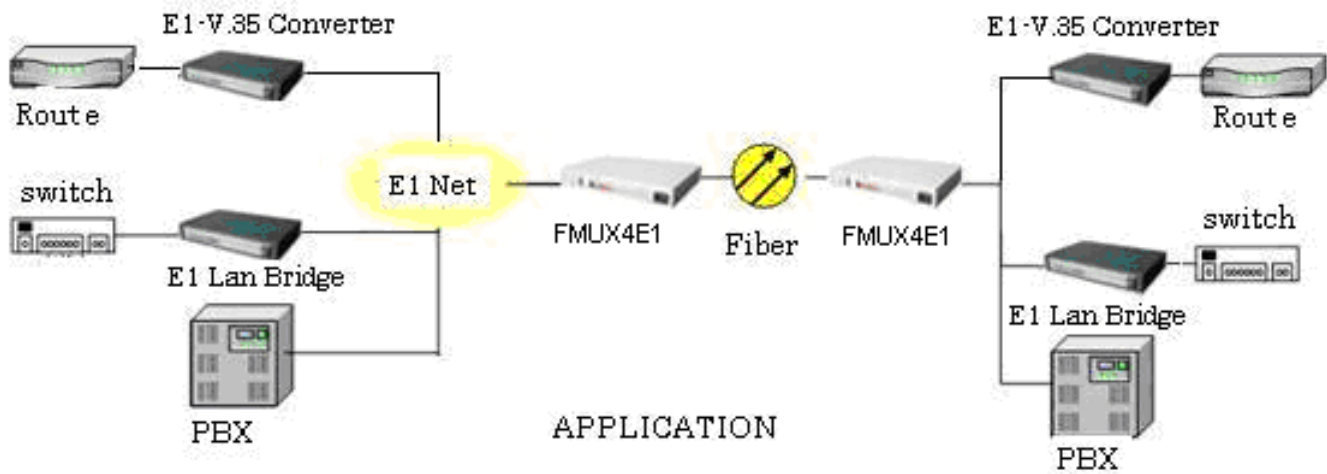
Below lists the features for XL-FMUX4E1:

- Offer 4x 2Mb/s digital interfaces
- Up to 4 E1 links on one fiber
- Management through Console port
- The supervisory control interface implements centralized monitoring and export the monitor and control information of this port and opposite port.
- One link to service telephone for duty contract
- 90-260VAC & -48VDC power options and the positive and negative of DC-48V can be optional because there is the self-test circuit for the polarity inside thie device

- Standard 19 inches rack, little volume, light weight, steady capacity and convenient setup
- Digital clock recovery circuit and digital smooth DPLL adopted for 2.048Mb/s port
- LED indicators

### 1.3 Application

XTENDLAN XL-FMUX4E1 can be used a high-speed baseband modem for point to point that connects two DTE over a lease Line. From Router → CSU/DSU → XL-FMUX4E1 → Fiber optical → XL-FMUX4E1 → CSU/DSU → DTE as illustrated in the Following Diagram.



## 1.4 Specification

### E1 line Interface

|                  |                       |                    |                    |
|------------------|-----------------------|--------------------|--------------------|
| Number of E1     | 4 E1's                | Interface Standard | ITU-T G.703        |
| Line Rate        | 2.048Mbps±50ppm       | E1 Impedance       | 120 ohm (balanced) |
| Line Code HDB3   | HDB3                  | Connector Type     | RJ-45              |
| Jitter tolerance | Fine than G.742,G.823 |                    |                    |

### Optical Fiber Interface

|              |               |                   |                     |
|--------------|---------------|-------------------|---------------------|
| Wavelength   | 1310nm        | Connector Type    | SC                  |
| Light Source | MLM Laser     | Detector PIN      | Photodiode          |
| System Gain  | 26 dB (Min.)  | Input Sensitivity | -38dBm (Ber<10e-10) |
| Line Code    | Scrambled NRZ | Output power      | -6dBm               |

### Physical/Electrical

| Dimension         |  |
|-------------------|--|
| Dimension         | Height 44 mm / 1.7 in (1U), Width 485 mm /19<br>In Depth 160 mm / 6.3 in |
| Mounting          | Stand-alone, 19" and 9.5" inch rack mount, wall mount also available     |
| Power Source      | 100 – 240 VAC ( 50H/60Hz) or -/+ 48 Vdc ( -36 to -72Vdc)                 |
| Power consumption | < 5 W  |
| Temperature Range | 0°C - 50°C (32° to 122°F)  |

### Timing

- Timing derived from incoming E1

### Diagnostics Test

- Loop-back testing for 4 x E1 (Local and remote)
- Loop-back testing for fiber optical (Local and Remote)

### Indicators

- Local optical signal indications for all E1s.
- Remote optical signal receive indication, working and loss.
- Loop-back indication.
- Alarm indication, on or off.
- Power on indication.

## **Front panel**

From left to right – phone push button, phone line port RJ-11, DIP switch panel, LED indicators.



## **Rear panel**

From left to right – power supply port 230V and DC 48V, fiber optics port SC duplex connector, 4x RJ-45 E1 ports.



## **2 INSTALLATION**

### **2.1 Site Selection**

This is a guideline for XL-FMUX4E1 installation. The following list indicates a site selection guideline.

User needs to follow this guideline for the select a proper installation site.

- For the XL-FMUX4E1 unit, the location should be part of the Central Office (CO) equipment layout design. The entrance cable routing should be considered.
- The installation should provide a proper room for the adequate ventilation and cable routing at site. At least 0.5 m should be reserve at the rear of the unit for the human access, cable, and airflow.
- The site should provide a stable environment. The Ops Area (Operating Area) should be free from extremes temperature, humidity, shock and vibration.
- Do not expose the unit under the rain because XL-FMUX4E1 is not a waterproof unit.
- Relative humidity should stay between 0 and 95%.
- Survey the site (power supply) before install the unit.

## 2.2 Mechanical Installation

XL-FMUX4E1 is a desktop and rack mount unit, which offers two kinds of power supply AC or DC.

### 2.2.1 Double-row indicator light

|   | Name                          | Color | Status | Describe                            |
|---|-------------------------------|-------|--------|-------------------------------------|
| 1   | LOS1                          | Red   | Active | E1 port 1 loss                      |
| 2   | LOS2                          | Red   | Active | E1 port 2 loss                      |
| 3   | LOS3                          | Red   | Active | E1 port 3 loss                      |
| 4   | LOS4                          | Red   | Active | E1 port 4 loss                      |
| 5   | OPLOS                         | Red   | Active | Optical signal Lost                 |
| 6   | OPLOF                         | Red   | Active | Optical SYNC loss                   |
| 7   | PWR                           | Green | Active | Power on                            |
| 8   | E-3                           | Red   | Active | Optical BER $\geq$ 10 <sup>-3</sup> |
| Remark: Equipment have two rows indicator light |                               |       |        |                                     |
| Local   | indicate local device status  |       |        |                                     |
| Remote  | indicate remote device status |       |        |                                     |

The equipment has perfect alarm and display. The 14 LED at front panel display different alarms, voice alarms is also offered. The alarms are described as following:

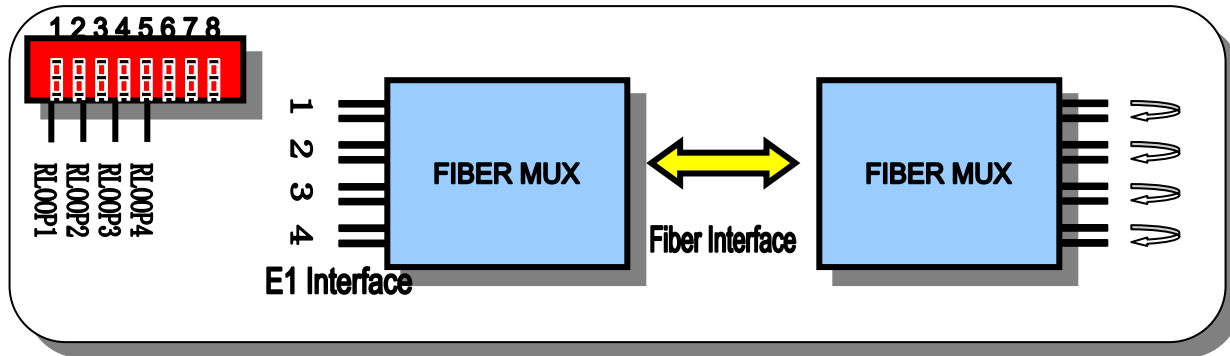
- Power supply indicator (PWR): this light on when power is on.
- Local terminal alarm indicator (LOCAL):
- Remote terminal alarm indicator (REMOTE):
- Not receiving optical signal alarm indicator (OPLOS): this light on when optical detector not detect input optical signal.
- Sync loss alarm indicator (OPLOF) : this light on when Optical sync loss.
- 1-4 branch E1 signal loss alarm indicator (LOS1-4): the light on when corresponding E1 signal loss.
- The light E-3 on when Local terminal optical BER $\geq$ 10<sup>-3</sup>

## 2.2.2 Front panel DIP definition:

Bit 1-4 ( RLOOP1-4 ): 1-4 E1 remote loop.

RLOOP1-4 as 1 to 4 port's E1 it is to indicate loop back.

If the RLOOP1 is ON, this means that at the far end the is doing a E1 loop-back



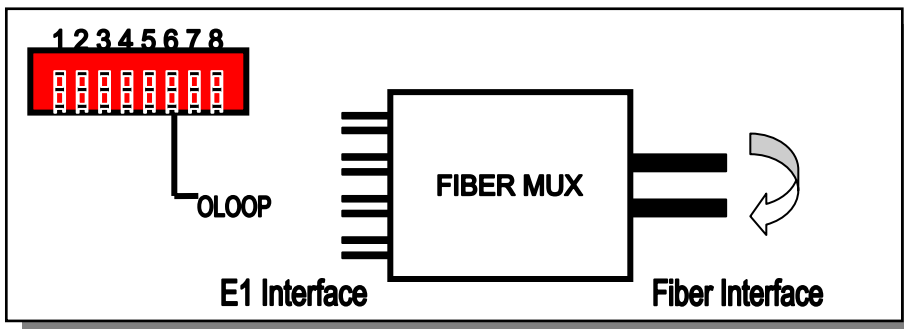
**For example: when RLOOP1 is on, E1 port of remote equipment loops.**

Bit 5: MUTE is for close alarm voice, ON is close.

Bit 6: OLOOP is for optical route loop, ON is loop.

OLOOP is the fiber optical Loop-back function.

To set the loop-back function, push it to “ON” and it will perform a local loop back on the optical.





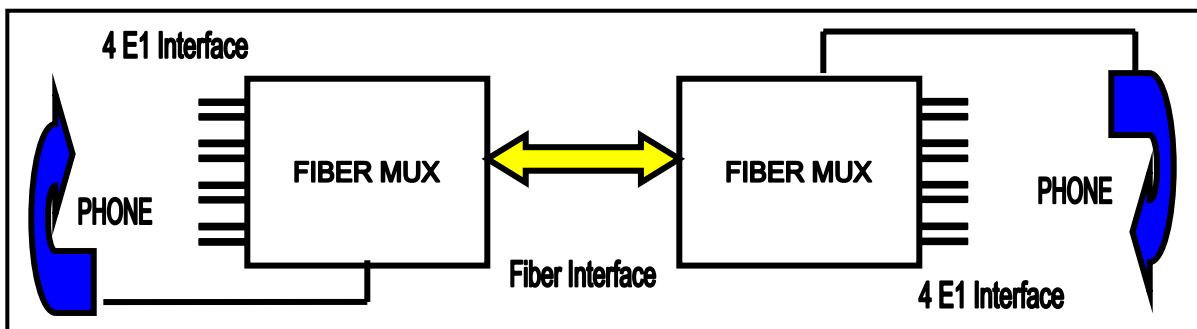
### All 8 DIP Switch Description:

| DIP | Function and implication          |                               |
|-----|-----------------------------------|-------------------------------|
| SW1 | Port 1 remote loop control switch | ON means remote loop          |
|     |                                   | OFF means disable remote loop |
| SW2 | Port 2 remote loop control switch | ON means remote loop          |
|     |                                   | OFF means disable remote loop |
| SW3 | Port 3 remote loop control switch | ON means remote loop          |
|     |                                   | OFF means disable remote loop |
| SW4 | Port 4 remote loop control switch | ON means remote loop          |
|     |                                   | OFF means disable remote loop |
| SW5 | Close alarm voice                 | ON alarm voice close          |
|     |                                   | OFF is alarm voice Open       |
| SW6 | OLOOP (optical loop function)     | ON is optical fiber loop      |
|     |                                   | OFF means Disable fiber loop  |
| SW7 | Reserved                          |                               |
| SW8 | Reserved                          |                               |

### 2.2.3 Hotline phone

Hot line phone not occupy 2M channel transmission.

On the front panel there is a "PUSH" button, press on the "PUSH" button on the remote site it will sound. To answer it the remote site just need to press the "PUSH" button on the remote unit, the alarm will cut off and just plug in the phone both side able to do the communication.



*Phone does not occupy the 2M circuits!*

## 2.2.4 Power supply

XL-FMUX4E1 fiber optical mux support 3 type powers: AC220V, -48V and +24V. If the power of DC-48V is used, the positive and negative terminal can be optional because there is the self-test circuit for the polarity inside the fiber optical mux.

# 3. Operation

## 3.1 Equipment installation

After unpacking and before installation, make sure checking the following:

- Make sure the package is well. If the package is damaged, contact service office of XTENDLAN quickly for solution.
- Check the package according to the product list, if find equipment severe damaged or lack of some components, please contact installation worker or service office of XTENDLAN.
- Check whether the equipment type is meet with the type you ordered.
- Check whether the component is integrity.
- Check the power supply type.

### 3.1.2 Quick installation

- Fasten the Equipment in 19 inch. rack with the screws in the equipment package.
- Use reliable ground connection at GND point of the equipment
- Use power tab to connect power according to the manual, don't exchange the polarities.
- Create user equipment connecting wire according to your demand (2M, V.35 and 10 Base-T), then connected, don't exchange receive and transfer wires.
- Connect receive and transfer optical with optical receive and transfer port of the equipment. Don't exchange receive and transfer wires, make sure the optical fiber head is clean, insert optical jumper, make sure connection well. (fiber bending radius $\geq$ 50 mm)
- Use multimeter to test power polarity and voltage, make sure it match with equipment requirement.

- After complete installation and make sure it's ok, power on the switch.

Check indicator light meet with practice situation (see related part of manual).

- A clean, steady environment and firm installation should provided for independent or wall hanging equipment.

### **3.1.3 Cautions about installation**

- Avoid severe libration and mechanical damage during the process of transfer and installation.
- Arrange fiber appropriately, fiber bending radius $\geq$ 50 mm.
- Check voltage and polarity meet with back panel, or it will cause permanent damage to the equipment.
- Fiber connector can't contaminate, wipe optical fiber head slightly using alcohol, or it will affect transmission. If the fiber connector not butt joint well, it may be cause power decline, adjust fiber connector according to practical situation.
- The installation position should convenience for personal pass and equipment movement.
- The environment should dry, clean and ventilation well.
- Essential static-protective is needed during the installation and maintenance, ground the chassis to increase anti-interference capability and prevent lightning strike. Before use the equipment, independence work ground and protect ground should provided, make sure it ground well.

### **3.2 Power on the equipment**

- Check indicators and alarms according to manual after power on.
- If both local and remote work well, fiber interface connect ok, the alarm light OPLOS and OPLOF off, POWER indicator light is green.
- Light LOSX (X=1-4) is red and voice alarm is on because of not connecting E1 signal. After connect E1 signal, light LOSX (X=1-4) will off, voice alarm will off until all light LOSX is off.
- Branch shield: shield no using branch alarm, no red light is on when all alarm is off.
- Hot line phone: after fiber optical mux works normally, insert microphone to hot line phone port, press button PHONE to call remote user, then can communication after the remote user press button PHONE and hold up the microphone. Buzzer rings when remote terminal call local terminal, press button PHONE and hold up microphone, then communicate with remote terminal. Back the button PHONE to norm after communication is completed.

- Branch loop: when system work normally and no branch alarm happen, loop test is available with SW. put the SW switch to ON in local terminal, can control remote corresponding 2 Mb/s branch to loop, then can test corresponding output signal at local 2 Mb/s output port. Use this function you can realize loop of all the branches, and it's easy for detect.
- Use bit error instrument to analyzing performance of 2M branch, and record it.
- Close voice alarm: voice alarm on when following situation happened:
  - A. Optical disconnected cause OPLOS alarm.
  - B. Signal not steady cause OPLOF alarm.
  - C. Some branches not use and not shielded.

Push down SW5 at local terminal, can control closing voice alarm. Note: after failure is removed, set the button to norm, validate the alarm function

### 3.3 Troubleshooting

Best status is configured to this equipment before out of factory, all the functional interfaces are at the front and back panel, don't open the chassis yourself. If have failure, you can determine the range of failure using single loop, and contact our corporation.

The following table list common failure and alarm, the reason may cause these alarm and solution to this alarm for you to reference.

Equipment alarm and corresponding solutions:

|   | Alarm       | Possible reason                 | Solution  |
|---|-------------|---------------------------------|---|
| 1 | POWER off   | not power on                    | Power connect not well, polarity exchanged                |
| 2 | OPLOS on    | Not receive optical signal      | Optical disconnected; remote having no optical output     |
| 3 | OPLOF on    | Not receive normal frame signal | Receive signal not steady, check fiber line and equipment |
| 4 | E1 alarm    | Not receive 2M signal           | Check wire; receive and transfer are exchanged            |
| 5 | Voice alarm | Local alarm happened            | Shield when process failure                               |

## NOTE:

- XL-FMUX4E1 is a sensitive electronic item, please do handle with extra care on delivery, shifting and humidity.
- Whenever there is a problem regarding the quality issue within the warranty period, XTENDLAN will take the responsibility to repair with free.
- After the warranty period, we will charge accordingly depending on the fault or damage.
- Whenever there is a fault, you can contact our technical support after you identify the problem and the alarm.