Contents

Preface

Version Description

Manual version: V2.0

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Disclaimer

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Brief Introduction

This User Manual describes the installation and operation of Ethernet Timeslot Drop/Insert Device. Before you use our device for the first time, please read all the included materials carefully, and install and operate this series of products in keeping with items listed in the manual, so as to avoid damaging the device resulting from malpractice. Thank you for choosing our products.

Environmental Protection

This product complies with the design requirements associated with environmental protection. The storage, use and disposal of the product should be conducted in accordance with related national laws and regulations.

We welcome you to put forward advice and suggestion to our work, which shall be viewed as the ultimate support to us.

Chapter 1 Introduction

1.1 Brief

FE1-ETH implements 10/100M Ethernet to G.703/FE1 interface converter. It is a high performance, self-learning remote Ethernet Bridge. Its small size and low cost. It is suitable for cost-sensitive bridging applications, or infrastructure as a bit stream on the LAN extender or subsection. Equipment can continuously to learn the connected LAN MAC address and the data frame destination MAC address to determine whether fat or filter.

This product has a high integration, high reliability, low power consumption, small size and functional characteristics, as well as an AIS alarm system to help project opening.

1.2 Features

➢ The integrated circuit is based on our own intellectual property rights. G.703 E1 line adopts HDB3 encoding, and the E1 interface channel and coding mode are in line with the ITU-T G.703 and ITU-T G.704 protocols. All-digital clock recovery technology and integrated phase locked loop are adopted and the jitter performance is far superior to G.823 and G.742 protocol standards;

➢ The alarm panel has a perfect alarm indicator, the device can be immediately prompted the correct settings, or whether the device is properly connected;

➢ Rate conversion and slot extraction function, which is extracted from the specified slot G.703 E1 to form N * 64K (N = 1 ~ 32) 10/100M Ethernet data channel;

➢ It has disconnected self-test function, when the line appears on the LOS, the device automatically turns off the Ethernet port and prompts the switch to enable backup lines, then the Ethernet light off. wait until the line is not alarming, the device Ethernet port will automatically re-enabled and prompted the switch to enable the main line used;

➢ Ethernet port with 10M / half-duplex, 10M / full-duplex, 100M / half-duplex, 100M / full duplex, five self-adaptive working modes optional;

➢ Ethernet support HDLC and GFP two modes to complete Ethernet frame encapsulation process. The function can be selected by DIP switch.

Chapter 2 Function Specification
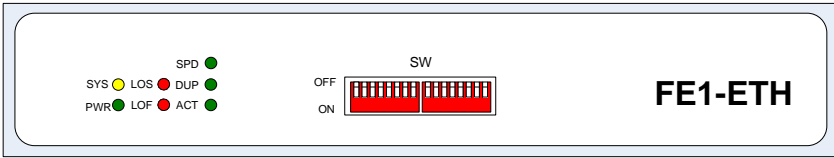
2.1 Device Front Panel

Figure 2-1 FE1-ETH Front Panel

2.1.1 Front Panel LED Indictor

There are 9 indicators on the front panel, and their functions are:

LED Indicator	Functions	Description	
PWR	Indication of 5V power supply	On	5V power supply is OK.
		Off	5V power is off.
SYS	MCU Working Status	on	Device on
		off	Device abnormal
		flash	MCU Normal
ACT	Ethernet Connection and Data Transmitting	on	Ethernet connected
		flash	Ethernet Data Transmitting
		off	Ethernet Disconnected
DUP	Indication of Ethernet full/half duplex	On	Full duplex.
		Off	Half duplex.
SPD	10/100M Working Status	on	Working speed100M
		off	Working speed 10M
LOS	E1 loss signal indication	on	Local E1 Channel loss signal
		off	normal
LOF	E1 Loss Frame Indication and All 1 alarm and service channel data package error	on	Local E1 Channel Loss Frame
		off	normal
		0.5s flash	E1 Channel All 1 alarming
		2s flash	Service channel data package error

2.1.2 **Front Panel DIP Switches**

Switch	Function	Description			
SW[1]	HDLC/GFP Packet Mode	ON	GFP Mode		
		OFF	HDLC Mode		
SW[2]	Clock mode selection	ON	Master (internal) clock, the device uses an internal crystal oscillator clock		
		OFF	Slave (line) clock, the device extract clock from the received uplink direction of the E1.		
SW[3]	PCM Selection	ON	PCM30		
		OFF	PCM31		
SW [4-8]	Starting timeslot selection	SW[4..8] are binary BCD code, SW[4] is least significant bit and SW[8] is most significant bit. Please refer to Appendix 1			
SW [9-13]	Rate Selection	SW[9..13] are binary BCD code, SW[9] is least significant bit, and SW[13] is most significant bit. Please refer to Appendix 2;			
SW [14-16]	Ethernet Configuration	Function Switches	14	15	16
		10M Half-Duplex	ON	ON	ON
		10M Full-Duplex	ON	OFF	ON
		100M Half-Duplex	ON	ON	OFF
		100M Full-Duplex	ON	OFF	OFF
		Self-Adaptive	OFF	X	X

Attachment: Clock selection principle:

1、 Must to Avoid All device adopt slave (line) at the same time. If there is a device provide master clock in the system line, all other device should be set as slave clock mode. If it is uncertain that there is a device provide clock in the system, please set the local device as internal clock mode.

**2、** Try to keep only one device to provide master clock.

Appendix 1: Starting Timeslot Section for Ethernet

Switch Timeslot	[4]	[5]	[6]	[7]	[8]
TS31	ON	ON	ON	ON	ON
TS30	OFF	ON	ON	ON	ON
TS29	ON	OFF	ON	ON	ON
TS28	OFF	OFF	ON	ON	ON
TS27	ON	ON	OFF	ON	ON
TS26	OFF	ON	OFF	ON	ON
TS25	ON	OFF	OFF	ON	ON
TS24	OFF	OFF	OFF	ON	ON
TS23	ON	ON	ON	OFF	ON
TS22	OFF	ON	ON	OFF	ON
TS21	ON	OFF	ON	OFF	ON
TS20	OFF	OFF	ON	OFF	ON
TS19	ON	ON	OFF	OFF	ON
TS18	OFF	ON	OFF	OFF	ON
TS17	ON	OFF	OFF	OFF	ON
TS16	OFF	OFF	OFF	OFF	ON
TS15	ON	ON	ON	ON	OFF
TS14	OFF	ON	ON	ON	OFF
TS13	ON	OFF	ON	ON	OFF
TS12	OFF	OFF	ON	ON	OFF
TS11	ON	ON	OFF	ON	OFF
TS10	OFF	ON	OFF	ON	OFF
TS9	ON	OFF	OFF	ON	OFF
TS8	OFF	OFF	OFF	ON	OFF
TS7	ON	ON	ON	OFF	OFF
TS6	OFF	ON	ON	OFF	OFF
TS5	ON	OFF	ON	OFF	OFF
TS4	OFF	OFF	ON	OFF	OFF
TS3	ON	ON	OFF	OFF	OFF
TS2	OFF	ON	OFF	OFF	OFF
TS1	ON	OFF	OFF	OFF	OFF
None	OFF	OFF	OFF	OFF	OFF

Appendix 2：Rate Setting of Ethernet

Switch Rate (Kbit/s)	[9]	[8]	[9]	[10]	[13]
2048	9~13 All ON， and 4~8 all ON。				
1984	ON	ON	ON	ON	ON
1920	OFF	ON	ON	ON	ON
1856	ON	OFF	ON	ON	ON
1792	OFF	OFF	ON	ON	ON
1728	ON	ON	OFF	ON	ON
1664	OFF	ON	OFF	ON	ON
1600	ON	OFF	OFF	ON	ON
1536	OFF	OFF	OFF	ON	ON
1472	ON	ON	ON	OFF	ON
1408	OFF	ON	ON	OFF	ON
1344	ON	OFF	ON	OFF	ON
1280	OFF	OFF	ON	OFF	ON
1216	ON	ON	OFF	OFF	ON
1152	OFF	ON	OFF	OFF	ON
1088	ON	OFF	OFF	OFF	ON
1024	OFF	OFF	OFF	OFF	ON
960	ON	ON	ON	ON	OFF
896	OFF	ON	ON	ON	OFF
832	ON	OFF	ON	ON	OFF
768	OFF	OFF	ON	ON	OFF
704	ON	ON	OFF	ON	OFF
640	OFF	ON	OFF	ON	OFF
576	ON	OFF	OFF	ON	OFF
512	OFF	OFF	OFF	ON	OFF
448	ON	ON	ON	OFF	OFF
384	OFF	ON	ON	OFF	OFF
320	ON	OFF	ON	OFF	OFF
256	OFF	OFF	ON	OFF	OFF
192	ON	ON	OFF	OFF	OFF
128	OFF	ON	OFF	OFF	OFF
64	ON	OFF	OFF	OFF	OFF
0	OFF	OFF	OFF	OFF	OFF

2.2 Rear Panel
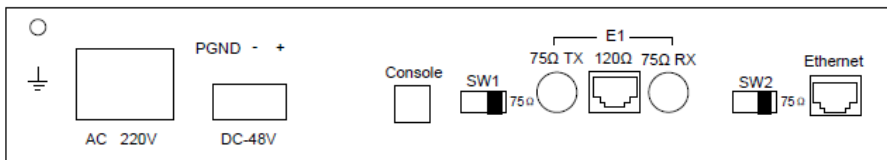
FE1-ETH Rear

2.2.1 Power Supply

The power supply has two options: AC and DC, which should be specified upon ordering. The device supports both voltages 220V and 48V. The device supports two power versions: 220V and –48V, with up to 20% fluctuation. Note that the DC power supply has positive and negative poles. The negative/positive pole of –48V power source should be plugged into the negative/positive pole of the power input on the device. **The power is off when the switch is on "OFF" position. Otherwise the power is on.**

2.2.2 E1 Interface

2 个 E1 120Ω Interfaces: Interface Type is RJ45，DOWN for down port, UP for port
E1 75Ω/DOWM(RX)： 75Ω unbalanced down E1 signal input
E1 75Ω/DOWM(TX)： 75Ω unbalanced down E1 signal output
E1 75Ω/UP(RX)： 75Ω unbalanced up E1 signal input
E1 75Ω/UP(TX)： 75Ωunbalanced up E1 signal output

2.2.3 Ethernet Interface (LAN Interface)

The rear panel has 1 Ethernet Interface: 10M/100M/Half/Full Self-adaptive. And the interface supports automatic identification of Straight-through cable and crossover cable.

Chapter 3 Technical Specifications

3.1 Operating Environment

The device has a wide range of operating temperature and is able to work normally and stably in highly adverse environment.

Working Temperature	0℃ ～ +50℃
Storage Temperature	－40℃ ～ +70℃
Relative Humidity	10 %～95 %
Atmospheric Pressure	70～106 kpa

The environment should be free from corrosive and solvent gases, dust, and magnetic interference.

3.2 Power Supply Section

Using high-quality power adaptor, the device has a wide fluctuation tolerance and strong anti-interference and isolation quality to ensure a stable operation.

Input voltage　　　　AC 220V / DC－48V

Voltage fluctuation　165VAC～265VAC or－36VDC～－72VDC

Power consumption　＜5 W

3.3 Mechanical Specifications

Appearance dimension Width 210mm×Height 41mm×Depth 143mm

3.4 E1 Interface Specification

Electric Characteristics of Interface: compatible with ITU-T G.703 standard

Transfer Characteristics of Interface: compatible with ITU-TG.823 standard

Jitter Characteristics of Interface: compatible with ITU-T G.823 standard

Rate: transmission port 2048Mbps±50ppm

Line Code Pattern: HDB3

Interface Impedance: 75Ω/120Ω

Interface Connector: Q9(75Ω), RJ45(120Ω)

## 3.5 Ethernet Interface Specification

Rate of Ethernet interface: 10M/100M self adjustable, 10M half duplex , 10M full duplex , 100M half duplex , 100M full duplex optional

Ethernet interface is compatible with IEEE 802.3 protocol and supports IEEE 802.1Q

Transmitting rate: N×64Kbps (N=1～32),64Kbps to 2048Kbps Configurable

Chapter 4 Introduction to Centralized Frame

4.1 Frame Front Panel Description
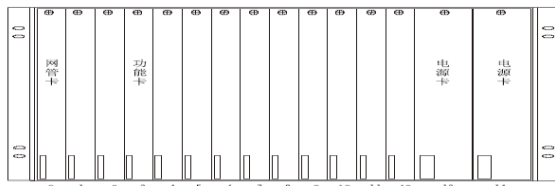
4.1.1 Operation Card

Maximally, 13 operation cards can be inserted into one frame. Mixed use of operation cards of various series of our devices is supported, and the operation is the same as desktop devices.

4.1.2 Power Supply Card

Customer can insert the needed power supply card according to actual configuration. The power supply card has temperature display, and voltages 220V, -48V and powers 75W are available. Power supply hot standby supported.

4.2 Description of Frame Rear Panel
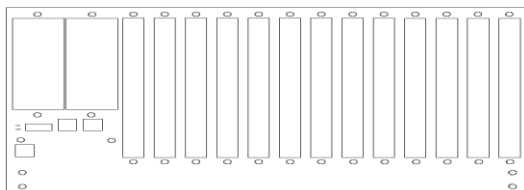
4.2.1 Address Switch

There are 8-bit DIP switches on rear panel, and it can be used to set address if the network needs to be administered.

4.2.2 Cascade Interface

There are 2 RJ45s on the right of the rear panel (back side) used as cascade interface if the network needs to be administered.

Chapter 5 Installation

5.1 Safety Requirement

Please read the following safety items before installation to avoid physical injury and damage to this product or any other products connected. To avoid potential hazard, the product can be used only within specified scope. **Maintenance can be conducted only by technical personnel authorized by our company.**

1. Avoid fire or physical injury.

2. All power supply should be shut off during installation, which can be turned on only when all terminals have been connected correctly and checked to be free from mistakes.

3. Connect and disconnect in a properly. When device is powered up, do not connect or disconnect data cable without due cause.

4. Grounding. The product should be linked to the ground through earthed conductor. To avoid electric shock, the earthed conductor must be in connection with the ground. Make sure that the product is correctly earthed before connecting with the input or output terminals.

5. Correct connection. Users are expected to use accompanied accessories. In the event that special connections are needed, please pay attention to the corner allocation requirements.

6. Don't operate when there is no cover plate over the device. Do not operate the product if the cover plate or panel has been dismounted.

7. No contact with bare circuit is allowed. Do not touch bare connectors or components when power is on.

8. No operation is allowed if there is suspicion of failure. Call authorized maintenance personnel for examination and reparation should the product be suspected of damage.

9. Good ventilation. Do not operate under humid or explosive environment.

10. Maintain the surface of the product clean and dry.

5.2 Inspection upon Unpacking

After unpacking the product, inspect the type, quantity and condition of device and accessories inside according to the list of contents specified in this manual. Contact the Company or its distributors and agencies immediately should abnormal circumstances arise.

5.3 Power Supply

Check the power supply of the device. The power input should be configured in accordance with related requirements. Pay particular attention to the voltage and polarity if the power supply is DC.

5.4 Test

Please first carry out the following test before usage:

1. Check whether all the switches on the front panel are in "OFF" position, turn on the power, the PWR light, UP-LOS light, DW-LOS light will light constantly, and UP-SYL light and DW-SYL light will flash for one time and be out.
2. Connect the device with E1 interface by 75ΩE1 crossover cable or 120ΩE1 cable, and the LOS lights will be out.

5.5 Configuration and Connection

If the indicator lamps of devices can operate normally as described in paragraph 5.4, turn off the power, and set clock and E1 impedance according to the conditions of the network, and plug the E1 cable and net cable. Turn on the power, and the device will be in normal operation condition.

If the devices can't operate normally as the above 6.4 describes, please look up diagnosis and troubleshooting. If fails in removing malfunctions, please contact our company or distributors and agents of our company at once.
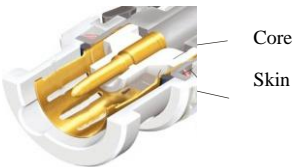
Chapter 6 Accessories

6.1 Method of making cables

6.1.1 How to make E1 connecting cable

75ΩLine Making Method:

Connection between core and
  core and between skin and skin;
No connection between skin and core

120ΩLine Making Method:

  The pins are arranged as follows:

Core

Skin

1，2，3，4，5，6，7，8

1（+）、2（-）pins are output ports

4（+）、5（-）pins are input ports

6.1.2 Making of Ethernet Interface Connecting Cable

Ethernet interface Connecting Cable adopts twisted pair line with its specific making methods divided into two international standards, which are EIA/TIA568A and EIA/TIA568B. Position the tail of crystal head downward (i.e. the flat side upward), determine the lines with figures as 1 2 3 4 5 6 7 8 from left to right, and the distributions of each line are as follows:

(EIA/TIA568A standard)			(EIA/TIA568B standard)		
Pin No.	Connection signal	Sequence of twisted pair line	Pin No.	Connection signal	Sequence of twisted pair lines
1	TX+(transmission)	White and green 1	1	TX+(transmission)	White and orange
2	TX-(transmission)	Green	2	TX-(transmission)	orange
3	RX+(receive)	White and orange	3	RX+(receive)	White and green
4	Not to be used	Blue	4	Not to be used	Blue

5	Not to be used	White and blue	5	Not to be used	White and blue
6	RX-(receive)	Orange	6	RX-(receive)	Green
7	Not to be used	White and brown	7	Not to be used	White and brown
8	Not to be used	Brown	8	Not to be used	Brown

RJ-45 twisted pair line is specified as follows:

1)1, 2 used to send; 3, 6 used to receive; 4, 5，7, 8 are bi-directional lines.

2)1, 2 must be pair twisted; 3, 6 pair twisted; 4, 5 pair twisted; 7, 8 pair twisted.

Making of straight-through line: both heads are connected as per T568B line sequence standard. Making method of crossover line: one head is connected as per T568A line sequence while the other head is connected as per T568B line sequence. The follows are specific connection conditions:

1) The device is connected with PC and router: straight-through line shall be adopted with the same connecting method on both ends of network line.

2) The device is concatenated with switch (or HUB): crossover line shall be adopted with different connecting method on both ends of network line.

6.2 Diagnosis and troubleshooting

Phenomena	Potential Cause	Measures
Power indicator of device PWR lamp fails to be ON.	1. Control switch is not in place 2. Incorrect connection of power polarity 3. External power supply is not plugged in 4. Conductor dropped into machine frame that leads the power supply to be short circuited with the ground. 5. Malfunctions of power supply module	1. Press the switch in place 2. Change the polarity of power supply 3. Plug the external power supply 4. Remove the conductor 5. Contact the supplier
LOS or SYL warning after the connection of E1	1. RX and TX of E1 are reversed. 2. The making of connection cable is not correct. 3. Transmission distance exceeds the standard specification.	1. Exchange RX and TX terminals. 2. Make the lines correctly. 3. 75Ω：300M 120Ω:500M 4. Set the clock mode of the

	4	The clock setting mode in the circuit line is incorrect.	5	other devices.
Ethernet interface can ping through, but there are packet-loss problems	1. 2. 3. 4.	Network line is not made in twisted line form There are too much concatenated HUBER in the network Working modes are not corresponded with each other There are wrong configurations of clock mode of device in the links.	1. 2. 3. 4.	Make the lines Correctly Change the structure of network and decrease the multi-level concatenated HUBER Set the correct working mode Adjust the other device clock mode on the line.

6.3 Warranty Card

Our company is committed to provide users with the following terms:

1. Warranty service

    1) Within the charge free warranty term (within 12 months since the purchase of the product), damaged parts can be exchanged free of charge and maintenance charges will be free in the conditions that the device is considered to be malfunctioned in normal service by our company.

    2) Within the charged warranty term (more than 12 months and within 36 months since the purchase of the product), damaged parts will be charged for corresponding cost with free maintenance service in the conditions that the device is considered to be malfunctioned in normal service by our company.

2. Users can not enjoy warranty service with the following cases and corresponding cost of damaged parts replacing and maintenance service will be charged

    （1） Exceed 36 months since the purchase of the product

    （2） Can't provide certificate of purchasing date, and serial No. of product shows that ex-works term has exceeded 36 months;

    （3） Include but not limit to the abnormal service conditions such as violent knocking, extrusion, drop, liquid immersion that cause damages;

    （4） Fragile label on the device is damaged;

    （5） User disassembles this product himself

    （6） Force majeure that leads to product damage, such as earthquake, flooding and lightening stroke;

3. The newly installed parts after maintenance will be repaired free of charge within 12 months since the installation date.

4. When malfunction occurs, users can choose to send it to our company to receive maintenance service or to post it to maintenance points of our company all over the country to be repaired.

5. Our company does not undertake any responsibilities for losses caused by abnormal operation; for losses really caused by product itself, including but not limited to all direct or indirect losses due to data loss, our company will only undertake responsibilities within the selling price of products.

Repair and Maintenance Record

Product Name: **FE1-ETH Interface Converter**		Device No.:
Maintenance date		**No. of Service Bill**
1		
2		

3		
4		
5		