



## FE1 – 4Ethernet Interface Converter



## User's Manual

**Manufactured by : Clearview Technologies Ltd.**

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## **WELCOME**

Congratulations on becoming an owner of Clearview Technologies Ltd.'s CTL - FE1-4Eth Interface Converter.

FE1-4Eth offers a rich set of functionality at an ultra affordable price. It is fully compatible with industry standards and can interoperate with many other compliant devices and software on the market.

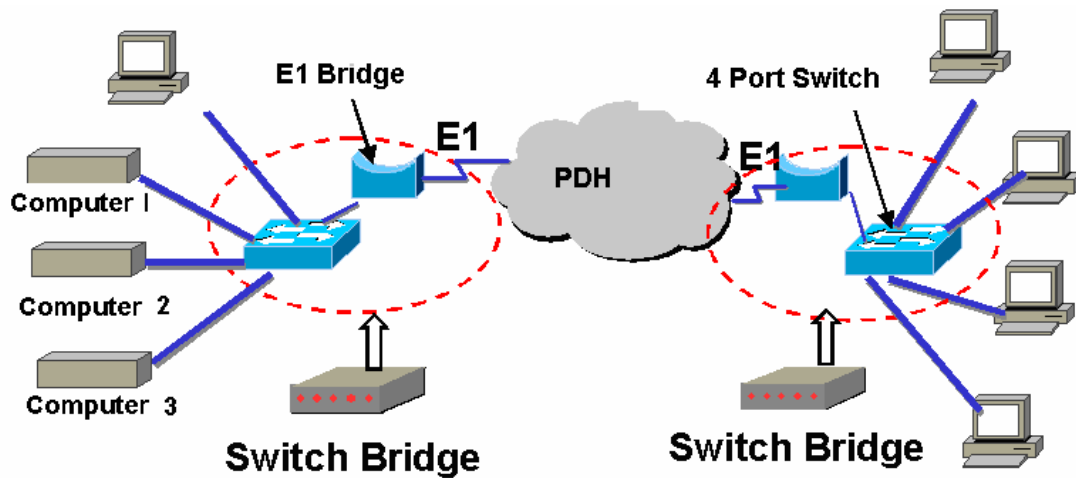
We hope you will enjoy all its capabilities.

You made an excellent choice!

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## I. APPLICATION



FE1-4Eth is an E1 transmission equipment for Ethernet signal transmitted through E1 link

## II. FEATURES

- Supports long packets at 1600
- Supports ISL (Interior Switching Link) protocol
- 10M/half duplex, 10M/full duplex, 100M/half duplex, 100M/full duplex and auto-negotiation (self-adapting) are options
- E1 impedances for 75 ohms and 120 ohms are auto-negotiated
- Support the local loop, loop from the local to remote and pseudo-random code detection
- Automatically detects and configures the twisted pair port on the converter (for straight or crossed cable connection)
- Supports 1-4 Ethernet interface switching.
- Can set channel isolation at switch-able Ethernet port.
- Can set packet length at Ethernet interface.
- Frame forward rate:
  - 10Mb/s: 14,800 pps at most
  - 100Mb/s: 148,810 pps at most
- LINKDOWN self-check function is available

## III. FUNCTIONS

The unit mainly includes the following two functions:

The unit is a switch-able Ethernet bridge, and also is E1 transmission equipment. It is a high performance, small size, low cost and self-learning Ethernet bridge.

The unit is Self Adapting for LAN extension (straight or crossed cable connection). It continuously learns the LAN MAC address present, and passes only relevant traffic to the other side of the bridge.

#### IV. SPECIFICATIONS

- Ethernet Port: 10M/100M Self adapting
- Data Rate: 2.048Mbit/s  $\pm$  50ppm
- E1 Impedance: 75 $\Omega$  Unbalanced or 120 $\Omega$  Balanced

#### V. WORKING ENVIRONMENT

- Voltage: AC 180V to 240V / DC -48V / DC +24V
- Power Consumption: <5W
- Working Temperature: 0 to +50 degrees C.
- Storage Temperature: -40 to +70 degrees C.
- Relative Humidity: <95 %

*Note: This unit should be operated in a low dust environment, in a location that is free from high electromagnetic interference.*

#### VI. SETUP GUIDE

1. Connect proper power supply according to POWER mark on the rear panel of the unit. Set AC/DC switch to -48VDC for a -48VDC supply or set AC/DC switch to 220VAC for an available 220VAC supply.
2. E1 impedances for 75 ohms and 120 ohms are auto-negotiated. According to different requirements of E1 line, E1 interface with required impedance should be correspondingly selected at first. E1 Receive port of the unit should be connected to E1 Send port of the other unit. While the E1 Send port of the unit shall be connected to the E1 Received port of the other unit. If E1 warning occurs over E1 link, the causes of the trouble can be confirmed through the push buttons.
3. After eliminating E1 trouble, set the Ethernet operating modes.
4. When Ethernet cables are connected to FE1 to 4Eth Converter, LINK indicator is normally lighted while F/D and SPD indicators are may be lighted or not, depending on the user's configuration. If F/D and SPD indicators are OFF, please check method of making Ethernet lines. Four Ethernet interface can be used at your option.

5. When the unit is operated at 100 Mbps, turn on the function of flow control of the attached equipment. When operated at 10 MBps, flow control is not needed.
6. This unit automatically adapts to cross-over and straight cables.
7. During the normal operation, PWR and LINK indicators should be ON. F/D and SPD indicators are ON or OFF depending on user's configuration. Other indicators and the LINK indicators (disconnected Ethernet interface) are OFF.
8. Push buttons on the front panel are disabled (factory default, SW5 set to OFF). If these press buttons are to be enabled, SW5 must be set to ON.

## VII. FRONT PANEL



### LED indicators

On the front panel there are seventeen valid LED indicators from right to left and up to down:

LED INDICATORS			OPERATING STATUS FUNCTIONS
NAME	FUNCTIONS	NAME	
PWR	Power Supply Operating Indication	PWR	Power Supply Operating Indication
LINK1 to LINK4	Ethernet Connecting Indication	ON	Connected
		OFF	Disconnected
		Blinking	Data transmission present
SPD1 to SPD4	Ethernet Rate Indication	ON	At 100 Mbps
		OFF	At 10 Mbps
F/D1 to F/D4	Operating Pattern	ON	At full duplex
		OFF	At half duplex

E1LOS	Warning for E1 signal loss	ON	E1 signal loss
		OFF	E1 link is normal
E1SYL	Warning for E1 data stream	ON	E1 frame sync loss
		OFF	E1 receive data is normal
PTOK	Pseudo-random code detection	ON	The local unit is in test and pseudo-random code is detected
		OFF	No pseudo-random code
TEST	Test	ON	Test being run
		OFF	Operating normally

Note: If the units are operated in the framing mode and E1 warning occurs at the local unit, the local E1LOS and E1SYL indicators will be ON and the same indicators at the remote unit will blink.

### DIP Switches

Ethernet operating mode setting. SW1, SW2 and SW3 are used to set Ethernet operating modes.

FUNCTION \ SWITCH		1	2	3
		MODE SELECTION	100Mbps Full Duplex	OFF
100Mbps Half Duplex	ON		OFF	ON
10Mbps Full Duplex	OFF		ON	ON
10Mbps Half Duplex	ON		ON	ON
Auto-negotiation	X		X	OFF

Notes:

1. X can be set to ON or OFF.
2. When the unit is operated at 100Mbps, the SWITCH for flow control of the attached unit should be turned on.
3. When changing Ethernet operating mode, the Ethernet LED indicators on the front panel will all blink and the unit will automatically restore new setting. *Do not turn on power supply again.*

**SW1** is used to set full/half duplex.

- When set to **OFF**, **full duplex** is available.
- When set to **ON**, **half duplex** is available.

**SW2** is used to set Ethernet rate at 10Mbps or 100Mbps.

- When set to **OFF**, the Ethernet rate is **100Mbps**.
- When set to **ON**, the rate is **10Mbps**.

**SW3** is used for auto-negotiation setting.

- When set to **OFF**, the unit is in auto-negotiation mode and **SW1** and **SW2** are **ineffective**.
- When set to **ON**, the switch is ineffective and **SW1** and **SW2** are **effective**.

#### Clock setting

**SW4** is used to set the clock.

- ON: INT (i.e. internal clock)  
The clock is derived from internal crystal oscillator)
- OFF: LINE (i.e. line clock)  
The clock is obtained from E1 receiving signal).

*Clock Select Principle:*

*ONLY ONE UNIT PROVIDES INT CLOCK OVER THE WHOLE LINK. If the unit provides INT clock, others will be set to LINE clock. If not confirm which unit will provide INT clock, this unit will be set to INT clock.*

*If converters are connected to E1 transmission equipment, such as PDH radio, the clock should be derived from the E1 transmission equipment, therefore SW4 should be set to OFF.*

#### Control setting for push buttons

**SW5** is used to control the front panel push buttons

- ON: Enable functions of four push buttons.
- OFF: Disable functions of four push buttons.

*Pressing these push buttons inadvertently will interrupt normal operation of the unit. To prevent this, the functions of the four buttons can be disabled with SW5.*

#### Self-check setting for LINKDOWN

**SW6** is used to set LINKDOWN self-check

- ON: Effective for LINKDOWN self-check
- OFF: Ineffective for LINKDOWN self-check

*When E1LOS, E1SYL and LINKDOWN occur on the transmission link, the unit can automatically SWITCH to start the other cables on standby.*

Packet length setting.

**SW7** is used to set packet length of four Ethernet interfaces.

PACKET LENGTH	STATUS
1518 / 1522	OFF
1916	ON

Channel isolation setting.

**SW8** is used to set channel isolation for four switchable Ethernet interfaces.

- When set to ON, channels are isolated
- When set to OFF, channels are not isolated

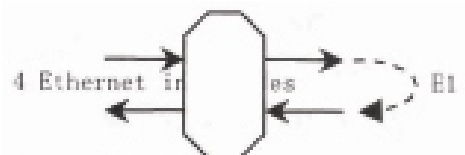
*The purpose of channel isolation is to avoid broadcast storm.*

### Push Buttons

On the front panel, four push buttons are available for testing:

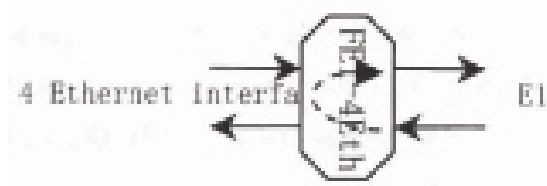
**ANA:** Runs a local loop from E1 interface to Ethernet-interface. Used to detect whether the local unit and E1 link are good or not.

*Operating method: Press the local PATT and ANA to run a loop test.*



**DIG:** Runs a local loop to a remote unit. Used to test whether remote unit and E1 link are good or not.

*Operating mode: Press the remote PATT and the local DIG to run a loop test.*



*When checking the whole E1 link, press the local DIG button to disconnect E1 lines and connect 2M error code analyzing instrument. If the E1 link is normal, the instrument's display shall be normal.*

**REM:** Ineffective. Reserved for new version.

**PATT:** Pseudo- random sequence code detection.

To detect if the input signal at the E1 interface meets the sequence standard, a generated pseudo-random code shall be transmitted to the E1 interface. If the input signal meets the standard, PTOK is ON. If not, PTOK is OFF.

Notes:

1. Pressing any of the push buttons will interrupt normal data communication and puts the equipment into test status.
2. When performing a PATT test, a loop must be set in the link. Otherwise, the generated pseudo-random codes could not return or loop-back.
3. Pressing ANA and DIG buttons for a long time will cause broadcast storm of SWITCH that may cause disconnection if Ethernet interfaces are connected to the SWITCHes.

*Use these buttons only to disconnect attached equipment to the SWITCH. Otherwise, don't use these buttons.*

## VIII. REAR PANEL



### Power Supply Input

Selectable 220VAC and -48VDC power supply input.

- If the user needs -48V, set AC/DC switch to "DC -48V"
- If the user needs 220V, set AC/DC switch to "AC 220V"

*When using a DC Supply Input, proper care must be taken on the correct wire/port/termination polarity of each connection.*

### E1 Socket

Physical interface for 75 ohms:

- Q9

*75 ohms /RX: 75 ohms unbalanced / E1 signal input*

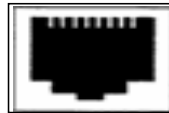
*75 ohms /TX: 75 ohms unbalanced / E1 input and output Ethernet interface*

Physical interface for 120 ohms:

- RJ45 (Not marked with RJ45 or RJ48-C) or
- RJ48-C (Marked with RJ48-C. The default value is RJ45).

*120 ohms E1: 120 ohms balanced / E1 input and output*

### 120Ω Connection



1, 2, 3, 4, 5, 6, 7, 8

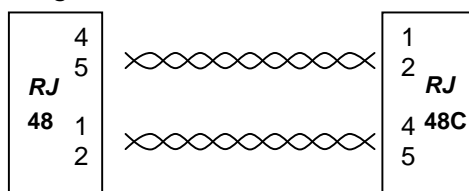
For RJ45 Connection : 2, 3 Pin Output/Transmit 6, 7 Pin Input/Receive

To ensure a good transmission distance, and to reduce interference, pins 2 and 3 should be connected to one twisted pair and pins 6 and 7 should be connected to a second twisted pair (RJ45 Connection).

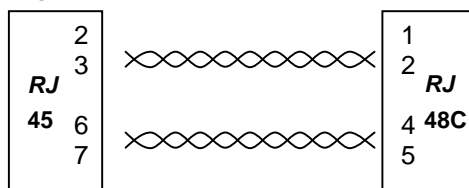
For RJ48C Connection: 4, 5 Pin Output/Transmit 1, 2 Pin Input/Receive

To ensure a good transmission distance, and to reduce interference, pins 4 and 5 should be connected to one twisted pair and pins 1 and 2 should be connected to a second twisted pair (RJ45 Connection).

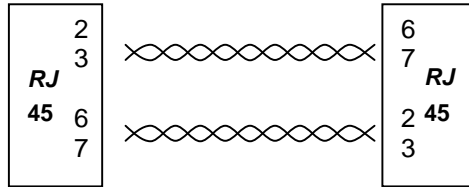
RJ48C Plug inserts to RJ48C Socket, Pin order should correspond, as below



RJ45 Plug inserts to RJ48C Socket, Pin order should correspond, as below



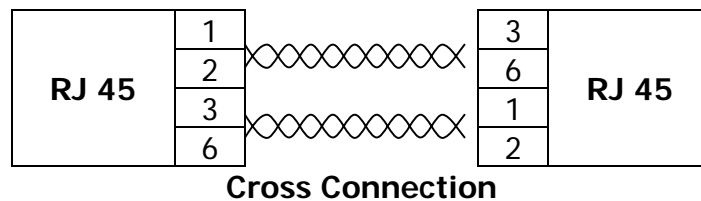
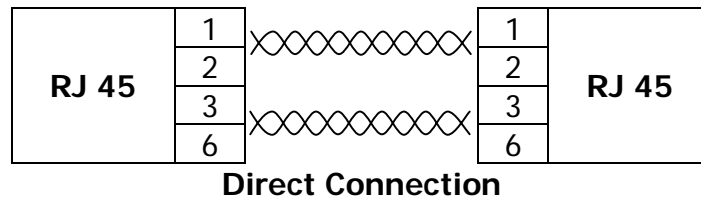
RJ45 Plug inserts to RJ45 Socket, Pin order should correspond, as below



**LAN ports**

The rear panel has four RJ45 ports. These 4 ports are self adapting for connection type (straight or crossed cable connection).

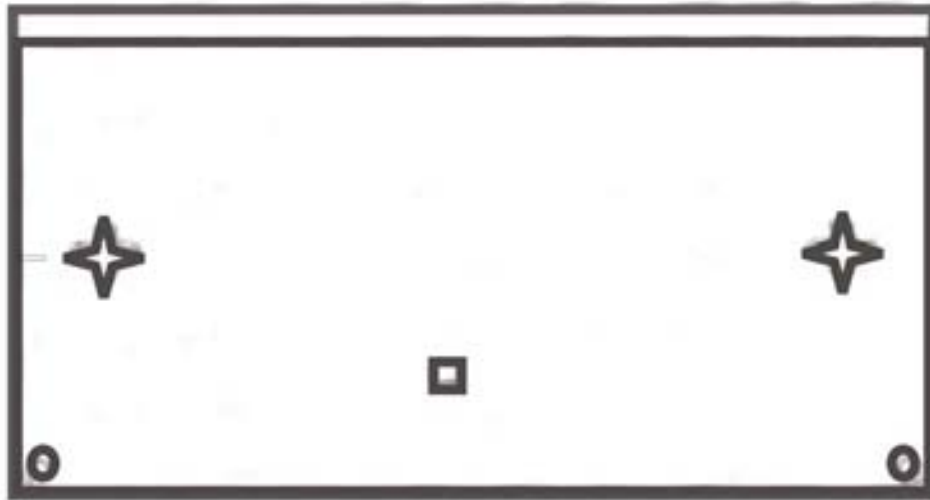
RJ45 Pin direct connection and cross connection as below



**Ethernet Interface**

- Four RJ45 ports used as Ethernet interfaces are available on the rear panel.
- The four Ethernet interfaces can be used simultaneously over E1 transmission link, so the functions of the four Ethernet interfaces are identical to those of four SWITCHes.
- Ethernet interfaces can automatically adapt to cross-over and straight lines eliminating the need for crossed Ethernet cables.

## IX. BOTTOM PANEL



### 2-bit Toggle Switches

- ON: indicates the protective earth terminal of the unit is grounded.
- OFF: indicates the protective earth terminal of the unit is not grounded.

SW1: Receive signal terminal is grounded

SW2: Transmit signal terminal is grounded

Note: *On the whole E1 link, ensure that one of the protective earth terminals is grounded.*

## X. TROUBLESHOOTING

Symptom	Probable Cause	Corrective Measure
Power LED is OFF	Switch is not properly pressed	Toggle switch properly
	Incorrect wire/termination /port polarity connection	Check and reconnect correct polarities
	Failure in Power Supply module	Contact supplier
E1LOS and are ON	E1 Receive and Transmit connectors are not connected properly.	Redo connection
	Error in making E1 line	Redo E1 line properly
	Transmission distance is beyond recommended	Check if within the limits: 75 ohms: 300 M 120 ohms: 500 M
	Failure in E1 module	Contact supplier
LINK is OFF	Error in making Ethernet cables	Refer to method of making Ethernet cable
	Error in connecting Ethernet interface (cross-over and straight)	Connect correct RJ45 interface
	SW6 is set to ON and E1LOS, E1SYL and LINKDOWN occurs.	Set SW6 to OFF
	Failure in Ethernet module	Contact supplier
Data can PING, but lose many packets	Excessive data packet collisions.	Use DATA SWITCH instead of HUBs and PC
	Ethernet cables are not properly assembled	Repeat the assembling of Ethernet cables or replace
Low Ethernet Rate	Data collision in the sectional network	Check other networking sections

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